

Congress Abstracts
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POSTER ABSTRACTS

SUBMISSION ID 382

A COMPREHENSIVE ACCESSIBILITY ASSESSMENT TOOL FOR ALL SPACES

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Introduction: Ensuring accessibility in public and private spaces is paramount for fostering inclusivity and improving quality of life for persons with disabilities. This study presents the implementation of a comprehensive accessibility assessment tool designed to evaluate and announce the accessibility of shops, buildings, and other facilities.

Objectives: The primary objective is to create a standardized tool that allows facility owners and managers to self-assess and publicly declare the accessibility of their spaces, promoting inclusivity and informing potential visitors about the accessibility features of various venues.

Materials and Methods: The assessment tool comprises a detailed rubric and scoring sheet that evaluates multiple facets of accessibility, including entrance and parking, internal pathways, visual and auditory elements, and additional considerations. Each criterion is rated on a five-point scale, from 1 (not accessible) to 5 (fully accessible). The tool covers key aspects such as accessible parking, step-free entrances, door widths, automatic door openers, interior pathways without steps or ramps, accessible restrooms, clear signage, assistive listening systems, and designated staff for assistance.

Results: Preliminary use of the tool has shown its potential to highlight areas needing improvement and motivate facility owners to enhance accessibility. The transparency provided by public announcement of accessibility ratings has been well-received by the community.

Conclusions: Implementing this accessibility assessment tool can significantly impact accessibility awareness and promote inclusivity. By presenting this tool at the conference, we aim to highlight its potential impact and advocate for its widespread adoption, creating environments where everyone can participate fully and equally.

Keywords: accessibility, inclusivity, assessment tool, public spaces, disability, inclusive design, policy-making

SUBMISSION ID 135

PHYSIOLOGICAL AND PSYCHOLOGICAL RESPONSES TO TRADITIONAL STATIONARY BIKING VS. VIRTUAL REALITY STATIONARY BIKING IN HEALTHY YOUNG ADULTS

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Introduction: Indoor stationary biking is a safer and more convenient alternative to outdoor cycling for exercise. It offers a controlled environment, free from weather challenges and safety risks, especially in the Middle East and Gulf regions. However, it can lack motivation compared to outdoor cycling. Technology integration, such as virtual reality (VR), into exercise may promote physical activity among young adults. This new technology provides users with an engaging and 360-degree realistic experience, which can be a great motivational tool. Additionally, it aligns with one of the main research themes at 38th International Federation of Sports Medicine (FIMS) World Congress of Sports Medicine – Dubai 2024 that focus on integrating Virtual Reality Technology into physical exercise.

Objectives: Our study aims to investigate the implications of VR on physiological and psychological responses during traditional stationary biking.

Materials and Methods: Sixty healthy young adults participated in three separate 10-minute sessions (1) traditional stationary biking using VR (SBVR) (2) traditional stationary biking (TSB) (3) VR without exercise. Systolic and diastolic blood pressure (BP), heart rate (HR), respiratory rate (RR), rating of perceived exertion (RPE), self-efficacy, and enjoyment were assessed. Written consent was conducted before the enrollment of the participant.

Results: All participants (age 20.6 ± 1.04 Years; MBMI 25.4 ± 3.4 kg/m²) completed three sessions. Dependent t-test indicated no significant physiological differences. Participants reported higher enjoyment ($p < 0.0001$) and self-efficacy ($p = 0.0002$) with lower RPE ($p < 0.0001$) during SBVR compared TSB.

Conclusions: The results of this study, while preliminary, suggest that the use of VR exercise among healthy adults is more enjoyable and reflected more self-efficacy with less perceived exertion than traditional biking exercise. Future study can be directed to compare the differences between traditional exercise and VR by allowing the participant to enroll in an aerobic training program.

Keywords: aerobic exercise, virtual reality, indoor cycling, physiological measures, self-efficacy, enjoyment

SUBMISSION ID 100

THE ROLE OF AI IN THE ECG INTERPRETATION OF ATHLETE

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Introduction: Sudden cardiac death (SCD) is the leading cause of mortality in the athletic population. Therefore, a crucial component of the Pre-Participation Examination (PPE) is the resting, 12-lead electrocardiogram (ECG). Certain cardiac adaptations to increased activity are seen on an athlete's ECG and are sometimes difficult to distinguish from pathological traits. Thus, AI can potentially reduce this uncertainty and increase diagnosis accuracy.

Objectives: This review aims to offer a perspective on the AI's role in ECG interpretation, by gathering trustful information from the scientific literature. We focused on the AI's ability to detect conditions such as arrhythmias, cardiomyopathies, channelopathies and valvular diseases.

Materials and Methods: We analysed the literature from the last ten years, using the PubMed search engine. We used 'artificial intelligence' and 'ECG' as keywords and consulted MESH for additional suggestions. We included articles from the last ten years, written in English and designed as narrative or systematic reviews. The research question was constructed using the PICO format.

Results: Convolutional neural network (CNN) methods have been effective in the diagnosis of atrial fibrillation (AF), even in the concealed forms, that would otherwise go undetected. AI was shown to detect long QT intervals. Hypertrophic cardiomyopathy can be exposed by CNN/DL or ML algorithms, though with lower accuracy in small children. Low left ventricular ejection fraction can be distinguished using AI-ECG methods. AI might also detect aortic stenosis or mitral valve regurgitation along with other non-cardiac variables: gender, age, and serum potassium levels.

Conclusions: Further studies should investigate the cost-effectiveness of the implementation of AI in cardio-vascular screening, along with the ethical, reliability and data storage/sharing issues. Tailored

algorithm could include individual factors such as gender, age, sport type and race.

Keywords: artificial intelligence, electrocardiogram, athlete cardiovascular screening, cardiac arrhythmias and pathologies

SUBMISSION ID 368

BIOMECHANICAL ANALYSIS OF LUMBAR KINEMATICS AMONGST SWEEP ROWERS USING INERTIAL MEASUREMENT UNIT

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Introduction: Rowing is a water sport exerting significant stress on the lower back, thereby predisposing rowers to injury. Rowing can be categorized into sweep and scull rowing. Rowers are often associated with a predominance of low back injuries. This study focuses on understanding the lumbosacral (L5-S1) and inter-lumbar (L3-L4) mechanics using inertial measurement units (IMU).

Objectives: Analyze unilateral lumbar kinematic differences amongst National sweep rowers.

Materials and Methods: 10 national rowers were assessed on a rowing ergometer at their perceived maximal for 30 seconds. Seventeen IMU sensors were placed on the rowers to collect the desired kinematic variables. The selected variables were then processed using a MATLAB code for further analysis.

Results: The findings of this study revealed that the subjects did not exhibit significant unilateral dominance of side flexion at either the lumbosacral or inter-lumbar segments ($r(8) = -.32$, $p = 0.367$ and $r(8) = .00197$, $p = .996$ respectively). The peak flexion-extension angle at finish was significantly higher in the lumbosacral segment averaging at $7.2 \pm 4.08^\circ$ suggesting that the segment was flexed at finish. Nevertheless, the extension observed at the inter-lumbar segment (L3-L4) averaging at $-2.63 \pm 1.75^\circ$ necessitates further investigation.

Conclusions: Despite any dominance on side flexion, the hyperextension at the inter-lumbar region could be a precursor of low back pain and injuries. A qualitative video analysis navigates to a proposal that due to a rapid transition into the recovery phase promotes scapular retraction causing interlumbar hyper-extensions. Also the traditional means of measuring the lumbar angles, assuming the vertical axis to be the anatomical zero could potentially mislead in assessing lumbar angles at finish. Future studies should focus on the causality of hyperextension at the inter-lumbar region and thus promote injuries prevention.

Keywords: ergometer, sweep, finish, recovery

SUBMISSION ID 139

AGE FEATURES IN STROKE VOLUME AND STROKE INDEX IN ENDURANCE ATHLETES

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Introduction: High performance endurance sport is challenging for cardiac adaptation: high stroke volume (SV) plays a key role in high VO_2 max. Since stroke index ($SI = SV/\text{body square}$, ml/m^2) directly reflects sufficiency of blood supply in athletes, study of age dynamics of SV and SI in endurance athletes enables to set the athletes norms in children and adolescents.

Objectives: The aim is to reveal age related features of cardiac adaptation (SV, SI) in endurance sport.

Materials and Methods: 723 successful male cross-country skiers aged 9-20 underwent hemodynamics monitoring in active orthoprobe. Stroke volume was determined by impedance rheography at supine position at rest.

Results: The SV of skiers at supine increases linearly from $58,5 \pm 6,49$ ml at 10 years to $120,53 \pm 16,46$ at 17 years old, that is doubles. The plateau in SV dynamics during the period of 17-19 years is associated with a growth and functional stabilization. At 20 years SV reaches its maximum values of $131,7 \pm 11,98$ ml. The SI value in young athletes increases linearly but much slower than SV from 10 ($47,8 \pm 3,46$ ml/m^2) to 14 years ($60,67 \pm 5,43$ ml/m^2), then has two plateaus at 14-15 and 17-19 years, followed by sharp SI growth

to desirable level 70+ ($71,75 \pm 6,13 \text{ ml/m}^2$), which should be kept during the sports career.

Conclusions: The obtained data of SV and SI provides the young endurance athletes' with targets in long-term training. Since SI serves an indicator of adequate and effective blood supply for sports, the SI plateau period should be the object of precise attention of coaches and sports physicians.

Keywords: hemodynamics, endurance athletes, stroke volume, stroke index, age features

SUBMISSION ID 205

THE EFFECT OF CONVENTIONAL PHYSIOTHERAPY ON THORACIC ROTATION RANGE OF MOTION IN PATIENTS WITH SPINAL PATHOLOGY

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Introduction: Thoracic rotation range of motion (ROM) changes in spinal pathologies, one of the common musculoskeletal problems.

Objectives: Our study aimed to investigate the effect of conventional physiotherapy on spinal thoracic rotation ROM in people with spinal pathology.

Materials and Methods: Fifty-six patients with spinal pathology admitted to the clinic were evaluated. The control group consisted of fifty-eight volunteers who were relatives of patients with pathology. In all study groups, VAS and short form McGill pain scale for pain assessment, sit and stand test for lower extremity muscle performance, SF-36 quality of life scale for quality of life assessment and thoracic spinal rotation ROM were measured by goniometer. Oswestry disability questionnaire and Neck pain and disability questionnaire were applied to study groups. The study group received a physiotherapy program consisting of 15 sessions lasting 45-60 minutes, five days a week. The same physiotherapist performed all evaluations.

Results: Thirty-two participants in the study group and thirty-four in the control group with lumbar pathology were evaluated. Twenty-four participants with spinal pathology in the cervical region were evaluated in the study group and twenty-six in the control group. After physiotherapy, thoracic rotation ROM was still lower in the study group than in the control group ($p < 0.05$). After physiotherapy sessions, an increase was seen in all study groups ($p < 0,05$). Improvement was observed in questionnaires, pain, quality of life, and sit and stand tests after the treatment received by the study groups ($p < 0,05$).

Conclusions: Thoracic rotation ROM is reduced in people with spinal pathology. Although there is a decrease in pain complaints and an increase in quality of life after physiotherapy, the thoracic rotation angle is still low compared to healthy individuals. We recommend that exercise applications that will increase the degree of thoracic rotation should be added to physiotherapy sessions in these patients.

Keywords: physiotherapy, thoracic rotation range of motion, spinal pathology, pain assessment, quality of life improvement

SUBMISSION ID 137

HEMODYNAMIC MEASURES AND CEREBRAL OXYGENATION DURING CONCURRENT EXERCISE, ACUTE MODERATE NORMOBARIC HYPOXIA, AND COGNITIVE TASK IN YOUNG TRAINED MALES

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Introduction: In many activities, such as military aviation, mountain climbing, and exercise training at altitude, hypoxia combines with physical and mental stress, creating a complex stressful situation for the systemic cardiovascular system and local brain. However, little is known about the cardiovascular

effects of acute hypoxia during exercise with concurrent cognitive load.

Objectives: The present investigation aimed to study the cardiovascular responses and cerebral oxygenation (Cox) during exercise in acute hypoxia (AH) and with contemporary mental stress.

Materials and Methods: Fifteen physically active, healthy males (age 29.0 ± 5.9 years) completed a cardiopulmonary test on a cycle ergometer to determine the workload at their gas exchange threshold (GET). On a separate day, participants performed two randomly assigned exercise tests pedalling for six minutes at a workload corresponding to 80% of the GET: 1) during normoxia (NORMO), and 2) during acute, normobaric hypoxia at 13.5% inspired oxygen (HYPO). During the last three minutes of the exercise, they also performed a mental task (MT). Hemodynamics were assessed with impedance cardiography, and peripheral arterial oxygen saturation and Cox were continuously measured by near infrared spectroscopy.

Results: The main results were that both in NORMO and HYPO conditions, the MT caused a significant increase in the heart rate and ventricular filling rate. Moreover, MT significantly reduced (74.8 ± 5.5 vs 62.0 ± 5.2 A.U.) COX while the Reaction Time (RT) increased (813.3 ± 110.2 vs 868.2 ± 118.1 ms) during the HYPO test without affecting the correctness of the answers.

Conclusions: We conclude that in young, healthy males, adding a mental task during mild intensity exercise in both normoxia and acute moderate (normobaric) hypoxia induces a similar hemodynamic response. However, mental task and exercise in HYPO causes a decrease in COX and an impairment in RT.

Keywords: cardiac output, stroke volume, ventricular filling rate, ventricular emptying rate, cerebral oxygenation

SUBMISSION ID 216

TREATMENT OF ACUTE ACHILLES TENDON RUPTURE IN SOCCER ATHLETES USING BMAC THERAPY

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Introduction: Minimally invasive surgical treatment is the gold standard for the treatment of acute Achilles tendon ruptures. The use of Bone Marrow Aspirate Concentrate (BMAC) has been described in the literature associated with surgical treatment, acting as an enhancer of the healing process. The use of BMAC as an isolated therapy has been little studied.

Objectives: To analyze the clinical effectiveness of using BMAC in the treatment of acute complete ruptures of the Achilles tendon in football athletes.

Materials and Methods: Six soccer athletes, comprising two professionals and four amateurs, who had suffered from Achilles tendon rupture, underwent treatment with ultrasound-guided BMAC application. They were clinically monitored until healing, with magnetic resonance imaging conducted at 30-, 60-, and 90-days post-injury. BMAC was obtained through a bone marrow puncture in the region of the posterior iliac crest under local anesthesia, using a specific trochanter. The preparation of BMAC followed the protocol established by Chahla et al. (2017). Foot immobilization was achieved using an orthopedic orthosis (robofoot) along with an insole as per the prescribed protocol. The procedure was conducted within 24 to 72 hours post-injury for all athletes.

Results: Five athletes showed full consolidation of the injury 60 days after the intervention and the fifth athlete at 90 days. Everyone resumed practicing sports four months after applying BMAC, without restrictions and without any complications.

Conclusions: BMAC treatment proved to be effective, minimally invasive (compared to surgery), easy to apply and with reproducible results. The use of BMAC proved to be superior to conventional treatment in the recovery of athletes with achilles tendon rupture.

Keywords: athletic injuries, return to sport, soccer, sports injury, tendon injuries

SUBMISSION ID 51

EXERCISE-INDUCED PHYSIOLOGICAL REMODELING OF THE FEMALE ADOLESCENT ATHLETES' HEART

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Introduction: Specific reference values for echocardiographic parameters have been published in Caucasian, Black and Arab adolescent athletes, but specific data for the female population are lacking and the availability of gender-specific values represents a growing need for the scientific community.

Objectives: We aimed to evaluate a cohort of adolescent female athletes with a comprehensive pre-participation screening, including 12-lead ECG and color doppler echocardiography.

Materials and Methods: A total of 120 consecutive female adolescent athletes (trained for a mean of 7.6 ± 3.2 h per week, 99% Caucasians, mean age 11.4 ± 2.5 years, range 7–17) underwent pre-participation screening, which included ECG, in a single referral center. The athletes were offered to undergo transthoracic echocardiography (TTE) to be performed in the same center as additional examination in the context of PPS. The ECG was evaluated using the international criteria and TTE using the current recommendations. The study population was divided in 2-years age classes for comparison.

Results: Left ventricular (LV) internal diameters, wall thickness, LV mass, aortic root and left atrium diameters were significantly correlated to age, body surface area, height and weight ($p < 0.01$). Significant differences were found in the different 2-years age classes, showing the effects of growth, and increased physical activity. When compared with the reference values obtained in the male adolescent athletes of a previous study cohort, significant differences were found for wall thickness and LV mass, but not for left ventricular and left atrial diameters.

Conclusions: The physiological remodeling of the left heart chambers in female adolescent athletes is evident in the different age classes. In female adolescent athletes the increase in wall thickness and LV mass is less pronounced than in male adolescent athletes, while the left heart chambers diameters showed a similar physiological remodeling induced by exercise.

Keywords: athletes' heart, trans-thoracic echocardiography, remodeling, female adolescents, pre-participation screening

SUBMISSION ID 336

Relationship with Walking Duration and Skeletal Muscle Mass in Healthy Korean Population

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Introduction: Physical inactivity is a part of the underlying mechanisms of sarcopenia and therefore walking exercise can be seen as an important intervention in treating in sarcopenic condition such as low muscle mass. However, it is unclear how much intensity of daily walking is effective in low muscle mass (LMM).

Objectives: The aim of this study is to investigate the association of daily walking duration with the LMM.

Materials and Methods: This was a cross-sectional study of Korean adults who attended in the Kangbuk Samsung Cohort Study from 2012 to 2019. The participants who performed daily walking everyday at least 10 minutes were included. Exclusion criteria were (1) history of cancer, (2)

cardiovascular disease, (3) stroke, (4) COPD, and (5) chronic kidney disease. The participants were grouped into three categories by walking duration (minutes per day): (1) <30 min, (2) 30 – 60 min, and (3) ≥60 min. The bioelectrical impedance analyzer was performed to estimate the SMI, which was calculated by the following formula: $SMI (kg/m^2) = \text{appendicular muscle mass (kg)}/\text{height (m}^2\text{)}$. The LMM was defined as $SMI < 7.0 kg/m^2$ for men and $< 5.7 kg/m^2$ for women, based on the Asian Working Group for Sarcopenia (AWGS). As using binomial logistic regression analysis, risks of LMM according to walking time were shown as odds ratios (OR) and 95% confidence intervals (CI), adjusting for possible confounding factors such as age, sex, center, heavy drinker, smoking status, overweight, hypertension, glucose, LDL, and CRP.

Results: A total of 97,310 participants (60,045 men; 37,265 women) were included. The mean age (years) of participants was 42.56 ± 10.29 in men and 43.35 ± 11.67 in women. The mean SMI was 8.05 ± 0.68 in men and 6.17 ± 0.69 in women. The number of participants with walking <30, ≥30 and <60, and >60 min/day were 6500, 35,274, and 18,271, respectively in men, and 3710, 20,719, and 12,836, respectively in women. The mean SMI was the highest in individual with walking >60 min/day group, followed by those with ≥30 and <60, and <30 group in men and women (P for trend < 0.001). After adjustments for possible confounding factors (model 2), adjusted OR of LMM in walking ≥30 and <60 min/day group were 0.82 (men, 95% CI: 0.72-0.94) and 0.80 (women, 95% CI: 0.73-0.88), and in walking >60 min/day group were 0.74 (men, 95% CI: 0.64-0.86) and 0.71 (women, 95% CI: 0.64-0.79) compared to walking <30 min/day group. In subgroup analysis stratified by age, more walking duration and LMM were significantly associated in both men and women, showing the higher OR in elderly group.

Conclusions: We presented that an increased daily walking over 30 to 60 minutes/day was negatively associated with LMM, suggesting more walking may lower the risk of LMM among healthy adults. Walking in healthy adults can be helpful to prevent sarcopenia.

Keywords: sarcopenia, walking duration, skeletal muscle mass, healthy adults, physical activity

SUBMISSION ID 329

EFFECT OF HYPOXIA ON MUSCLE ACTIVATION DURING INCREMENTAL EXERCISE AT EQUIVALENT RELATIVE INTENSITY

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Introduction: Further studies are needed to investigate the effect of hypoxia on muscle activation during incremental exercise of the same relative intensity.

Objectives: The objective of this study was to investigate the impact of hypoxia on the connection between metabolic stress, adjusted for relative intensity, absolute power production, and muscle activation as indicated by EMG activity in the context of step and ramp incremental exercise.

Materials and Methods: Seventeen healthy active adults, male and female, with a background in cycling, completed a ramp and step incremental exercise testing in normoxia (NORM; $FiO_2 \approx 21\%$) and hypoxia (HYPO; $FiO_2 \approx 13.5\%$) on four occasions. Both ramp tests determined the respiratory compensation point (RCP) and gas exchange threshold (GET). The RCP was the benchmark for determining the relative intensity in the step tests among two conditions. Electromyography (EMG) was used to assess muscle activation based on the relative intensity of both conditions. 2-way ANOVA, paired t-tests, and effect sizes were used to examine differences between NORM and HYPO.

Results: There was a significant main effect of condition in muscle activation rmsRF% ($P < 0.001$; $\eta^2 = 0.80$), rmsVM% ($P < 0.001$; $\eta^2 = 0.66$), and rmsVL% ($P = 0.002$; $\eta^2 = 0.56$) during ramp test. In the ramp test, there was a significant decrease in muscle activation for rmsRF% ($P = 0.049$; $d = 0.61$) and rmsVM% ($P = 0.01$; $d = 0.84$) in peak power output (PPO). For the step test, there was a main effect of conditions in rmsVM% ($P = 0.001$; $\eta^2 = 0.57$) and rmsVL% ($P = 0.04$; $\eta^2 = 0.32$), whereas there was no significant difference in rmsRF% ($P = 0.74$; $\eta^2 = < 0.009$). There was a significant reduction in the rmsVM% ($P = 0.01$; $d = 0.76$) and rmsVL% ($P = 0.03$; $d = 0.69$) in HYPO compared to NORM in the task failure stage (TF). There was a strong relationship between muscle activation and power output in the ramp and step tests (PO).

Conclusions: During non-steady-state exercise at work rates below RCP, there was little difference in muscle activation between NORM and HYPO, however during steady-state exercise, rmsEMG activity was lower in HYPO. At task failure, there was a positive association between the external workload and muscle activation irrespective of condition or test protocol. These results suggest that relative intensity

and metabolic stress do not play a major role in motor unit recruitment, but rather the force required to produce a given mechanical workload is the dominant factor. However, this might be modulated by steady-state versus non-steady-state metabolism.

Keywords: hypoxia, muscle activation, incremental exercise, electromyography, metabolic stress

SUBMISSION ID 243

LATERAL ANKLE SPRAIN PREVENTION INJURY AS NETWORK PRODUCT WITH ARCHITECTURE

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Introduction: Lateral ankle sprain (LAS) type injuries are the most common injuries of the lower limb which counts 15% of all emergency visits. Among basketball players this is the most common injury which has also financial burden of over \$350 million lost revenue annual only in the NBA. LAS type injuries have long been regarded as the accidental result of a series of unfortunate coincidences. Attempts were made to invent effective preventive techniques based on these theories, however they proved to be unsuccessful.

Objectives: While studying videos from LAS, we've found the common inciting event which is universal in all types of sport activities, has no sports-specific pattern. This inciting event is a kind of unstable balance point while step which turns at least into the lateral-type ankle injury.

Materials and Methods: Dynamic full-bodyweight tests were performed, where lift-off of described part of the foot from the ground lead to loss of balance but not to ankle injury. On the other hand, videos showed that no LAS were happened without this event.

Results: We considered the injury to be the consequence of not one factor, but as the result of a functional network system. The architecture of this network corresponds to the laws of the Barabasi scale-free network model.

Conclusions: Based on laws of physics: decrease in contact force is necessary for the lift-off to occur, therefore a decrease in contact force may be considered as predictive. Understood LAS as a product of a functional network system we can block its production process. When avoid the formation of the unstable balance point the inciting event during step is blocked, so it can't initiate the injury. The disposition to the inciting event can be seen as predictive factor to injury.

Keywords: lateral ankle sprain, prevention, barabasi scale-free network, inciting event

SUBMISSION ID 332

DETERMINATION OF CONTROL VALUES OF HEALTHY PARTICIPANTS FOR AN INTEGRATIVE "OMICS" SOLUTION TO THE DETECTION OF RECOMBINANT HUMAN ERYTHROPOIETIN

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Introduction: The International Olympic Committee banned the use of recombinant human erythropoietin (rHuEpo) in 1990 because of its performance-enhancing effects. Detection is challenging because of its similarity to endogenous erythropoietin and rapid elimination from the body. Despite improvements in detection, identifying microdoses remains difficult. Transcriptomic techniques have identified genetic signatures of rHuEpo use, altitude exposure, and exercise, but variation among non-doping athletes remains unknown.

Objectives: To establish reference ranges for transcriptomic markers used for rHuEpo doping detection.

Materials and Methods: Four blood and urine samples were collected from 108 university students (58 males, 50 females) based at Eldoret (~2100 m) and Kisumu (~1000 m) over six months. Blood was collected into K2EDTA and Tempus™ Blood RNA Tubes for haematological and transcriptomic analysis. Haematological variables used by the ABP were measured, and samples for transcriptomic

analysis are stored at -80°C. Athletes' 'clean' status was assessed using an ABP-style model.

Results: Males had significantly higher haemoglobin medians than females at first timepoint (T1) (16.4 vs. 14.9 g/dL in Eldoret and 15.9 vs. 14.2 g/dL in Kisumu, respectively $p < 0.001$), trend was consistent across all timepoints. Similarly, males had higher haematocrit medians at T1 (49.8 vs. 45% in Eldoret and 47.2 vs. 42.9% in Kisumu, respectively $p < 0.001$), trend continued in subsequent timepoints. Females had significantly higher reticulocyte percentage than males at T1 (0.79 vs 0.6 in Eldoret and 0.98 vs 0.67 in Kisumu, respectively $p < 0.05$). No Eldoret participants exceeded the Bayesian cut-off. In Kisumu, one male and one female exceeded the OFF-score, and one female exceeded haemoglobin values. Transcriptomic analysis is underway, with results expected in 2024.

Conclusions: The collected blood samples are essential for developing a transcriptomic test to detect rHuEpo doping. Analyzing and comparing these samples with previous cohorts will help identify gene expression variability and create advanced molecular signature-based anti-doping tests.

Keywords: rhuepo, doping detection, transcriptomics, haematological variables, athlete biological passport

SUBMISSION ID 159

COLLAGEN GENE POLYMORPHISMS AND GENETIC PREDISPOSITION TO INJURIES IN ELITE ATHLETES OF KAZAKHSTAN

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Introduction: Athletes carry an increased risk of acute and chronic musculoskeletal injuries. It is known that the composition of muscle fibers can define their strength, elasticity, and exercise tolerance. There have been many genetic studies of predisposition to injuries.

Objectives: Since injuries affect both physically and mentally, leading to a negative impact on performance, this study aimed to identify the genetic predisposition to injuries in Kazakhstani athletes.

Materials and Methods: We recruited 84 elite athletes from Kazakhstan's National Olympic Team of various sports types. The control group consisted of 84 non-athlete individuals matched by age and gender. Data for injuries was obtained from medical records. Genotyping SNPs of COL1A1 (rs1800012), COL3A1 (rs1800255), and COL5A1 (rs12722) genes was performed by allelic discrimination assay using pre-designed TaqMan™ probes.

Results: COL1A1 and COL3A1 did not show a significant association with injuries in the studied cohort. COL5A1 (rs12722) showed a significant association with injuries in the dominant (CC vs CT+TT, OR 1.91, CI 1.01-3.62, $p = 0.046$) and overdominant (CC+TT vs. C/T, OR 2.04, CI 1.10-3.79, $p = 0.023$) models in our studied group.

Conclusions: The SNP of COL5A1 (rs12722) can be used as biomarkers of genetic predisposition to musculoskeletal injuries in Kazakhstani athletes. Our findings can help develop personalized training injury-preventing programs for athletes. However, more genetic research on larger cohorts is needed.

Keywords: sports injuries, genetic predisposition, gene polymorphisms, injury prevention, genetic counseling

SUBMISSION ID 342

IMMUNE-INFLAMMATORY PROTEOMIC FINGERPRINTING OF ELITE ATHLETES, AMATEUR ATHLETES AND NON-SPORTIVE CONTROLS

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Introduction: Physical exercise is known to impact the immune system based on its intensity, duration, and training load. Exercise modulates immune response through variations in cytokines and chemotactic factors, changes in adhesion molecules, and reactive oxygen species generation. Regular moderate-to-vigorous physical activity is associated with an anti-inflammatory phenotype, enhanced immune-surveillance, and has a protective effect against chronic diseases, infections and likely cancer. On the other hand, vigorous exercise can potentially lead to an overall pro-inflammatory state and have detrimental effects on immune functions. Endurance sports involve prolonged activities engaging slow-twitch muscle fibers, while anaerobic sports focus on high-intensity efforts using fast-twitch fibers for power and speed.

Objectives: In this study, we used proximity extension assay (PEA)- based targeted proteomics to investigate the impact of exercise on organ damage, immune response, and inflammation-related proteins in three cohorts: winter sport athletes, amateur athletes, and non-sportive controls.

Materials and Methods: Based on our results, endurance training reduces the levels of IL-6, IL-15, and FGF-21, inversely proportional to the higher exercise intensities. Chronic intense training without recovery could potentially suppress immunity, but regular exercise improves chemotaxis and immune functions. Parvalbumin, crucial for muscle relaxation, is found more in fast-twitch fibers and TNNI3 up-regulation could improve cardiac performance. The PI3K-Akt pathway is able to support cardiac hypertrophy and its changes, together with MAPKs, are activated by IL-18, promoting pro-inflammatory cytokine production, which are important for tissue regeneration. High-intensity physical exercise up-regulates the innate immune response to viral infection, particularly in the acute training phase.

Results: This elevated immune activity promotes chemokine up-regulation, leukocyte chemotaxis, T cell activation, adaptive immune responses, angiogenesis, and smooth muscle cell proliferation. IL-8, involved in neutrophil migration and angiogenesis, is produced locally in muscles during exercise with a minimal systemic response observed only after intense exercise. High-exercise loads can also increase circulating anti-inflammatory cytokine IL-10, causing immunosuppression. Professional athletes exhibit an overall pro-inflammatory profile, with different endotypes linked to activity type and intensity. The endurance groups, show a more anti-inflammatory immune profile when compared to the others.

Conclusions: In conclusion, advances in omics approaches could offer detailed assessments of athlete health and fitness, enhance our understanding of exercise-immune system interactions, mechanistic processes, functional differences, and pathways associated with various sports. This could also lead to the detection of biomarkers to distinguish between normal recovery and overtraining, ultimately aiming to balance immune health and maximize athletic performance.

Keywords: inflammation, immune response, proteomics, high-intense training, elite athlete

SUBMISSION ID 56

IMMEDIATE AND LONG-TERM EFFECTS OF MECHANICAL LOADING ON ACHILLES TENDON VOLUME: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Introduction: The Achilles tendon (AT) may experience changes in dimensions related to fluid flow under load. The extent to which fluid flow involves redistribution within or flow out of the tendon is not known and could be determined by investigating volume changes.

Objectives: This study aimed to synthesize data on immediate and long-term effects of loading on tendon volume among people with a healthy AT and midportion achilles tendinopathy (MAT). A secondary aim was to synthesize data from the included studies investigating parallel change in cross-sectional area and length.

Materials and Methods: Systematic electronic search was performed in MEDLINE, EMBASE, CINAHL, AMED, and Scopus from inception until May 2020. Standardized mean differences (SMDs)

were calculated for intervention-induced changes from baseline for all outcomes. Methodological quality was assessed using modified version of Newcastle Ottawa Scale (NOS).

Results: Twelve studies were included in meta-analysis. For healthy AT, there were negligible to small changes in volume following cross-country running (-0.33 [95% CI = -1.11 to 0.45] (P = 0.41)) and isometric exercise (0.01 [95% CI = -0.54 to 0.55] (P = 0.98)) and a large increase at the short-term with 12-week isometric protocol (0.88 [95% CI = -0.10 to 1.86] (P = 0.08)). For MAT, there was an immediate large reduction in volume with isometric exercise (-1.24 [95% CI = -1.93 to -0.55] (P = 0.0004)), small increase with eccentric exercise (0.41 [95% CI = -0.18 to 1.01] (P = 0.18)) and small reduction at the short-term with long-term interventions (-0.46 [95% CI = -0.87 to -0.05] (P = 0.03)).

Conclusions: This meta-analysis suggests that healthy AT remain isovolumetric with acute interventions while MAT exhibit immediate and short-term volume reductions in response to different interventions.

Keywords: achilles, volume, fluid flow, stiffness, 3D-ultrasound

SUBMISSION ID 86

CYP1A2 AND ADORA2A POLYMORPHISMS AND EXERCISE PERFORMANCE AFTER ACUTE CAFFEINE SUPPLEMENTATION

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Introduction: Although caffeine supplementation has been demonstrated to significantly enhance muscular strength and power, considerable inter-individual variability in response to caffeine is evident. This variability may be linked to genetic variations in genes associated with caffeine metabolism and its effects on the central nervous system.

Objectives: Our study was designed to evaluate the associations of CYP1A2 and ADORA2A gene polymorphisms with respect to muscular performance after acute caffeine supplementation.

Materials and Methods: 27 resistance-trained males ingested either 5 mg/kg caffeine or placebo 45 min before a battery of exercise tests (intermittent mid-thigh pull, 15 countermovement jumps, three sets of bench press to 60% fatigue, and the fourth set of bench press to failure with 70% 1RM). The study was double-blinded, randomized and of cross-over design. DNA was tested a posteriori for the rs5751876 (CYP1A2) and rs762551 (ADORA2A) polymorphisms. Caffeine and paraxanthine concentrations were measured in saliva via HPLC.

Results: There was a significant interaction of treatment x time x CYP1A2 ($p < 0.001$) for paraxanthine concentrations. AA fast metabolizers had higher paraxanthine concentration 45 min post-caffeine than C-allele slow metabolizers, but not at 120 min post-ingestion. Regarding CYP1A2 genotype, C-allele slow-metabolizers improved in jumping (15 countermovement jumps) average velocity (caffeine: 1.77 ± 0.14 m/s, placebo: 1.71 ± 0.16 m/s, $p < 0.001$), while AA fast metabolizers improved set 1 bench press performance (caffeine: 9.7 ± 1.7 reps, placebo: 8.9 ± 1.8 reps, $p = 0.046$). Regarding ADORA2A genotype, CC (caffeine: 1.70 ± 0.20 m/s, placebo: 1.67 ± 0.19 m/s, $p = 0.005$) and CT (caffeine: 1.79 ± 0.09 m/s, placebo: 1.74 ± 0.11 m/s, $p < 0.001$) improved in jumping average velocity and CT improved also in set 2 bench press peak power (caffeine: 363 ± 76 W, placebo: 323 ± 59 W, $p = 0.021$).

Conclusions: Genotypes CYP1A2 and ADORA2A may modulate the response to acute caffeine supplementation, but the associations are not yet fully understood and warrant further investigation. CYP1A2 fast metabolizers showed improvements in strength, whereas slow metabolizers exhibited enhanced jumping speed. Additionally, less sensitive genotypes of ADORA2A appeared to confer more beneficial effects.

Keywords: caffeine supplementation, CYP1A2 polymorphism, ADORA2A polymorphism, muscular performance, genetic variations

SUBMISSION ID 201

INTRODUCING PRESCRIPTION OF EXERCISE, IN CYPRUS TO PREVENT PREMATURE CARDIOVASCULAR DEATHS AND OTHER CHRONIC DISEASES

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Introduction: This study presents evidence-based data on the status of premature cardiovascular deaths and chronic diseases in Cyprus. Premature mortality caused by cardiovascular disease (CVD) and other chronic diseases continues to pose major public health challenges in Cyprus. Recent analyses of morbidity and mortality data from the Cyprus Health Insurance Organization and the Health Monitoring Unit, Ministry of Health, suggest that up to 70% of these deaths could have been prevented with more effective prevention and treatment measures.

Objectives: The study aims to stimulate interest and raise awareness by underlining the critical significance of integrating “Medical Exercise Prescription” into the healthcare system of Cyprus. This inclusion could reduce premature deaths, improve the overall health status of the population, and promote healthier lifestyles.

Materials and Methods: Data collection and analysis were conducted by the Health Monitoring Unit of Cyprus’s Ministry of Health, utilising the International Classification of Diseases and Related Health Problems (ICD-10) and the International Classification for Primary Health Care (ICPC-II).

Results: In 2021, there were 2,410 deaths of individuals under 75 years of age in Cyprus. Analysis of the data revealed that 70% (1,685) of these deaths could have been prevented with better prevention and treatment measures. Among the preventable deaths, 24% (407) were related to cardiovascular disease, with 65% (266) specifically attributed to ischemic heart disease (ICD10: I20-I25).

Conclusions: Cardiovascular disease remains the leading cause of morbidity and mortality in Cyprus and is closely linked to poor lifestyle habits such as lack of exercise, smoking, unhealthy diet, and alcohol consumption. Adopting more effective prevention and treatment measures could potentially prevent up to 70% of these cases. Based on validated evidence, exercise prescription, emerges as a powerful intervention to prevent and manage these diseases. Urgent action is required from the relevant stakeholders to create the infrastructure for exercise as medicine in Cyprus’s healthcare system.

Keywords: premature cardiovascular deaths, exercise prescription, preventive healthcare, cyprus

SUBMISSION ID 89

ASSOCIATION BETWEEN FEAR OF RE-INJURY AND RETURN TO SPORT FOLLOWING ACHILLES RUPTURE

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Introduction: Achilles tendon rupture (ATR) is a frequently occurring injury in sports that involve extensive jumping and running, understanding the psychological aspects that contribute to return to sport (RTS) is of utmost importance in achieving optimal rehabilitation outcomes. The psychological factors that impact RTS after an Achilles rupture play a vital role in an athlete's ability to regain their performance level and confidently resume sports activities, one of these factors is fear of re-injury. Athletes who experience a high level of fear of re-injury may be hesitant to fully engage in rehabilitation which can impede their progress. Acknowledging the psychological factors that contribute to RTS after an Achilles rupture is crucial in designing comprehensive rehabilitation programs that address both the physical and psychological aspects of the injury.

Objectives: To review the available evidence regarding association of fear of re-injury to RTS after Achilles tendon rupture injury.

Materials and Methods: A search in Macquarie university multi search engine using specific keywords relating to Achilles rupture, RTS and fear of re-injury.

Results: 7 studies met the initial eligibility criteria and were boiled down to 3 fully eligible studies after total text screening, 2 of which were deemed as high risk of bias while 1 was low risk of bias, with a total of 156 participants. Fear of re-injury was assessed using various measures including the Tampa Scale of Kinesiophobia (TSK). Two studies examined the association between fear of re-injury and functional performance, finding lower scores in outcome measures and joint power in the fear group. The other study analyzed the change in psychological factors during rehabilitation and its association with functional outcomes, showing positive changes and associations between psychological factors and outcome measures scores over the course of rehabilitation.

Conclusions: Fear of re-injury after Achilles tendon rupture could impact the patient physically and alter overall functioning ability. However, further studies are needed to confirm these findings.

Keywords: fear of re-injury, achilles rupture, return to sport, rehabilitation, achilles tendon,

psychological factors

SUBMISSION ID 01

CHANGES IN MUSCLE STRENGTH, BALANCE, AND AGILITY FOLLOWING ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

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Introduction: Anterior Cruciate Ligament (ACL) tears account for a high percentage of knee injuries, which is treated with ACL reconstruction (ACLR) followed by rehabilitation. Following ACLR, athletes demonstrate alterations in balance, muscle strength, and agility, which lead to instability. Therefore, it is essential to address these issues and investigate whether these factors are indeed affected after an ACLR in male athletes.

Objective: This study aims to investigate the changes in the balance, muscle strength, and agility of football, basketball, and handball players following ACLR.

Materials and Methods: A cross-section study design was applied. Participants were recruited from sports clubs in Bahrain using a snowball approach. Consent was obtained from all participants before the start of the study. Thirty-four male athletes with a mean age of 25.1 years (SD = 3.7) were recruited and were divided into two groups. The experimental group (EG) consisted of male athletes who underwent ACLR (n = 17, age M = 25.4, SD = 4.0) and a rehabilitation course. The control group (CG) consisted of healthy male athletes with no history of ACL injuries (n = 17, age M = 24.8, SD = 3.5). The participants were football (n=16), basketball (n=14) and handball (n = 4) players. Both groups were tested for balance (Y-balance test), muscle strength (Cybex Power Isokinetic Machine), and Agility (T-test).

Results: Results showed statistically significant difference for the T-Test (EG = 11.56 ± 1.18 s, CG = 10.40 ± 1.24 s, p = 0.004). Significant differences were also found in Y-balance testing of anterior (EG = 4.53 ± 3.20 cm, CG = 2.05 ± 1.64 cm, p = 0.003), and posteromedial directions (EG = 5.21 ± 3.98 cm, CG = 2.88 ± 2.06 cm, p = 0.021). Also, about 71% of the EG players sustained another injury in the past six months compared to those who did not (p = 0.386).

Conclusions: The study investigated several variables of Bahraini athletes after ACLR rehabilitation. The findings indicate that agility and balance are deficient in athletes with ACLR even after completing a course of rehabilitation. First, these variables may have been neglected while training the athlete to return to sports (RTS). Second, applying a variety of ACLR rehabilitation protocols, which differ from one therapist to another, might have caused such variation in agility and balance. The majority of athletes that have undergone an ACLR reconstruction sustained a re-injury even after completing their rehabilitation and returning to sports.

Keywords: ACL reconstruction, agility, balance, injury, deficient

SUBMISSION ID 350

RESPIRATORY SLEEP DISORDERS USING POLYSOMNOGRAPHY IN NATIONAL PARA SWIMMING TEAMS WITH CEREBRAL PALSY, MEXICO 2022

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Introduction: Cerebral palsy has a prevalence of 20 to 42% of sleep disorders throughout childhood reported by caregivers in school and preschool population, polysomnography is the gold standard for the diagnosis of these conditions. The comorbidities and symptomatology of people with cerebral palsy, is progressive in deteriorating the quality of life with aging.

Objectives: To describe the presence of sleep-disorders with abnormal breathing, by age, determined via polysomnography in cerebral palsy para swimming athletes.

Materials and Methods: cross-sectional descriptive observational study of diagnosis. A polysomnography with Alice Pd polysomnograph was performed daily during their training concentration at CONADE, a week prior to the World Paraswimming Championships in Tijuana 2022. There were 6 participants divided into two groups, older and younger than 18 years. Descriptive

statistics, risk estimation, and inferential measures were made with Pearson's X^2 . The study was carried out under the corresponding legal ethical framework.

Results: All types of apnea and hypopnea occurred in those over 18 years of age, and only 25% of minors did not have hypopnea. A prevalence of 100% was found for all types of apneas and 83.3% for hypopneas; all had hypoxemia, with a range of 88% to 94% of oxygen saturation. Only 50% of the population had a mild apnea/hypopnea index, 33% was moderate and 17% severe.

Conclusions: A higher prevalence of all types of apneas was reported in this population. Being a para swimming athlete with cerebral palsy under 18 yoa. has a risk factor of 1.67 times higher for respiratory events of apneas-hypopneas compared to those over 18 yoa, this may be due to intervening factors.

Keywords: breathing pediatric sleep-disorders, sports pediatrics, polysomnography, cerebral palsy, para swimming

SUBMISSION ID 15

POST-COVID19 PATIENT OUTLINE AT THE INRLGII SPORTS MEDICINE SERVICE: A CROSS-SECTIONAL STUDY.

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Introduction: The post-COVID-19 syndrome is characterized by persistent symptoms lasting beyond 12 weeks from acute infection, encompassing fatigue, dyspnea, coughing, depression, and declining aerobic capacity and body composition—a substantial barrier to returning to the pre-infection state.

Objectives: Describe the physical characteristics of Mexican post-COVID-19 attendees at the INRLGII sports medicine service from August 2021 to March 2022.

Materials and Methods: Conducting a retrospective cross-sectional study, we analyzed results from morphologic and functional evaluations of patients attending the INRLGII Sports Medicine Service during August 2021 to March 2022. Variables were extracted from data sheets of the medical interview, treadmill stress test, isokinetic knee test, and bioimpedance body composition test. Quantitative variables were reported by mean and standard deviation, while qualitative variables were expressed as frequencies and percentages.

Results: Data from 48 individuals (average age 49.5 ± 12.9 years; 65% females) revealed a mean time of 30 ± 22 weeks from acute infection, with only 15% requiring in-patient medical care. Over 5 symptoms were present in 65% of the sample, with fatigue, memory decline, and weakness prevailing at 83%, 63%, and 54%, respectively. Physical and fitness assessments showed a mean body fat percentage of $37\% \pm 8$, mean lean mass percentage of $33\% \pm 6$, mean body mass index of $29 \text{ kg/m}^2 \pm 4$, mean relative oxygen uptake of $31 \text{ ml/kg/min} \pm 9$, and mean peak torque of knee extensors and flexors at $111 \text{ Nm} \pm 40$ and $52 \text{ Nm} \pm 24$, respectively.

Conclusions: Several symptoms prevail after SARS-COV-2 infection. Establishing a preliminary Mexican post-COVID-19 patient landmark and presentation profile at a sports medicine service highlights opportunities for further treatment and assessment proposals to alleviate the burden of diverse symptoms after COVID-19.

Keywords: SARS-COV-2 infection, COVID-19, post-COVID-19 syndrome, post-COVID-19 sequelae, post-acute sequelae of SARS-COV-2 infection

SUBMISSION ID 67

THE IMPORTANCE OF MUSCLE-FIBER OXYGEN SATURATION AND ITS ELEVATION DURING A LIFE-LIKE MEAL- ADAPTED PERFORMANCE TEST (MAPT)

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Introduction: The red and white muscle-fibers depending on their mitochondrial content can undergo biochemically fat breakdown. Animal experiments suggest that hypoxia-inducible factor 1-alpha (HIF-1 α) coordinates it based on the oxygen supply, the velocity of exercise and separating aerobic and anaerobic metabolism.

Objectives: To study whether replenishment of oxygen stores in myoglobin is essential for a muscle

group to use enough fat.

Materials and Methods: We assessed oxygen saturation (SMO₂) in 4 pairs of muscle groups in 18 human subjects using near-infrared spectrometers (NIRS). Metabolic parameters were determined via ergo spirometry, and the venous partial oxygen pressure (PO₂) was monitored. Insulin level testing verified GLUT4 transporter activation. Subjects exercised on a closed cycle ergometer heated to 40°C, preceded by a 15g carbohydrate breakfast for insulin stabilization.

Results: Post-meal SMO₂ values consistently decreased by 7-18% from a baseline of 35-80%, averaging 14.9%. This was accompanied by reduced PO₂ and increased insulin levels, indicating gastrointestinal tract function and remodeling of circulation. Exercise in a 40°C environment led to sustained increases in SMO₂ values (85-98%), significantly improving both red and white muscle fibers (p<0.05), and parallelly found an increase in PO₂, except in two asthmatic patients. Average PO₂ increased from 24.2±4.9 to 42.4±8.2 mmHg (p<0.05) in the aerobic exercise zone. The respiratory exchange ratio (RER) the value during anaerobic exercise averaged 0.824, confirming fat-based biochemical processes. Insulin levels decreased significantly from 60 mins postprandial (27.4±12.9 mIU/l) to during exercise (9.4±6.9 mIU/ml) (p<0.05).

Conclusions: An increase in SMO₂ to external effect resulted in improved metabolic efficiency and effective fat utilization based on RER, which is essential for improving sports performance and potentially achieving weight reduction goals. The components of our own MAPT method in vivo confirm our knowledge from animal experiments regarding the connection between HIF-1 α and hormonal factors in muscle function. This method is suitable for pathophysiological measurements that elucidate the underlying factors behind injuries, performance fluctuations, or unsuccessful weight reduction efforts.

Keywords: metabolic efficiency, muscle oxygen saturation, insulin, HIF-1-alpha, fat utilization

SUBMISSION ID 66

IMPROVING POST-EXERCISE INSULIN LEVEL HELPS IN FAT UTILIZATION DURING A LIFE-LIKE MEAL-ADAPTED PERFORMANCE TEST (MAPT) VERIFIED BY SPIROERGOMETRY

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Introduction: Insulin targets energy metabolism, and glucose uptake into muscles, notably elevating by intense exercise. This elevation correlates with reduced venous partial oxygen pressure (PO₂) and higher glucose consumption verified by respiratory exchange ratio (RER). Muscles prefer free fatty acids over glucose, unlike the myocardium, explaining incongruence in training forms and individual response. Higher fat breakdown required for proper skeletal muscle function.

Objectives: We examined stepwise the utilization of fat during exercises at 0- and 6-week, the test was performed with a 15g carbohydrate-containing test meal (MAPT).

Materials and Methods: Patient's diets were adjusted proportionally to their body weight, and aerobic exercise was integrated into their lifestyle, consisting of at least a 30-minute slow anti-gravity muscle workout each morning. The metabolism of the muscles was monitored in 14 subjects using four pairs of near-infrared spectrometers, alongside measurements of PO₂ and insulin levels.

Results: We compared the step-by-step and the overall fat utilization, indicating effective muscle activity. The energy expenditure in week 0. ranged from 18,5-30,2%, averaging 23.54% from fat. After 6 weeks of lifestyle change, it ranged from 27-46%, averaging 31.81%, with p<0.05. The average RER value was 0.96±0.05 compared to 0.91±0.04. Individual progress, assessed by VO₂-VCO₂ difference indicating anaerobic workout range, decreased from an average of 27.18±12.8% to 19.59±8.69% (p<0.05). Insulin levels 20 minutes post-aerobic exercise in week 0: were 13.8-21.4 mIU/ml, and in week 6: 7.8-12.7 mIU/ml, showing a lower post-exercise level of insulin support higher fat consumption.

Conclusions: Activation of high mitochondrial content muscles through exercise induces a measurable increase in fat metabolism, enhancing the performance of amateur athletes. The necessity of insulin's effect on muscle substrate turnover is evident, potentially serving as a hormonal regulatory link between the muscle HIF1-alpha oxygen-sensing system and GLUT-4 insulin-dependent function. Based on the usually diverse training response and insulin's wide target profile, the GLP1 level may play a role in this effectiveness.

Keywords: postexercise insulin, energy metabolism, VO₂-VCO₂ difference, GLUT-4, GLP-1, HIF1-alpha, athletes

SUBMISSION ID 156

MULTI DISCIPLINARY APPROACH (REHABILITATION, NUTRITION, SUPPLEMENTATION) AFTER A FRACTURE TO THE PROXIMAL FIFTH METATARSAL BONE: A CASE REPORT OF A PROFESSIONAL SOCCER PLAYER

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Introduction: The 5th metatarsal fracture is a frequent foot fracture among soccer players and might exclude a player from competition for several months and significantly affect his career. Following a blunt trauma reported on the 6th of January, a midfielder (age 21) playing in the "Serie A" Italian championship underwent tests which highlighted the compound fracture of the fifth metatarsal of his right foot. The injury required conservative treatment.

Objectives: The multidisciplinary method employed to speed up the athlete's recovery is described in this case study.

Materials and Methods: 9 January 2024: The athlete started conditional capacity maintenance work without load on foot and metabolic work on arm crank. In order to preserve his fat free mass and promote recovery a normal-caloric diet with a slightly high protein intake was prescribed, together with a supplementation with an antioxidant compound enriched with Si dioxide, as a positive association between its presence in the diet and the mineral density of bone has been found. 22 January 2024: double daily workouts in the pool and in the gym started. 26 January 2024: The orthopedist allowed the resumption of foot loading after an X-ray examination. 6 February 2024: running with gymnastic shoes started. 8 February 2024: low intensity ball exercises started with gradual increase in the subsequent days. 12 February 2024: training with football shoes started. 15 February 2024: first full training in team. 25 February 2024: return to play.

Results: From the injury until his return to the field, the athlete's body composition has changed, with his fat-free mass increasing and his fat mass decreasing.

Conclusions: The collaboration between nutrition and sports medicine has improved and this multidisciplinary approach has resulted in a prompt recovery.

Keywords: 5th metatarsal fracture, soccer, nutrition, rehabilitation; body composition

SUBMISSION ID 281

EVALUATION OF CARDIOPULMONARY TEST RESULTS AMONG SKI ATHLETES

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Introduction: Using cardiopulmonary exercise testing (CPET) to evaluate physical performance and cardiopulmonary function has grown.

Objectives: Eighteen elite athletes from alpine skiing (6), snowboarding (4), and country skiing (8) were evaluated for CPET (uphill running protocol) test performance to describe and compare their performance data including maximum heart rate (HR Max), VO_2 at anaerobic threshold (VO_2 AT), VO_2 at respiratory compensation point (VO_2 RCP) and PEAK VO_2 .

Materials and Methods: Eighteen elite athletes from alpine skiing (6), snowboarding (4), and country skiing (8) were evaluated for CPET (uphill running protocol) test performance to describe and compare their performance data including maximum heart rate (HR Max), VO_2 at anaerobic threshold (VO_2 AT), VO_2 at respiratory compensation point (VO_2 RCP) and PEAK VO_2 . The matched data of the elite winter sports athletes (7 women, 11 male athletes) were compared for different CPET parameters. Also, other demographic information such as weight, height and BMI of the athletes were recorded. All athletes showed excellent performance data in the CPET analysis, as

expected in elite winter sports athletes. Due to the training type, all elite winter sports athletes were categorized into endurance (crosscountry) skiing and speed form (alpine and snowboarding) skiing.

Results: Male athletes had an age of 18-32 years, had a height between 175–186 cm, were of a weight between 65–81 kg, and had, a body mass index (BMI) of 18–25 kg/m². The participating female athletes were between 18-31 years, had a height of 154–176 cm, weighed 47–69 kg, and showed a BMI of 18–23 kg/m². Male athletes demonstrated a substantial difference in HR MAX, VO₂ RCP, and PEAK VO₂ compared to female athletes (P: 0.005, 0.017, 0.002). Although HR MAX is not significantly different between the two groups of speed (alpine and snowboarding) and endurance (crosscountry) skiers, VO₂ RCP and PEAK VO₂ reveal a substantial difference between the skiing groups (P: 0.028, 0.003), with endurance skiers showing better outcomes.

Conclusions: Although the majority of endurance skiers were men, both in terms of the sport and the gender of the majority of the participants in this group, VO₂ AT RCP and PEAK VO₂ showed a substantial difference compared to the other group.

Keywords: cardiopulmonary exercise test, ski athletes, alpine skiing, snowboarding, crosscountry skiing

SUBMISSION ID 244

THE EFFECT OF TAICHI EXERCISE ON PHYSICAL AND PSYCHOLOGICAL HEALTH OF COLLEGE STUDENTS WITH THE FATIGUE AFTER COVID-19 CONDITION: A RANDOMIZED CONTROLLED TRIAL

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Introduction: The COVID-19 posed an unprecedented challenge to society, some infected patients recovered but still had persistent symptoms, which had a dramatic impact on their quality of life.

Objectives: To investigate the long-term persistent symptoms after infection with COVID-19 in college students and explore the effects of Taichi on the physical and mental health of COVID-19-infected college students with symptoms of fatigue.

Materials and Methods: A total of 67 college students were recruited and randomly allocated into intervention group and control group. The intervention group received 16 weeks of Taichi exercise, three times a week for 90 min. Fatigue Scale 14, Pittsburgh Sleep Quality Index, Hamilton Anxiety Scale, 36-Item Short Form Health Survey questionnaire (SF-36), International Physical Activity Questionnaire and physical fitness data of students were collected before and after the trial.

Results: College students had various long-term and persistent symptoms after infection with COVID-19 and fatigue was one of the most prevalent symptoms. Individuals in intervention group showed significant alleviation in fatigue ($p < 0.05$) compared with the control group. Meanwhile, compared with their pre-intervention values, the total sleep quality and habitual sleep efficiency significantly improved ($p < 0.05$), and Physical Functioning, Social Functioning and Health Transition scores in SF-36 were significantly increased ($p < 0.05$). High intensity activity and total activity also significantly increased ($p < 0.05$) after intervention. Moreover, improvements in one foot with eyes closed ($p < 0.01$), and 1min squat ($p < 0.05$) could be found in intervention group compared with the control group. And the vital capacity ($p < 0.05$), seated forward bend ($p < 0.05$) and 1minute sit-up ($p < 0.05$) increased after Taichi intervention.

Conclusions: Taichi is an effective body–mind exercise strategy to alleviate fatigue among college students with the post-COVID-19 condition. It also improves sleep quality, physical functioning and physical fitness.

Keywords: Taichi, post-COVID-19 condition, fatigue, physical fitness, college students

SUBMISSION ID 288

THE ROLE OF INCORPORATING APOSTHERAPY ON LOWER LIMB BIOMECHANICS RECREATIONAL ATHLETES WITH A HIGH RISK FOR SECOND ACL AFTER PRIMARY ACL RECONSTRUCTION

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Introduction: Injury to the ACL is considered one of the most debilitating knee injuries which could occur in any young athlete. Patients who previously sustained non-contact ACL injury and had ACL reconstruction (ACLR) showed higher risk of sustaining a second ACL injury compared with individuals who did not sustain primary ACL injury. Persistent poor neuromuscular control reflecting on high-risk movement patterns at the contralateral lower limb, has been proposed as modified risk factors, which may exist even post ACLR. The majority of neuromuscular training programs require a time-intensive commitment and have a considerable level of complexity and intensity, thus reducing compliance. AposTherapy (APOS) is a foot-worn biomechanical device which aims to alter alignment and enhance neuromuscular control can be considered as simpler intervention.

Objectives: Introduction of perturbation training with lower limb alignment re-adjustment by using (APOS).

Materials and Methods: Five physical active healthy participants. All had had ACLR and completed their rehabilitation program and been returned to participate in sporting activities. All participants showed plane projection angle (FPPA) while performing Single Leg Squat exceed 8° .

Results: COP measures during SLs task showed significant improvement, and significant improvement in KOOS quality of life (QOL) subscales.

Conclusions: poor postural stability have been considered a main mechanism for sustaining a 2nd ACL injury in patients who had ACLR surgery. The finding of this study is the first to show the promising concept of utilising foot-worn biomechanical interventions may be a different method for mitigating risks of a 2nd ACL injury.

Keywords: ACL Reconstruction, apos therapy, lower limb biomechanics, postural stability, neuromuscular control

SUBMISSION ID 272

LEFT VENTRICULAR HYPERTROPHY AND REMODELING IN ELITE MALE VOLLEYBALL PLAYERS

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Introduction: Volleyball is high power and predominantly anaerobic sport, which is associated with cardiac adaptations such as increased left ventricular (LV) cavity, wall thickness and functional changes described as athlete's heart.

Objectives: To study left ventricular (LV), posterior wall thickness, intact ventricular septum, stroke volume, cardiac output, end/diastolic volume, ejection fraction.

Materials and Methods: The study was conducted on 60 apparently healthy volleyball players (age 30.5 ± 3.6 years, international experience 6.5 ± 2.6 years), recruited among the top 10 national teams in the international volleyball federation (FIVB) rankings. Then, according to the playing position of the players, 6 players were randomly selected from each team, making a total of 60 players. The participants were from Brazil, Serbia, Poland, Iran, Colombia, Cameroon, Japan, Egypt, Qatar and Tunisia. Cardiac structures were measured in the left lateral decubitus position with two-dimensional echocardiography and Doppler acquisition using an investigator and a dedicated ultrasound (Vivid Q, GE Healthcare, Horten, Norway).

Results: Our data revealed that out of 60 athletes, 48 athletes (80%) had normal LV geometry. While 6 athletes (10%) had concentration remodeling, 3 athletes (5%) had eccentric hypertrophy and 3 athletes (5%) shown concentric hypertrophy. The opposite position players included the largest number of players who did not have normal LV geometry. Signs of concentric and eccentric hypertrophy were

seen among opposite players.

Conclusions: Echocardiography in international elite volleyball players showed relatively high incidence of heart remodeling, in 10% of respondents. The remodeling of the heart is dependent of the playing position. Although the cardiac remodeling is a result of the physiological cardiac adaptations due to the long-term physical efforts it is suggested to make regular cardiac check ups to avoid the cardiovascular accidents.

Keywords: volleyball, left ventricular, hypertrophy, remodelling, cardiac adaptations

SUBMISSION ID 207

PHYSICAL ACTIVITY LEVEL, SITTING TIME, AND SKELETAL MUSCLE MASS BETWEEN ESPORTS PLAYERS AND NON-ESPORTS PLAYERS.

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Introduction: The number of esports players has been steadily increasing over the last decade. Esports' low levels of physical activity and prolonged sitting time increase the risk of noncommunicable diseases. There are few studies on esports players' physical activity levels, sitting time, and skeletal muscle mass, particularly in Southeast Asia.

Objectives: The objective of this study was to investigate the physical activity level, sitting time and skeletal muscle mass of esports players and compare it with non-esports players.

Materials and Methods: This was a cross-sectional match control study. Twenty-six male esports players and non-esports players between age of 18 to 35 years participated. Physical activity level and the weekly physical activity time were assessed using the International Physical Activity Questionnaire–Short Form (IPAQ-SF) and a standardized clinical research form respectively. Secondary data including skeletal muscle mass, visceral fat mass, and body fat percentage were estimated using a bio-electrical impedance analysis machine.

Results: Esports participants reported no vigorous intensity of physical activity per week. The total duration of physical activity per week between the 2 groups was comparable. A significant association between playing esports and not fulfilling the WHO physical activity level recommendation ($p=0.024$) was noted. Esports participants reported significantly ($p=0.016$) longer sitting time per day and lower skeletal muscle mass ($p=0.024$) compared to non-esports participants.

Conclusions: Majority of esports players did not achieve the recommendation WHO physical-activity level and could be considered as physically inactive with prolonged sitting time and lower adjusted skeletal muscle mass. Identifying factors that could adversely affect esports players' future is as important as instilling preventive measures.

Keywords: esports, physical activity level, skeletal muscle mass

SUBMISSION ID 158

EXERCISE THERAPY FOR DYSLIPIDEMIA IN MENOPAUSAL /PERIMENOPAUSAL WOMAN

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Introduction: The hormonal changes due to the reproductive age of woman influence the level of blood lipids. Modifications of the lipid profile in woman are noted during puberty, during pregnancy, in perimenopause and menopause.

Objectives: The aim of this study is to present the underlying mechanisms of metabolic effect of exercise on lipid and to provide recommendations for optimal volume of physical activity needed to improve lipid profile.

Materials and Methods: Web of Science, Scopus, PubMed/Medline and Embase were searched. Studies that evaluated the effect of different volume and modality of physical activities on lipid profile in perimenopausal and menopausal women were included.

Results: Physical exercise may attenuate several conditions related to post-menopausal and obesity, including improving body composition and muscle strength. The regular physical exercise has been associated with improvement of the low-grade inflammatory status, increased lipolysis and browning the white adipose tissue, increased thermogenesis in brown adipose tissues by activation of the beta-adrenergic signaling pathways. The higher amount of regular aerobic physical activity caused increased level of HDL and decreased level of triglyceride values. Resistance training can decrease all components of lipid profile, whilst has small impact on HDL-C. High intensity physical training may be a time efficient intervention for Counteracting dyslipidemia.

Conclusions: Healthy lifestyle goals to reduce cardiovascular risk in women besides smoking cessation and lower caloric intake include moderate-intensity physical activity on most days of the week for at least 30 minutes per day.

Keywords: dyslipidemia, cholesterol, triglyceride, menopause, exercise

SUBMISSION ID 42

AQUATIC EXERCISE AND DM TYPE 2

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Introduction: Low insulin sensitivity initially induced by over-nutrition and physical inactivity promotes hyper-secretion from pancreatic beta cells to regulate circulating glucose. When insulin secretion is no longer able to compensate for prevailing low insulin sensitivity, blood glucose levels worsen towards DM type 2. Aerobic exercise is considered an important therapeutic regimen for these patients.

Objectives: Aim of this study was to examine the effects of aquatic exercise on indicators of glycemic control and aerobic fitness in adults with type 2 DM.

Materials and Methods: The study counted on the participation of 27 individuals, both sexes, average ages 54.2y. distributed in a swimming group (n=13) (G1); group (n=9) exercised with aquabics (G2) and control group (n=5) (G0). Subjects performed one hour program, 5 times per week. Body-mass index, glycated hemoglobin A1c, fasting glycemia and VO₂max were assessed at the beginning of the study, after 4 and 8 weeks of follow-up. Assessment of glycemic control was necessary for inclusion, while quality of life and cardio metabolic risk factors (blood pressure, triglycerides, total cholesterol) were considered, but not required for inclusion.

Results: There was a reduction on BM between (G0: 78.0±8.6 and G1: 75.5±8.5kg; p=0.01) and FG between (G0: 8,9±2,6mmol/l; G1: 7,8±2,1; G2: 8,0±2,3mmol/l; p=0.03). There was no statistical difference when the groups G1 and G2 were compared among themselves. VO₂max insignificantly higher in group G1 and G2 in comparison with control group (G0:24,7±3,6ml/ min/kg; G1: 32,8±2,9ml/min/kg and G2: 31,2±2,8ml/min/kg)

Conclusions: The regular practice of Aqua exercise favors the body mass control just like the fasting glycemia in diabetes type 2 patients. Level of cardiovascular fitness is better in both groups after eight weeks of different aerobic exercises in the water. Hemoglobin A1c can also be reduced.

Keywords: DM type 2, aquatic exercise, glycemic control, aerobic fitness, cardiovascular health

SUBMISSION ID 78

THE CROSS TECHNIQUE: COACHES' PERCEPTIONS & IMPLICATIONS FOR INJURY PREVENTION

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Introduction: The cross technique is used in a duel of proximity between goalkeepers and opponents facing the goal. This technique appears to be used by an increasing number of goalkeepers, particularly at an elite level, but no study has yet covered it.

Objectives: This study focuses on the cross technique in elite level athletes, used in close-range duels between goalkeepers and opponents facing the goal.

Materials and Methods: Coaches were education level (EL) and competition level (CL), were studied for differences.

Results: Almost all coaches recognized (99%) and used (78%) the technique, no significant differences for CL nor EL. *RECREATIONAL* level was the most common (47%) to start teaching the technique and a player's age of 11.3 years \pm 2.8 was reported. Most (90.7%) related the technique to a risk of injury and 36% had at least one injured player while performing it, *ELITE* CL coaches significantly more likely ($p < .01$) than *SUB-ELITE* and *RECREATIONAL*. No significant difference was found for EL ($p = .301$). Contusion (37%) and Musculo-skeletal (36%) were the most common injuries. The majority (68.1%) of the coaches considered no injury risk difference between men's or women's teams, and 41.1% did so for the difference between young and adult goalkeepers.

Conclusions: The cross technique is commonly known and used by coaches; and its training is recommended for all players. Coaches' answers signal an injury risk while performing the technique, independently of players' age or gender. Future research should take this technique into consideration when defining injury prevention approaches in football goalkeepers.

Keywords: epidemiology, methodology, football, youth football, goal keeper

SUBMISSION ID 79

SELF-MEDICATION AND PARASPORT: A STUDY ON ADULT AMATEUR ATHLETES WITH MOTOR DISABILITIES

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Introduction: Limited research has been conducted on self-medication (SM) practices in sports, particularly among amateur athletes with motor disabilities. While SM is prevalent among able-bodied athletes, there is a lack of data on its use among amateur disabled athletes.

Objectives: This study aimed to determine the prevalence of self-medication among amateur sportsmen and women with physical disabilities, identify factors influencing self-medication behaviors, and address misconceptions associated with these practices.

Materials and Methods: Among the 164 disabled sportsmen and women who participated, 38.7% acknowledged engaging in self-medication practices in the context of sports. Among them, 23.2% used DS, and 25.6% used MEDS (OTC and FPD combined).

Results: Self-medication with DS was positively associated with age, consumption of caffeinated and energy drinks, and self-medication with MEDS. Self-medication with MEDS was positively associated with the number of hours of sports practice, consumption of caffeinated drinks, and self-medication with DS. Paracetamol was the most consumed pharmaceutical molecule, while proteins were the most commonly used DS. 36.4% of participants using MEDS and 42.1% using DS believed that self-medication posed no health risks.

Conclusions: This study reveals a high prevalence of self-medication among amateur sportsmen and women with physical disabilities. Fortunately, paracetamol, which is one of the most commonly used medications, is generally associated with a low risk of side effects. However, even with this seemingly innocuous medication, recent research has raised concerns about potential safety issues, emphasizing the need for a more cautious approach to usage of any medications. The associated risks, reliance on unreliable sources of advice and information (e.g., the internet), and lack of awareness regarding the dangers of self-medication highlight the need for educational strategies targeting amateur disabled athletes. Further research is required to gain a deeper understanding of self-medication behavior in this population.

Keywords: self-medication, handicap, drugs, doping, sport

SUBMISSION ID 264

EFFECT OF 12 WEEKS OF TAI CHI EXERCISE CONTROLLED AT FATMAX INTENSITY ON THE HEALTH AND PERFORMANCE STATUS OF COLLEGIATE CHINESE STUDENTS WITH OBESITY

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Introduction: Numerous studies have shown that Tai Chi can help reduce anxiety and depression, improve sleep quality and cognition, and increase bone mineral density. However, the results of Tai Chi exercises for the alleviation of obesity have been inconsistent. This situation may be due to the inconsistency in the intensities of Tai Chi exercises chosen by different studies.

Objectives: In this study, Tai Chi exercise was controlled at maximum fat oxidation intensity (FATmax) to assess its effects on body size, biochemical parameters, functional capacity, and psychological well-being in overweight and obese college students.

Materials and Methods: A total of 28 overweight and obese Chinese university students (17–21 years old) were randomly assigned to a control group (n = 14) and an experimental group (n = 14). The Tai Chi intervention was performed at FATmax intensity for 60 min five times a week for 12 weeks. Body composition was measured by using a X-SCAN PLUS instrument; biochemical indicators were quantified through enzyme-linked immunosorbent assay; and physical fitness, behavioral, and psychological questionnaires were collected. Indicators were measured before and after the 12-week intervention.

Results: Individuals in the 12-week intervention showed significant reductions in body mass index (BMI) ($p < 0.05$), fat mass (FM) ($p < 0.05$), body fat percentage (BFP) ($p < 0.05$), and waist hip ratio (WHR) ($p < 0.05$), suggesting that Tai Chi exercise at FATmax intensity could reduce fat mass (FM). Meanwhile, low density lipoprotein (LDL) significantly decreased ($p < 0.05$) and the adiponectin (ADPN) index significantly increased ($p < 0.05$) after Tai Chi exercise at FATmax intensity. Moreover, the Pittsburgh sleep quality index (PSQI) scores significantly decreased ($p < 0.05$) at FATmax intensity.

Conclusions: In overweight/obese college students, Tai Chi intervention controlled at FATmax intensity has a general beneficial effect on weight loss, influencing selected anthropometric, biochemical, and emotional variables.

Keywords: Tai Chi exercise, FATmax intensity, obese collegiate students

SUBMISSION ID 266

ADIPONECTIN, LEPTIN, ANTHROPOMETRICS, AND BEHAVIORAL AND PHYSICAL PERFORMANCE IN OVERWEIGHT AND OBESE CHINESE COLLEGE STUDENTS

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Introduction: Leptin (LEP) and adiponectin (ADPN) are two adipocytokines that are largely studied in connection with obesity. The relationship of LEP and ADPN with anthropometric measures is of clinical interest because it may aid the diagnosis of hyperleptinemia without an initial invasive test and has been widely explored. However, these relationships have been poorly investigated in obese adults.

Objectives: To assess the relationship of LEP and ADPN with other circulating fat markers, physical capacity, behaviors, and anthropometric indices in a population of overweight and obese Chinese university students, LEP and ADPN levels, as well as behavioral, anthropometric, biochemical, and performance characteristics were measured.

Materials and Methods: The 40 respondents were assigned to a control group. A total of 17 anthropometric parameters, 8 questionnaires (investigating quality of life, sleep, eating, perceived functioning, stress, and depression), 9 biochemical parameters, and 12 functional parameters were investigated.

Results: In contrast to previous studies, the study found an unusual strong relationship between LEP and ADPN ($r = 0.961$, $p = 0.000$) that can be related to ethnicity. Meanwhile, LEP and ADPN were associated with stress and bodily pain. A total of 12 anthropometric measures were also associated with LEP/ADPN levels. Moreover, LEP/ADPN was related to lower limb, hand, abdominal strength; blood pressure and basic metabolism. However, this study not find an association with sleep and eating habits or cardiovascular fitness, which was measured in the form of resting heart rate and VO_2 max.

Conclusions: This study finds a novel relationship between LEP and ADPN in obese Chinese college students and deserves further investigation.

Keywords: leptin, adiponectin, obese Chinese college students

SUBMISSION ID 30

A RANDOMIZED CROSSOVER DESIGN TRIAL OF A STUDY ON THE EFFECT OF THE CHINESE TRADITIONAL HEALTH QIGONG OF BADUANJIN ON THE IMMEDIATE RECOVERY OF EXERCISE FATIGUE

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Introduction: The effect of Baduanjin healthy Qigong on exercise-induced fatigue needs further study.

Objectives: This study aimed to explore the effects of the traditional Chinese health Qigong, Baduanjin, on immediate recovery after exercise fatigue.

Materials and Methods: This study used a randomized crossover design. We recruited 20 college students (13 males and 7 females) at Beijing Sport University and randomized the participants to immediate post-fatigue recovery using either the Baduanjin or slow-walking methods after fatigue modeling using the laboratory running table fatigue induction protocol, with a one-week interval between the two methods, which was washout period. The primary metrics selected for the experiment included heart rate just after exercise (HR1) and heart rate after intervention (HR2), subjective fatigue scale (RPE), and secondary metrics were respiratory mean power and lower limb muscle flexibility (quadriceps, hamstrings, calf triceps, and gluteus maximus).

Results: Before and after the intervention of Baduanjin, there were highly significant recovery effects in the primary indexes of immediate heart rate (HR1: 184.50 ± 6.33 BMP vs HR2: 102.25 ± 8.69 BMP, $p = 0.000$) and RPE (17.10 ± 0.64 vs 8.75 ± 0.97 , $p = 0.000$); and in the secondary indexes of lower limb

muscle flexibility, including popliteus ($61.65 \pm 11.69^\circ$ vs $65.15 \pm 9.55^\circ$, $p=0.004$), quadriceps ($11.48 \pm 4.07\text{CM}$ vs $10.36 \pm 3.52\text{CM}$, $p=0.001$), and calf triceps ($15.59 \pm 15.21\text{CM}$ vs $17.43 \pm 16.55\text{CM}$, $p=0.002$) had significant recovery effects. There were highly significant recovery effects on immediate heart rate (HR1: 181.70 ± 5.33 BMP vs HR2: 102.90 ± 14.35 BMP, $p=0.000$), RPE (17.25 ± 0.72 vs 9.05 ± 1.10 , $p=0.000$), and calf triceps flexibility (11.55 ± 3.89 CM vs 12.61 ± 3.49 CM, $p=0.001$) all showed highly significant recovery. A comparison of pre-and post-intervention differences between groups revealed that Baduanjin was superior to slow walking for immediate flexibility recovery of the quadriceps ($-1.115 \pm 1.3140035\text{CM}$ vs $0.2798 \pm 0.6677378\text{CM}$, $p=0.001$) and hamstrings ($3.50 \pm 4.741\text{CM}$ vs $-0.90 \pm 5.647\text{CM}$, $p=0.026$).

Conclusions: Both Baduanjin and slow walking are effective for immediate recovery from exercise fatigue. Baduanjin can be used as one of the methods for immediate recovery from exercise fatigue in the future.

Keywords: baduanjin, slow walking, exercise fatigue recovery, randomized crossover design

SUBMISSION ID 327

TRENDS OF CHANGES IN PHYSICAL ACTIVITY OF OLDER ADULTS IN POLAND 2009-2019. THE RESULTS OF THE REPRESENTATIVE POPULATION-BASED POLSENIOR2 STUDY

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Introduction: Health benefits of regular physical activity (PA) have been widely recognized in older subjects.

Objectives: The aim of this study was to present the data on leisure time physical activity (LTPA) of Polish citizens aged 65 years and over in the representative population-based PolSenior2 project conducted between 2018 and 2019 and to compare with PolSenior study conducted 10 years earlier.

Materials and Methods: The data of the 4,932 participants (2,430 men and 2,502 women) aged over 65 years from the PolSenior2 study with complete PA data were related to the results of the 4,813 participants (2,488 men and 2,325 women) aged 65 and more from the PolSenior study. The methodology was the same in the PolSenior2 as in the PolSenior study. PA data was reviewed to determine whether the respondents fulfil the recommendations of the American College of Sports Medicine (ACSM) on cardiorespiratory exercise training.

Results: Gardening (51.5%), walking (35.3%) and cycling (31.2%) were the most popular physical activities, however, with lower prevalence as compared to PolSenior. The percentage of older subjects engaged in swimming, dancing and running or jogging (borderline significance) increased in PolSenior2 as compared to PolSenior study. Overall adherence to the ACSM recommendations was comparable ($p=0.064$) in PolSenior2 vs. PolSenior (35.4% vs. 33.6%). Higher adherence was found for age cohort of 65-69 years, for the residents of villages, for farmers, and for other than blue and white collar workers social class group. In contrast, the adherence to ACSM guidelines was lower for the residents of cities with 200,000-500,000 inhabitants in the PolSenior2 as compared to the PolSenior survey.

Conclusions: Health policies should concentrate on a combination of sustaining existing favourable PA habits and developing access and motivation to participate in sports activities characteristic of western countries.

Keywords: physical activity, older adults, poland, leisure time physical activity

SUBMISSION ID 253

THE EPIDEMIOLOGY OF INJURY AND ILLNESS DURING THE FIRST WOMEN'S NATIONAL VOLLEYBALL LEAGUE IN SAUDI ARABIA.

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Introduction: The number of volleyball players worldwide makes volleyball one of the most popular sports. Jumping, landing, hitting, and blocking movements are the most common causes of volleyball injuries, with jumping injuries accounting for the most acute injuries and overuse injuries in sports. The explosive movements and short recovery periods included during volleyball games make it one of the most intense anaerobic sports worldwide.

Objectives: The study aims to determine the prevalence of sports-related injuries and illnesses during the first-ever women's national volleyball league in Saudi Arabia for the season 2024 by implementing an International Olympic Committee injury and illness surveillance protocol.

Materials and Methods: The medical staff of the participating teams (n=8) were requested to report all new injuries and illnesses during matches and training daily throughout the event from April 01, 2024, until July 31, 2024. Exposure (number of player hours) during matches will be calculated for all the players (n=120).

Results: During the competition, 5.7% of accredited players suffered injuries, with a rate of 24 match injuries per 1,000 player-hours. Middle Hitters faced the highest risk 5.75% (n=7). Most injuries were less severe, with joint sprains being common. In total, 1.6% (n=2) of the injuries were overuse injuries, and recurrence of previous injury. The respiratory tract (the upper and the lower respiratory tract) was the most affected (n=2, 1.6 %).

Conclusions: The debut of the women's national volleyball league in Saudi Arabia showcased a notable prevalence of injuries, particularly lower extremity injuries, emphasizing the need for focused injury prevention strategies.

Keywords: epidemiology, sport, volleyball, injury rate, female athletes, Saudi Arabia

SUBMISSION ID 431

INTEGRATED HEALTH APPROACH: MUSCLE PHYSIOTHERAPY AND PHYSICAL ACTIVITY FOR THE B OF CHRONIC TYPE 2 DIABETES

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Introduction: The prevalence of Type 2 Diabetes Mellitus (T2DM) has rapidly increased globally due to lifestyle changes, such as reduced physical activity and rising obesity rates. T2DM is characterized by its insidious onset, insulin resistance, and partial insulin secretion by pancreatic β cells, often accompanied by hypertriglyceridemia, as evidenced by altered levels of glycated hemoglobin (HbA1c) and triglycerides. Major endocrinology organizations, such as the American Diabetes Association, approve physical exercise as a therapeutic intervention.

Objectives: This study aimed to analyze whether lifestyle changes, such as physical exercise and muscle physiotherapy interventions, can control and reduce HbA1c and triglyceride levels in T2DM patients within primary healthcare. Seven individuals with early-stage T2DM from the public health system were followed for three months.

Materials and Methods: Using the validated FANTASTIC instrument, patients adhered to a diet accompanied by moderate exercise. Patients were monitored pre- and post-exercise, with capillary blood glucose and anthropometric parameters measured. Laboratory tests for HbA1c, HDL, and triglycerides were conducted at the beginning and end of the three months. Based on the normality assessment using the Shapiro-Wilk test, either the paired T-test or the Wilcoxon test was selected for statistical analysis.

Results: The data showed a 140% increase in the mean exercise score on the FANTASTIC questionnaire with the inclusion of muscle physiotherapy activities. A weighted mean reduction in pre- and post-exercise blood glucose of 45.36 mg/dL, with a standard deviation of 26.38, was confirmed by paired T-test ($p < 0.0001$), indicating significant individual variation. Additionally, there was a mean reduction in HbA1c of 6.94%. Results indicate that physical exercise and muscle physiotherapy significantly influenced primary healthcare capillary blood glucose reduction and T2DM control.

Conclusions: The proposed interventions effectively promoted positive changes in participants' habits and health and can be replicated in other public health systems.

Keywords: primary care, lifestyle, diabetes, exercise, patient care

SUBMISSION ID 83

COMMON ECG FEATURES IN ATHLETES WITH VARIOUS FORMS OF DISABILITY

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Introduction: Adaptive sport requires a special attention due to its social and ethical significance as according to WHO data more than one billion of individuals have disabilities. Although it is known that deafness in some cases is associated with QT prolongation, there is lack of data of electrophysiologic features in individuals with other forms of disabilities. Better understanding of heart functioning in athletes with inherited health conditions would provide with safe training prescriptions.

Objectives: The aim is to study common heart electrophysiologic features in athletes with various forms and severity of disabilities.

Materials and Methods: Seventy-nine athletes with various forms and severity of disabilities from different sports disciplines aged 9-46 years were recruited for the study. Each participant fulfilled health questionnaire, underwent resting and 12-leads ECG stress exercise-testing with the use of individually selected test protocol. Overall ECG recordings were manually analyzed. Further statistical analysis was undertaken.

Results: The obtained ECG data set showed normal electrophysiologic both resting as well as stress-test cardiac response. Although prolonged QTc at rest was identified only in 2% of athletes, we found that mean QTc value within the whole studied group was $411,4 \pm 23,6$ (350-478) ms, basically considered as potentially lengthened in reference to QT scale normal values and required additional observations. Comparable values were observed across all studied subgroups of disabled athletes irrespective of type of sport, age, and form of disability. In particular, professional deaf track-and-field athletes had QTc - $414,6 \pm 24,2$ ms, sledge hockey-players with multiple disabilities - $411,3 \pm 23,8$ ms, young soccer-players with cerebral palsy - $413,9 \pm 25,9$ ms, blinded amateur runners - $401,6 \pm 30,6$ ms, professional wheel-chair tennis-players - $405,4 \pm 25,4$ ms, young deaf swimmers - $419,14 \pm 14,3$ ms.

Conclusions: As the obtained data showed no significant difference in QTc values in athletes irrespective of form of disabilities there's a need of further precise determination of nature and predispose conditions for QT-interval undefined lengthening.

Keywords: ECG, disabled athletes, electrophysiologic features, cardiac adaptation

SUBMISSION ID 127

SUBJECTIVE ASSESSMENT OF THE CHARACTERISTICS AND FACTORS ASSOCIATED WITH SLEEP QUALITY AMONGST ELITE SAUDI ATHLETES. A PRELIMINARY RESULTS.

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Introduction: The amount, quality, and timing of sleep are considered important for athletes' ability to train, maximize training responses, and recover. Recent studies indicate that professional athletes seem to experience significant sleeping problems. However, data related to the characteristics and factors associated with Sleep Quality Amongst Elite Saudi athletes are lacking.

Objectives: The purpose of this study is to explore the characteristics and factors associated with sleep quality among elite Saudi athletes using self-reported validated sleep questionnaires.

Materials and Methods: The study will be conducted among the elite athletes of Saudi Arabia for a period of 15 months duration. A total of 400 Saudi sportsmen athletes Arabic-speaking participants will be recruited and met the inclusion criteria and completed the self-reported questionnaires will be recruited for the present study. Athletics are selected based on specific eligibility criteria. The study will include a wide age range (20–45 years). Informed written consent was provided by all athletes, with ethical approval granted by the Research Ethics Committee of Sultan Bin Abdulaziz Humanitarian City (IRB NO: 109-2023-IRB). All participants will be screening using Athlete Sleep Screening Questionnaire (ASSQ).

Results: First stage: The authors were conducted a pilot study as a trial collection data among 20 athletes to check the understandability and readability for 20 athletes. Also, to assess how much time to completed the survey. Second stage: The project is still ongoing and the preliminary results of elite athletes from different group sports (soccer, basketball, volleyball and handball) will be available and to be presented during conference.

Conclusions: Subjectively reported effective sleep was related to the sleep quality of elite Saudi athletes.

Keywords: sleep quality, elite athletes, Saudi Arabia, self-reported questionnaires, athletic performance

SUBMISSION ID 240

PREVALENCE OF POSTURAL DISORDERS IN CHILDREN AGED 10-15 YEARS IN ALBANIA

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Introduction: Scoliosis and other spinal deformities are prevalent among children and adolescents during growth. A survey of 'Health Behavior in School-Age Children' conducted by the Albanian Institute of Public Health showed that 27.3 % of children aged 11- 15 in Albania reported back pain. School screening of postural disorders can help predict whether back pain referred by students is associated with spinal deformities.

Objectives: The study's purpose was to assess the prevalence of postural disorders in students in the 5th to 8th grades in the public schools of Tirana.

Materials and Methods: This study was conducted in the city of Tirana, in nine public schools of basic education, with students aged 10 to 15. Physiotherapists examined students for postural disorders using the Adams test and scoliometer for scoliosis and the Arcometer for thoracic spine kyphosis.

Results: 2020 participants were examined for postural disorders, aged 10-15 years, 1032 boys (51.1%) and 988 girls (48.9%). Three hundred eighty-three students (19%) resulted with the positive Adams test, 124 boys (12.01% of boys) and 259 girls (26.21% of girls). As the age increases from 10 to 14 years, the prevalence of a positive Adams test increases by 1.64 times. The 13–14-year age group has the highest prevalence of a positive Adams test, respectively 24.07% and 20.71%. 301 students (14.9%) had thoracic hyperkyphosis, with the convex curvature of the thoracic spine 47.81 ± 8.23 ; 41-93 grade (mean \pm SD; min-max)

Conclusions: The prevalence of postural problems in younger adolescents, which increases with age, underscores the necessity of early screening programs. Mandatory screening for postural disorders for students in the fifth grade of elementary school, with school doctors and physical education teachers as the first examiners, is not only beneficial but also cost-effective, potentially preventing long-term health issues.

Keywords: scoliosis, hyperkyphosis, examination, health, spine, posture

SUBMISSION ID 299

MYOCARDIAL BRIDGE IN A YOUNG ATHLETE

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Introduction: Myocardial bridge (MB), a congenital coronary anomaly, is a clinical condition with several possible manifestations and its clinical relevance is debated. MB is present when a segment of a major epicardial coronary artery, the ‘tunnelled artery’, runs intramurally through the myocardium. With each systole, the coronary artery is constricted. MB has been associated with arrhythmias, angina, depressed left ventricular function and rarely with sudden cardiac death.

Objectives: We present the case of a 16 years old football player. During a medical examination for suitability for competitive sport activity, the rest ECG showed complex ventricular ectopic beats; for this reason, a stress test was performed and ventricular ectopics persisted. The echocardiogram was normal. To rule out a coronary etiology of these ectopic beats, we carried out a CT angiography and the presence of a MB on proximal left anterior descending artery emerged.

Materials and Methods: In this patient we decided to grant competitive eligibility to play football, but to carry out a 6 months follow-up. If ECG anomalies suggestive of myocardial ischemia will appear, the feasibility of invasive treatment (PCI or CABG) will be evaluated. Additional research is needed to define patients in whom myocardial bridging is potentially pathologic, and randomized trials are needed to assess the natural history, patient selection, and therapeutic approaches; in the absence of clinical trials to guide the optimal treatment plan, a shared decision-making approach is recommended. With this case report we would like to underline the importance of always investigating the presence of arrhythmias in competitive athletes.

Results: Compared to coronary angiography, both intravascular ultrasound and CT-angiography provide important information with respect to the morphological aspects of myocardial bridge, even if these modalities are limited in defining the hemodynamic and clinical significance of MB.

Conclusions: Medical treatment generally includes Calcium channel blockers and Beta Blockers. Nitrates should be avoided because symptoms may worsen. Intracoronary stents and surgery have been attempted in selected patients.

Keywords: myocardial bridge, coronary artery, cardiac death, intravascular

SUBMISSION ID 289

RISK AND PROTECTIVE FACTORS IN THE INCIDENCE OF INJURIES IN EUROPEAN FLAG FOOTBALL NATIONAL TEAMS

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Introduction: Flag Football is a relatively new but highly practiced and extended worldwide sport, with similar movements but very different biomechanics charges to American Football. A lot of differences are showed in scientific response and professional medical services in relation to American Football.

Objectives: Objective is to identify risks and preventive factors to develop injuries.

Materials and Methods: 139 players (48 females) from national selections of the International Federation of American Football (IFAF) were involved in the study, anthropometric variables in accordance of International Society of Advancement in Kineanthropometry (ISAK) protocol were recorded, historical of injuries, preventive actions and sports experience were collected by a questionnaire.

Results: Results show that take preventive actions such as muscle discharges, cryotherapy and prophylactic exercises, decrease 89% the risk of present injuries (Odds= 0.112 IC= 0.030 – 0.424), about player positions, defensive back has an increased risk of 28.7 times to develop injuries in comparison to Quarterback (Odds= 28.724 IC= 2.096 – 393.716), also we identify that each centimeter increase of relaxed arm circumference, lateral tibial Height and brachial index, represents a higher risk of injury (Odds= 3.129 IC=1.066 – 9.182; Odds= 1.806 IC= 1.026 – 3.177; Odds= 1.385 IC= 1.039 –1.846 respectively), but each centimeter of flexed arm decrease the risk 75% (Odds= 0.249 IC= 0.084 – 0.733).

Conclusions: Identify anthropometric characteristics and its relation to injury risks allows the medical teams to take actions to prevent injuries by modulating body composition, specific strength training and prevention with recovery therapy methods.

Keywords: injuries, flag football, training load, preventive factors

SUBMISSION ID 190

A COMPARISON OF THE ACCURACY OF NOLLA'S AND DEMIRJIAN'S METHODS OF DENTAL AGE ESTIMATION BASED ON PANORAMIC RADIOGRAPHY IN UAE POPULATION

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Introduction: Dental age assessment is one of the most reliable methods of chronological age estimation used for criminal, forensic, and anthropologic purposes. It is also used in sports to confirm the age of the patient. Various investigators proposed several methods. Nolla's and Demirjian methods are well-established dental age estimations and are applied to different populations. This study aimed to assess and check Nolla's and Demirjian method's accuracy with chronological age in UAE.

Objectives: To determine the accuracy of different methods in different age groups/genders. To assess the actual variability between the chronological age and dental age.

Materials and Methods: After obtaining Ethical approval, patient details and OPGs of ages 4 to 18 years were acquired from the archives of RAK College of Dental Sciences after following inclusion and exclusion criteria. The details including the age, gender, and registration no. of the patient details were organized into an Excel sheet. Two researchers independently analysed the OPGs manually and compared the stages of development of the tooth given according to Nolla's and Demirjian's methods.

Results: 386 OPGs of different age ranges were analysed. Pearson's correlation showed a perfect positive correlation between Demirjian's methods ($r=0.940$) with Chronological age and a good correlation between Nolla's method with Chronological age ($r=0.859$).

Conclusions: Demirjian's method is a good predictor for Chronological age assessment. Nolla's age slightly underestimates the chronological age. Dental age estimation can be used to estimate chronological age if the date of birth is unknown in sports activities or competitions.

Keywords: demirjian's method, nolla's method, dental age estimation, OPG

SUBMISSION ID 286

PROTECTIVE MOUTHGUARDS: CONTACT SPORTS AND DENTISTRY

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Introduction: Participation in sport carries an increased risk of sustaining dental trauma which can be reduced by the use of a mouthguard. The mouthguard is a resilient device or appliance that is placed inside the mouth to protect against injuries to the teeth, lacerations to the mouth, and fractures and dislocations of the jaw. There are different types of mouthguards available which vary in design, cost, and the level of protection provided. Dentists are encouraged to educate patients regarding the risks of oral injury in sports, fabricate properly fitted mouthguards, and provide appropriate awareness on mouthguard types and their protective properties, costs, and benefits.

Objectives: To review the available literature to enlighten the importance of suitable customized mouthguards during sports activity

Materials and Methods: We conducted a comprehensive search using search terms “mouthguards”, “sports guard”, “protective guard”, “mouthpiece” and “gum shields” AND “dental trauma”, “teeth injury”, “teeth protection”. The search engines used are PubMed, Scopus, Web of Sciences, Ebscohost, CINHALL, and Proquest. Apart from these search engines, a manual search of the references of selected articles was done.

Results: The major materials used in mouth guards are polyvinyl acetate-polyethylene or ethylene vinyl acetate (EVA) copolymer; (ii) polyvinylchloride; (iii) latex rubber; (iv) acrylic resin; and (v) polyurethane. Studies have concluded that injury rates are lower in sportspersons wearing mouthguards than those without mouthguards.

Conclusions: Published literature concludes that mouthguards offer significant protection against orofacial injuries during sports. Dentists play a vital role in educating, customizing, designing, and fabricating mouthguards.

Keywords: mouthguard, contact sports, dentistry, dental injury

SUBMISSION ID 247

ANTHROPOMETRIC AND PHYSICAL FITNESS AMONG FEMALE EMIRATI SCHOOL CHILDREN: EFFECT OF AGE AND MATURITY STATUS

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Introduction: Substantial evidence indicates that children’s physical fitness levels are markers of their lifestyle, health profiles and future chronic disease predictors.

Objectives: This study aimed to (i) determine physical fitness and anthropometric characteristics of Emirati female children, (ii) assess the prevalence of overweight and obesity according to chronological age and years from peak height velocity.

Materials and Methods: A school-based sample of 1,256 female children from Sharjah-UAE (U8; n = 234, U10; n = 300, U12; n = 328, U14; n = 395), was involved in a cross-sectional survey. Measurements included maturity offset (i.e. chronological age, estimated age at peak height velocity), morphological characteristics (i.e., body mass, height, sitting height, leg length, BMI percentile), and fitness characteristics, i.e. 20-m sprint, sit & reach, standing long jump (SLJ), medicine ball throw (MBT), handgrip strength (HG). Children were divided into three groups of maturity: early, normal, and late maturing (Mirwald et al. 2002).

Results: ANOVA indicated a main effect of age and maturity status for the height, body mass, BMI, 20-m sprint, MBT, and SLJ ($p < 0.001$, large effect size). Performance enhancement was observed from 8 to 10 years at the SLJ and 20-m sprint. For HG, performance enhancement was observed from 8 to 10 and from 12 to 14 years ($p < 0.01$). A decrease in flexibility was noted from 8 to 10 years and from 10 to 12 years ($p < 0.01$). In addition, MBT performance improved throughout the years ($p < 0.01$). The overall prevalence of overweight and obesity was 14.6% and 19.6%, respectively. The proportion of obese children increases with age and maturity status ($p < 0.01$).

Conclusions: These findings highlight that anthropometric and physical characteristics develop across age categories and maturity status. This study confirms the high incidence of overweight and obesity in Sharjah children. Public health interventions should be implemented to curb the obesity

epidemic in children.

Keywords: peak height velocity, female school children, fitness assessment, obesity

SUBMISSION ID 320

EFFECT OF INSPIRATORY MUSCLE TRAINING ON CYCLISTS PERFORMANCE

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Introduction: Inspiratory muscle training (IMT) has gained attention as a potential strategy to improve respiratory muscle function and exercise performance in cyclists.

Objectives: This systematic review aims to summarize and evaluate the current evidence regarding the effects of IMT on cyclists' performance outcomes.

Materials and Methods: A comprehensive search was conducted in electronic databases (PubMed, Scopus, chocrane) using keywords related to IMT, cycling, respiratory muscle training, and performance. Studies were included if they were randomized controlled trials (RCTs) or controlled trials that assessed the effects of IMT on cyclists' performance parameters.

Results: A total of 12 studies met the inclusion criteria and were included in the review. The studies varied in terms of IMT protocols, participant characteristics, and outcome measures. Overall, the majority of studies reported positive effects of IMT on cycling performance, including improvements in maximal oxygen uptake (VO₂max), time trial performance, and respiratory muscle strength.

Conclusions: Based on the current evidence, IMT appears to have positive effects on cyclists' performance, particularly in terms of respiratory muscle function and endurance capacity. Future research should focus on establishing optimal IMT protocols and investigating long-term effects on cycling performance.

Keywords: inspiratory muscle training, cyclists' performance, respiratory muscle function, endurance capacity, exercise performance

SUBMISSION ID 380

EFFECT OF CORE STABILITY TRAINING WITH HMB SUPPLEMENTATION ON PAIN, FUNCTION AND LUMBAR MUSCLE STRENGTH IN PATIENTS SPINAL CANAL STENOSIS

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Introduction: Spinal canal stenosis is a prevalent disease which causes back pain and radicular leg pain with changes in intensity during activities such as walking. Symptoms of the disease, especially pain, can affect the quality of life of patients.

Objectives: The aim of this study was to determine the effect of HMB (hydroxymethyl butyrate) supplement along with central stability exercises on pain and function in patients with spinal stenosis.

Materials and Methods: This study was a randomized clinical trial. Patients referred to the sports medicine clinic of Sina Hospital in Tehran, were divided into two groups of control and intervention. The intervention group received core stability training and HMB supplement for 6 weeks and the control group received only core stability training for 6 weeks.

Results: Finally, 42 patients including 21 patients in the control group and 21 patients in the intervention group were evaluated, of which 27 were female (64.3%) and 15 were male (35.7) and the mean age of the study population was 55.81 ± 6.55 . Pain intensity after the intervention was statistically significantly reduced in both groups, which was statistically significantly lower in the intervention group than the control group ($p < 0.001$). Also, the disability index in both groups had a statistically significant decrease after the intervention compared to before the intervention. This decrease in disability index in the intervention group was more significant than the control group ($p < 0.001$).

Conclusions: It seems that combination therapy of core stability exercises with HMB supplementation has a better effect on reducing pain and improving the function of patients with spinal

canal stenosis.

Keywords: core stability exercises, spinal canal stenosis, HMB, low back pain, muscle strength

SUBMISSION ID 381

A COMPARATIVE STUDY OF THE EFFECT OF HIGH INTENSITY INTERVAL EXERCISE (HIIT) AND MODERATE INTENSITY CONTINUOUS TRAINING (MICT) ON OBESITY INDICES IN OBESE PEOPLE

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Introduction: Obesity is one of the biggest problems in developed societies. One of the ways to prevent this problem is exercise. Due to the lack of time, facilities and costs, the type of exercise is important.

Objectives: We compared two types of common exercise for weight loss: Moderate Intensity Continuous Training (MICT) and High-Intensity Interval Training (HIIT).

Materials and Methods: We compared these two methods of exercise in terms of body mass, muscle mass, fat mass, sugar and fat profiles, and vitamin D₃ in overweight and obese people. We used 65%–75% of HR peak as exercise intensity of choice for MICT group and 85%–90% of HR peak for HIIT group. The two groups performed exercise three days a week according to a regulatory program under supervision for 8 weeks. Participants were randomly divided into two sports groups, and 17 participants conducted MICT, and 21 persons exercised HIIT.

Results: The participants included 38 individuals, of which 30 (78.9%) were women, and 8 (21.1%) were men. The age of these people ranged from 17 to 54 years with an average of 34.95. The effect of exercise type on weight loss, BMI reduction, and the fat mass reduction was significant, and the effect of HIIT exercise was reported to be more. However, the changes in muscle mass did not have a significant difference between the two exercises. Regarding the biochemical indicators, there was no significant difference between the two types of exercises.

Conclusions: HIIT exercise for anthropometric changes is more effective than the MICT exercise; however, the two exercises are not significantly different due to the significant reduction in fat profile.

Keywords: high intensity interval training, moderate intensity continuous training, obesity, HIIT, MICT

SUBMISSION ID 256

SPORTS INJURY AND ILLNESS INCIDENCE IN THE INTERNATIONAL TRANSPLANT GAME: A PROSPECTIVE STUDY OF THAI TEAM

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Introduction: The Transplant Games are a multisport event that showcases transplant athletes and highlights the benefits of organ transplantation. Since 1989, Thailand has actively participated in this event, achieving noteworthy success.

Objective: This study aims to investigate the prevalence of injuries and illnesses among Thai national athletes at the International Transplant Games.

Materials and Methods: The prospective descriptive epidemiological study involved collaboration with the medical team leader to gather reports documented using the standardized form of the International Olympic Committee.

Results: The results revealed that during the 2017- 2019 International Transplant Games, a total of 139 athletes underwent comprehensive analysis. Among this group, 60% were male, with kidney transplant recipients representing a significant majority at 79%. There was a total of 12 injuries and 62 illnesses, leading to an overall incidence rate of 8.6 injuries and 44.6 illnesses per 100 athletes. Notably, injuries predominantly affected the lower extremities, accounting for 58%, with knee and thigh injuries being the most prevalent at 33%. Strains and contusions were the most common types

of injuries, collectively comprising 50% and primarily attributed to overuse, which accounted for 33%. In terms of illnesses, musculoskeletal issues were encountered most frequently at 43.5%, followed closely by respiratory tract concerns at 37%. Pain was identified as the predominant symptom, observed in 67.7% of cases, with exercise -induced conditions identified as the primary cause of illness, accounting for 38.7%.

Conclusions: Injuries among transplant athletes are often due to overuse, similar to patterns in non-transplant athletes, indicating that organ transplantation does not lead to unique or severe injuries. However, respiratory illness incidence is much common than non-transplant athletes. Immunosuppressive medications increase infection risk, yet most injuries and illnesses are minor and don't deter athletes from participating. Understanding these patterns emphasizes the need for tailored preventive measures for their health and performance in sports.

Keywords: transplantgames, sports injury, surveillance, transplant athletes, epidemiological study

SUBMISSION ID 255

IMPACT OF DIETS WITH DIVERSE GLYCEMIC INDEX ON EXERCISE PERFORMANCE IN MEN CROSSFIT PRACTICIONERS

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Introduction: Nowadays more importance is attached to a healthy lifestyle. Key factors are physical activity and a proper nutrition. CrossFit has become popular in the field of physical activity. Therefore, it is important to evaluate the association of accurate training programs with optimal nutrition.

Objectives: This study aims to investigate the impact of low and high glycemic index (GI) diets on athletes' performance and body composition (BC).

Material and Methods: 13 males were divided into two groups. One (n = 7) was on low GI diet and the second one (n = 6) was on high GI diet. Diet intervention took 4 weeks. BC and total body weight (TBW) were measured. Groups were tested with Fight Gone Bad (FGB) CrossFit workout. Five exercises were performed: wall ball, sumo deadlift high pull, box jump, push press, row - before and after diet intervention.

Results: Athletes with a low GI achieved greater effects in reducing TBW (p=0,046). In group with low GI, exercise capacity was higher, both in terms of the overall FGB test and in 3 out of 5 exercises performed as part of the FGB test. Participants following a high GI diet obtained better results in only 1 of the FGB exercises.

Conclusions: This research proves that a diet with a low GI allows for obtaining more favorable and desirable effects for CrossFit athletes in terms of sports performance and BC

Keywords: crossfit, glycemic index, exercise capacity, body weight, body composition

SUBMISSION ID 394

STRENGTHENING THE ANTI-DOPING FIGHT IN RECREATIONAL SPORTS IN CYPRUS

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Introduction: The use of doping substances in recreational sports is a growing concern that has not been well-studied in Sports Medicine literature. This study was part of a European program to assess the use of Performance and Appearance-Enhancing Substances (PAES) among recreational exercisers in five European countries.

Objectives: The study aimed to assess the prevalence of controlled Performance and Appearance-Enhancing Substances used by recreational exercisers in Gyms and Fitness Clubs in Cyprus and other European Countries. The goal was to develop interventions to prevent doping among young athletes

in fitness clubs and gyms.

Materials and Methods: Nearly 800 young people aged 16-25 from Cyprus, Germany, Greece, Italy, and the UK were surveyed about their use of controlled substances to enhance physical performance. 499 were male, 285 were female, and 10 did not disclose their gender.

Results: The study found that PAES use among 16-25-year-olds is widespread, with almost one out of four individuals in the sample having prior exposure. Higher rates were observed in Greece and Cyprus.

Conclusions: The use of controlled Performance and Appearance-Enhancing Substances (PAES) is still increasing in amateur sports and exercise settings. According to the Cyprus Sports Medicine & Research Center, this highlights the need for a policy response through scientifically based educational interventions.

Keywords: anti-doping, recreational sports, performance and appearance-enhancing substances (PAES), prevalence study, educational interventions

SUBMISSION ID 153

ASSESSING ANTI-DOPING KNOWLEDGE AMONG SERBIAN ELITE ATHLETES

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Introduction: Anti-doping education is of the utmost importance and plays a pivotal role in the fight against doping in sport. Athletes are obliged to recognize and know all rules related to anti-doping, which are of fundamental importance for providing fairness in sport.

Objectives: This study aimed to assess the anti-doping knowledge among elite Serbian athletes in order to implement potential future interventions.

Materials and Methods: The study was conducted in November 2023, with a convenient sample of 349 elite athletes in Serbia. Participants responded to an anonymized questionnaire consisting of 31 questions.

Results: Mean age of athletes was 23.3, 59.3% being male and 40.7% female. On average, athletes trained 16.21 hours weekly. The majority of athletes are competing on international level (71%), while 29% are national level athletes. A significant portion (83.67%) have received anti-doping education, and 51.5% had previously undergone doping control. While 89.1% were aware that the World Anti-Doping Agency (WADA) published a List of prohibited substances, only 48.1% knew that the List applies uniformly across all sports in the world. Substantial majority (86%) demonstrated knowledge of Therapeutic Use Exemptions (TUEs). Athletes displayed limited knowledge regarding anti-doping rules violations (ADRV). A part of participants (68.4%) was aware that "actions by an athlete or any other person aimed at discouraging or retaliate against reporting to authorities" is an ADRV, whereas the study showed that other violations were more recognized. Additionally, 95.4% of athletes are aware of principle of strict liability.

Conclusions: This extensive anti-doping study revealed that Serbian athletes are well-informed about anti-doping, since elite athletes in Serbia are obliged to attend anti-doping educations twice a year. Yet, it is advisable to find numerous, different approaches which could be used for the improvement of anti-doping education in Serbia.

Keywords: athletes, knowledge, anti-doping, education

SUBMISSION ID 376

EVALUATION THE EFFECT OF KINESIO TAPE AND LOW-DYE TAPE ON PAIN AND FUNCTION OF PATIENTS WITH PLANTAR FASCIITIS

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Introduction: Plantar fasciitis is one of the most common causes of heel pain. Kinesio tape and low-dye tape with completely different functions lead to achieving favorable effects in relieving the pain.

Objectives: The aim of this study was investigation of Kinesio tape and low-dye tape to comparison with each other as the treatment of plantar fasciitis.

Materials and Methods: In this clinical trial, patients who have been more than 4 weeks since the onset of their illness, were treated in two groups, A and B, with kinesio taping and the other group was treated with low dye. taping escaped and were visited and re- examined 1 and 72 hours after the treatment. Finally, the results of the AOFAS and VAS performance scale were compared in two groups.

Results: A total of 55 patients were evaluated (27 in the low dye group and 28 in the Kinesio group). There was no significant difference in the demographic variables. There was a significant difference based on the three measured times of pain intensity and performance index in both groups of patients ($P<0.001$). The pain intensity in the second time of measurement was significantly less than the first time, and also in the third time was significantly less than the second time ($P<0.001$). There was no significant difference between the two groups in the first and second time of measurement, but in the third time in the Kinesio group it was significantly lower than in the low dye group ($p=0.006$).

Conclusions: Both tapes are effective in reducing pain in the short term by creating relative immobility and improving local blood flow. Reducing pain, in turn, improves patients' performance.

Keywords: kinesio tape, low-dye tape, plantar fasciitis, pain, foot function

SUBMISSION ID 379

CARDIORESPIRATORY FITNESS AND CARDIOVASCULAR AUTONOMIC CONTROL IN PATIENTS WITH MILD TO MODERATE RELAPSING REMITTING MULTIPLE SCLEROSIS FOLLOWING 6 WEEKS ENDURANCE EXERCISE PROGRAM

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Introduction: Disorders observed in the course of MS are associated with either disease trend or lack of physical readiness. In MS patients, it is still unknown whether exercising can be effective in improving cardiac autonomic control and cardiorespiratory fitness however, this has been confirmed in cardiac disease patients, and normal human studies.

Objectives: The aim of this study is assessing the impact of the intervention on cardiac autonomic control and cardiorespiratory fitness during exercising in MS patients. This study can also demonstrate the etiology of exercise intolerance in MS patients and the effect of exercise on the etiologic factors.

Materials and Methods: In an interventional study, 21 female MS patients, type RR with EDSS (1-4) and the mean age of 35 ± 5.18 years were studied. All cases underwent CPET test on Ergometer before and after the intervention. The intervention comprises 18 endurance training sessions on stationary exercise bicycles with 70% HR peak or 60% vo_2 peak intensity under supervision and cardiac monitoring.

Results: The findings showed that overall, 17/24 variables of cardiac autonomic control and cardiorespiratory fitness (aerobic fitness) changed significantly ($p<0.05$). Moreover, all maximal variables before and after the exercise intervention were analyzed in an equal RER (mean=0.92).

Conclusions: It was observed that even a short-term 6-week aerobic exercise made some changes in the number of heart rate, consumed oxygen and autonomic disorder improvement and this shows that cardiorespiratory system of the MS patients develops adaptation to exercise. Autonomic disorder enhancement followed by exercising shows that the pathology is not only caused by CNS involvement and decreases through cardiorespiratory fitness resulting from exercising.

Keywords: multiple sclerosis, cardiorespiratory fitness, autonomic control, endurance exercise, oxygen uptake kinetic, cardiopulmonary exercise test

SUBMISSION ID 52

TIME ADDED TO PRIMARY CARE VISITS BY MUSCULOSKELETAL POINT OF CARE ULTRASOUND

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Introduction: Few studies have investigated time needed for Point of Care (POCUS) examinations,

but none have evaluated the time added to primary care patient visits by diagnostic musculoskeletal ultrasound examinations.

Objectives: This study aims to determine the time added to patient visits by musculoskeletal POCUS.

Materials and Methods: Patient charts were retrospectively examined from 8/11/2021-7/30/2022, recording the timestamp of when the physician started seeing the patient, and the timestamp of when the nurse discharged the patient. The clinic visits where ultrasound was used were compared with 120 randomly selected visits with the same clinician where ultrasound was not used.

Results: Over the 12-month period, 305 ultrasound examinations were performed in the primary care office, where 68 ultrasound examinations were musculoskeletal or soft tissue exams. The average patient visit with US was 42.3 minutes, and the average patient visit without US was 30.6 minutes. The average time added for musculoskeletal ultrasound was 11.6 minutes. The most commonly examined joint was the knee, which added less than average, only 3.0 minutes to the patient visit. Interestingly, if multiple or bilateral examinations were performed (like elbow and wrist) time added was less than average, only 4.9 minutes.

Conclusions: While the sample size is small, and there are many confounding variables, the difference in time added to the patient encounter in a primary care visit was statistically significant. Adding 11.6 minutes is similar to other studies which reviewed time added to ultrasound evaluations in the emergency department. This exploratory pilot is the first study to look at time added to patient visits by musculoskeletal POCUS examinations. This can prompt future research in office time management and patient satisfaction for POCUS examinations.

Keywords: point of care ultrasound, musculoskeletal examinations, primary care, time management, patient visit duration

SUBMISSION ID 62

EFFECT OF IMAGERY INTERVENTION ON MOOD-STATE AMONG NATIONAL LEVEL YOUTH FEMALE FOOTBALL PLAYERS

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Introduction: Female athletes have been the most remarkable set of athletes as they have shown resilience in the face of obstacles. Their contribution to Indian sports has been par excellence and they continue to grow tremendously in the arena of sports. The face of competition has changed and has brought about challenging circumstances. Thus, as India gears up for the 2024 Paris Olympics, the psychological profile of athletes, more so the female athletes are of prime importance.

Objectives: The present study utilized a quantitative approach to understand the relationship between pre and post test score on mood state among youth female football players.

Materials and Methods: The sample comprised of 15 national level youth female football players (under 17) from Women Football Academy under sports council of Kerala from Ernakulam District, Kerala. The questionnaire used were the POMS questionnaire which is developed by Douglas M. McNair was the developer of the sentence along with Maurice Lorr and Leo F. Droplemann in 1971. The statistics used were descriptive statistics and paired t-test.

Results: The study's outcome emphasized a noteworthy correlation between the pre-test and post-test score on mood state among youth female football players.

Conclusions: The study has immense applications in the field of intervention for female youth athletes and has added to the research database of the psychological indicators needed to understand the mood-states, mental health and well-being of female youth athletes.

Keywords: national level female youth football players, mood-states and imagery intervention

SUBMISSION ID 305

THE USE OF NUTRITIONAL SUPPLEMENTS AND PERFORMANCE ENHANCING SUBSTANCES IN PATIENTS- UMHLANGA, SOUTH AFRICA

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Introduction: Nutritional supplements play a key role in the lifestyle of a sizeable proportion of the population. The use of these supplements has grown substantially in the past decade. Nutritional sports supplements are dietary supplements commonly used by those involved in bodybuilding, athletics, and many other sports. Performance enhancing substances (PES) are defined as any substance that is used by athletes to heighten their abilities and enhance the performance in their sport participation.

Objectives: To determine the use of nutritional supplements and performance enhancing substances (PES) by patients, in a selected group of medical and physiotherapy practices.

Materials and Methods: The study was conducted at a total of four practices, which were two private medical and two physiotherapy practices, located in the suburb of Umhlanga, South Africa. The study consisted of data of completed questionnaires collected over a period of two months from 260 participants (n=260) aged between 18 to 55 years of age. The study used a cross-sectional method design with an anonymous self-administered questionnaire. Outcome measures of this study included the following; Age, gender, level of education, and occupation; Type of exercise, frequency, duration and intensity of exercise; Type of supplement used by the participants; Reasons for supplement and PES use; Source of information about supplements and PES; Attitudes and perceptions to the use of PES and nutritional supplements.

Results: The study consisted of data of completed questionnaires collected over a period of two months from 260 participants. Of the 260 participants in this study, more than half (60%) indicated that they did not consume supplements whilst about 40% indicated that they did use supplements. Of the participants, 95% answered “No” to the use of Performance Enhancing Substances, whilst 5% (n=13) reported use of PES. The primary reason selected by the participants overall for supplement use was to meet nutritional needs (31%), followed by those using supplements to increase energy levels (22%). The primary reasons for the usage of PES selected by the participants, were to accelerate healing (24%), to meet nutritional needs (24%), and to improve sport performance (19%). Across all exercise types, multivitamin usage was the highest, with a mean of 41% followed by protein supplements with a mean of 27% across the various exercise types. In terms of PES, Human Growth Hormone (HGH) had the highest usage, at an average frequency of 43% across all types of exercise participation.

Conclusions: The results of this study signify a fairly extensive use of nutritional supplements and evidence of some use of PES amongst medical practice and physiotherapy patients in the Umhlanga area of South Africa. From our study it is evident that physicians, healthcare providers and pharmacists, do not sufficiently engage their patients in conversation with reference to nutritional supplements and PES. Further research is necessary with respect to healthcare practitioner knowledge about supplements and PES. Sport organisations and the relevant stakeholders should offer more education to athletes both recreational and professional on the use of supplements and PES in sport.

Keywords: nutritional supplements, performance enhancing substances (PES), south africa, medical practice, physiotherapy patients

SUBMISSION ID 143

EFFICIENCY OF REHABILITATION IN LIMB ASYMMETRIES OF ACHILLES TENDINOPATHY FEMALE PATIENTS

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Introduction: Ankle pain is one of the most widely recognized wounds of the lower limbs. It is described by changes of ligament microstructure and is related with torment, enlarging, furthermore, a deficiency of capability. Albeit multifactorial in beginning, ligament mechanical overburden is viewed as the super contributing element. Between deviation might add to either the beginning or the ingenuity of musculoskeletal injury. Past exploration revealed that a between ankle pain is more noteworthy than 10-15% is related with expanded injury risk and diminished execution, while between imbalances lower than 10% for strength or capability are considered as threshold permitting get back

to-wear. Between appendage strength deviation might prompt non-symmetric stacking, which may thus expand the gamble of over-burdening, inconsistent power assimilation, and decreased security because of changes in engine conduct.

Objectives: To be sure, strength deviation has been accounted for to be a gamble factor for lower limb injury pain., recommending a negative effect of articulated between appendage contrasts. In this study, the rehabilitation effect of limb asymmetry in female Achilles tendon patients was analyzed.

Materials and Methods: We evaluated the effects of a 8-week exercise intervention mechanical, material, and morphological musculoskeletal characteristics and function in patients with heel pain (n = 44). Additionally, we investigated the relationship between asymmetry reductions and better patient-reported outcomes.

Results: At baseline, tendons with tendinopathy showed decreased tendon force ($p = 0.013$), decreased tendon stress ($p < 0.0001$), greater tendon cross-sectional area ($p < 0.001$).

Conclusions: The injured leg contrasts from the asymptomatic leg while helpful activity mediations meaningfully affect imbalances.

Keywords: heel pain, achilles tendinopathy, limb asymmetry

SUBMISSION ID 35

VIBROPERCUSSION EFFECT ON MUSCLE ENDURANCE INDICATORS AMONG STUDENT ATHLETES

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Introduction: Local vibropercussion effects on muscles actively involved during training in athletes are the subject of numerous scientific discussions and potentially act as a mechanism for effective recovery and improvement of athlete's performance.

Objectives: The purpose of the study is to evaluate, within the framework of a pilot clinical study, the possibilities of using vibropercussion as a means of muscle recovery under conditions of short-term physical activity.

Materials and Methods: The study was fully completed by 40 (100%) 2-6 years students of the Faculty of Medicine of the Russian National Research Medical University N.I. Pirogov" of the Ministry of Health of Russia, having a sports category in the discipline of hockey. The experimental group consisted of 20 (50.0%) participants who underwent vibropercussion massage of the calf muscle in response to a short-term isometric load; for a comparative group consisting of 20 (50.0%) participants, a period of passive physical rest was used as a method of muscle recovery. The load mode consisted of 4 approaches to the "calf raise" exercise, each approach performed until physiological muscle failure. The effectiveness of muscle recovery methods assessed using indicators of maximum voluntary contraction – MVC, as well as parameters the range of motion in the limb – ROM, in addition, the phenomena of delayed pain syndrome – DOMS assessed.

Results: In our pilot study, a 14.8% effect on the proportion of MVC was obtained when using vibropercussion as a method of muscle recovery compared with passive rest ($p < 0.001$). There was also a significant increase in the subjective experience of delayed DOMS pain syndrome by 18.7% when using vibropercussion ($p < 0.001$). Finally, ROM values weren't statistically significantly different between experimental and comparison groups ($p = 0.695$).

Conclusions: Despite a number of contradictions obtained as a result of comparing the data obtained from our study with previously published scientific works. Local vibropercussion is a relatively new and potentially effective mechanism for increasing the performance of athletes during the training process and competitions. The data obtained from the pilot study demonstrates the possibility of including this technique in the warm-up and post-exercise recovery program for athletes, but requires standardization of the protocol for use.

Keywords: vibropercussion, muscle recovery, muscular endurance

SUBMISSION ID 354

A COMPARATIVE ANALYSIS OF LOWER LIMB ACCELERATION BETWEEN THE LEFT AND RIGHT SIDES AMONG INDIAN FEMALE ROWERS

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Introduction: Rowing, a sport where symmetry and coordination is crucial, asymmetries in lower limb biomechanics can impact the athlete's career path adversely. Understanding these asymmetries is essential for optimizing performance and preventing injuries. This study aims to examine the differences in acceleration between the right and left hip and knee in national rowers, providing insights that could help in developing targeted interventions to enhance performance and reduce injury risk.

Objectives: The aim of this study is to analyse bilateral asymmetries in accelerations at the hip and knee among National rowers.

Materials and Methods: Ten female national rowers performed at their maximum for 30 seconds on an ergometer. Seventeen Inertial Measurement Units were used to measure accelerations of the hip and knee. Paired t-tests were conducted to analyse the difference between the right and left acceleration.

Results: The findings revealed a significant disparity in acceleration between the right hip ($M = 22.6$, $SD = 10.7$) and the left hip ($M = 14.9$, $SD = 3.4$), $t(9) = 2.3$, $p = .047$. The right knee ($M = 19.3$, $SD = 9.2$) and the left knee ($M = 13.4$, $SD = 4.4$), $t(9) = 2.8$, $p = .021$ also portrayed similar variations. These results demonstrate significant asymmetries in lower limb acceleration among the rowers.

Conclusions: These differences could affect the kinetic chain transfers and disturb the net forces across the oars and thus could potentially increase the risk of injuries and boat movements. Improving on these asymmetries can increase the net kinetic output, mandating a better work-energy ratio. Further research can unravel the causes of these imbalances and their effects on rowers' health and performance. Tailoring training programs to address these differences can optimize performance and energy utilization.

Keywords: rowing, asymmetry, acceleration, injury, female

SUBMISSION ID 298

DOES KINESIOLOGY TAPE RE-EDUCATE THE NEUROMUSCULAR JUNCTION AND INCREASE MUSCLE STRENGTH?

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Introduction: One of the stated benefits of kinesiology tape is to improve muscle tone and strength. H-reflex can be used to understand the neuro-physiological effect of kinesiology tape on muscles.

Objectives: This study was based on kinesiology tape retraining to investigate the role of neuromuscular junctions in increasing muscle strength.

Materials and Methods: Seventy healthy subjects (32 male and 38 female, age 21-405) were recruited randomly from health science center students at Kuwait University. The participants were separated into three categories. At random, a control and two experimental groups. Kinesiology tape was placed on the flexor carpi radialis muscle, and H-reflex and muscle strength will be recorded pre and post-taping in three different time intervals. (IRB # 637)

Results: Analysis of variance ANOVA showed no statistical difference in muscle strength in gram nor in H-reflex between all three groups before applying kinesiology taping, immediately after taping, 2 hours after taping, and 24 hours after taping. The excitatory group showed a slight increase in H-reflex amplitude over the 24 hours after taping, whereas. The inhibitory group showed a slight decrease in H-reflex amplitude over the 24 hours after taping.

Conclusions: Although these changes were not statistically significant, kinesiology tape might need to be applied for a longer period to activate the neuromuscular connections.

Keywords: kinesiology tape, muscle strength, neuromuscular circuit, hreflex

SUBMISSION ID 230

NUTRITION KNOWLEDGE AS A DETERMINANT OF REHABILITATION EFFICACY IN SPORT-RELATED INJURIES

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Introduction: Sports-related injuries pose a significant health and economic challenge globally, with the Kingdom of Saudi Arabia (KSA) being no exception. The role of nutrition knowledge (NK) in both sports performance and injury management is paramount.

Objectives: This study aimed to assess the levels of nutritional knowledge and explore the factors influencing it among injured athletes in the KSA, in order to determine the relationship between nutritional knowledge and the probability of injury recurrence.

Materials and Methods: This cross-sectional study was conducted in five regions (North, Central, South, East, and West) of the KSA between December 2023 and March 2024. An online survey was utilized to collect data, with invitations to participate being distributed to rehabilitation centers and hospitals across various regions of Saudi Arabia.

Results: The survey assessed NK levels and explored determinants of NK among injured athletes in Saudi Arabia. A total of 125 participants, comprising 96 men and 29 women, completed a self-reported structured questionnaire. The findings revealed that a considerable proportion of injured athletes exhibited a poor understanding of NK, with 68.8% achieving scores within the poor knowledge range. Furthermore, the study identified significant disparities in knowledge levels based on educational level ($P = 0.001$). In addition, a strong correlation was reported between good NK and a reduced likelihood of recurring injuries ($P = 0.039$).

Conclusions: These results highlight the need for targeted nutrition education to enhance injured athletes' rehabilitation and well-being. Addressing the poor knowledge of nutrition is therefore crucial in optimizing the recovery and performance outcomes of injured athletes in Saudi Arabia.

Keywords: sport injuries, sport nutrition knowledge, injury rehabilitation, educational interventions in sports

SUBMISSION ID 396

THE EFFECT OF EIGHT WEEKS OF RESPIRATORY MUSCLE TRAINING ON RESPIRATORY INDICES AND THE PERFORMANCE IN ADOLESCENT MALE SWIMMERS: A RANDOMIZED CONTROL TRIAL

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Introduction: Improvement in the strength of respiratory muscles following inspiratory muscle training (IMT) has been observed in the majority of athletes. However, there are contradictory results concerning its effect on athlete performance, especially among swimmers.

Objectives: This study aimed to evaluate the effect of the IMT program in combination with other routine exercises on increasing the performance of adolescent swimmers

Materials and Methods: The present study was conducted on professional swimmers who were divided into intervention and control groups. Both groups had identical routine training in their

team's camp. The intervention group was prescribed eight weeks of progressive IMT with a starting strength of 30% MIP daily, twice a day for three sets of 15 repetitions per set with a threshold resistance device. The control group was constantly trained with 15% maximum inspiratory pressure (MIP). Spirometric indices, the MIP, and the personal best time (50 meters PBT) of the swimming fifty meters were assessed before and after the trial.

Results: A total of 20 adolescent male swimmers (mean age 13.05 (2.01) years; body mass index 19.85 (2.31) kg/m²) were included in the study. The strength of the inspiratory muscles, forced expiratory volume in the first second (FEV1) and 50-meter PBT were significantly improved in the intervention group (p<0.005); however, forced vital capacity (FVC) and FEV1/EVC did not significantly improve compared to those in the control group (p>0.005).

Conclusions: The findings of this study indicate the importance of using IMT in the process of swimming education and could help coaches provide swimmers with more effective IMT protocols to maximize the benefits of training

Keywords: breathing exercises, swimming, athletic performance

SUBMISSION ID 68

FORMING AN ALLIANCE WITH MEDICAL STAFF TO STRENGTHEN SAFEGUARDING EFFORTS AGAINST TRAFFICKING IN SPORT: A FRAMEWORK PROPOSAL

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Introduction: Child exploitation is a grave concern within the sports community, necessitating a concerted effort to safeguard athlete well-being. This abstract presents a comprehensive framework designed to forge alliances between healthcare professionals, sports entities, and other institutions, aimed at mitigating risks and detecting exploitation early on.

Objectives: The primary goal of this proposal is to establish a framework for robust partnerships between medical and athletic staff of sports organizations and other institutions facilitating early detection and management of potential victims of exploitation. By leveraging the expertise and access of healthcare professionals, the goal is to create a proactive approach to safeguarding athlete welfare.

Materials and Methods: The framework comprises four main pillars: safeguarding, establishment, empowerment, and decoupling. Each pillar delineates specific strategies and action steps aimed at achieving the overarching goal of combatting child exploitation. Key methods include developing clinical protocols, disseminating educational programs, integrating safeguarding measures into existing practices, and fostering collaboration between stakeholders.

Results: Upon implementation, the framework aims to demonstrate promising outcomes in strengthening efforts to address child exploitation in the sports community. Collaborative efforts between healthcare professionals, sports entities and other institutions will lead to improved detection of potential victims, enhanced reporting mechanisms, and streamlined protocols for intervention and support.

Conclusions: In conclusion, the framework outlined in this abstract offers a systematic approach to tackling child exploitation in sports settings by fostering alliances between medical and athletic staff, integrating safeguarding measures into organizational practices, and empowering stakeholders to take decisive action. This is a proactive and innovative strategy for safeguarding athlete well-being. Moving forward, continued collaboration will ensure the sustained success of efforts to combat child exploitation in sports.

Keywords: child exploitation, sport safety, medical alliance, safeguarding framework, athlete welfare

SUBMISSION ID 212

GINSENG'S ROLE IN ENHANCING RECOVERY AND PERFORMANCE IN PROFESSIONAL FEMALE CYCLISTS

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Introduction: Nutritional strategies are critical for reducing exercise-induced cardiac fatigue and improving athlete's performance. This research examines ginseng's effectiveness in promoting recovery and augmenting performance in female cyclists during demanding multi-day events.

Objectives: The study aims to evaluate ginseng's influence on essential recovery and performance metrics, particularly heart rate variability (HRV), resting heart rate, and overall athletic performance in Asia top-tier female cyclists.

Materials and Methods: Twelve elite Chinese female cyclists were randomly separated into a control group (CG) or a ginseng group (GG), with the latter consuming 5g of ginseng daily for 31 days. HRV and resting heart rate were measured before and after the intervention using POLAR software. The data were analyzed using SPSS.

Results: Post-competition data showed no significant changes in HRV indices (Total Power, Low Frequency, High Frequency, LF/HF ratio, SDNN, RMSSD) between CG and GG, indicating ginseng's limited effect on cardiac autonomic regulation. However, GG experienced a significant 7.2% reduction in resting heart rate post-event, signifying improved recovery. Notable increases in HRV metrics (LF: 823.8 ± 700.2 ms² to 899.2 ± 522.4 ms², HF: 2123.8 ± 700.2 ms² to 2749.8 ± 967.8 ms²) and a substantial decrease in resting heart rate (from 63.8 ± 1.8 bpm to 57.2 ± 3.1 bpm) were observed in GG. All GG cyclists finished the races, exceeding the CG's 66.7% completion rate.

Conclusions: The marked reduction in resting heart rate among the ginseng-supplemented cyclists highlights ginseng's potential to enhance cardiovascular recovery after exercise and to increase heart rate reserve during competitive events. These initial results support the use of ginseng to improve athletic performance and warrant further investigation into its long-term impact on athletes' cardiac health and stamina.

Keywords: ginseng, performance, recovery, female cyclist, heart rate variability

SUBMISSION ID 85

PRE-EXERCISE HEALTH SCREENING: A NECESSITY OR BARRIER TO ENGAGE IN PHYSICAL ACTIVITY?

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Introduction: Sedentary lifestyles are linked to increasing non-communicable diseases, highlighting physical activity (PA) as crucial for public health. Understanding pre-exercise screening practices and PA-related health literacy is key for health promotion effectiveness.

Objectives: This study assesses pre-exercise screening practices and health literacy among physical activity facility users in the UAE, examining influencing factors.

Materials and Methods: A comprehensive questionnaire was completed by 630 participants from various UAE physical activity facilities, gathering data on demographics, PA engagement, PA benefits knowledge, and pre-exercise screening practices. Data analysis was performed using SPSS Version 28, employing descriptive statistics.

Results: Analysis revealed that 496 (78.7%) of participants were unemployed, with 554 (87.6%) aged 18-34. Bachelor's degrees were held by 294 (46.7%), and 522 (82.9%) were single. Females comprised 329 (52%) of respondents. Only 186 (29.5%) underwent pre-exercise screening, with 377 (59.8%) not screened and 67 (10.6%) uncertain. Participants' understanding of the purpose of pre-exercise screening as risk stratification was 214 (34.1%), with prevention 257 (40.7%) being the most recognized goal. Using 2023 PARQ+, 401 (63.7%) were cleared for PA, while 229 (36.3%) warrant further evaluation due to existing medical conditions like osteoporosis, arthritis, back problems 64 (11.4%) or mental health issues, learning difficulties 38 (6.8%). Most 467 (83.4%) received no guidance from exercise professionals. However, 468 (74.3%) favoured compulsory pre-

exercise screening.

Conclusions: The findings emphasize the need to improve pre-exercise screening awareness and practices in the UAE. Addressing knowledge gaps and screening adoption barriers is essential for effective health promotion strategies. Mandatory screening protocols and professional guidance could enhance health literacy and PA facility safety.

Keywords: pre-exercise screening, physical activity, UAE, health literacy, exercise practices

SUBMISSION ID 307

EVALUATION OF MUSCLE EFFICIENCY AFTER ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

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Introduction: The return to sporting activities after ACL reconstruction takes place months after surgery, and adequate muscle control is necessary.

Objectives: To analyze strength and integrated electromyography (IEMG) data in order to determine the neuromuscular efficiency (NME) of the vastus lateralis (VL) and biceps femoris (BF) muscles in patients with anterior cruciate ligament (ACL) injuries, during the preoperative and postoperative periods; and to compare the injured limb at these two times, using the non-operated limb as a control.

Materials and Methods: The sample was composed of 12 male adults with unilateral ACL injuries and after a preoperative evaluation underwent a surgical procedure to reconstruct the ACL, followed by physiotherapy. The surgical procedures were performed by the same orthopedist, using the tendons from the semitendinosus and gracilis muscles as grafts, fixed in the femur by the Rigidfix® system and in the tibia using absorbable interference screws. This study was approved beforehand by the local ethics committee, in accordance with report no. 155/2021-CEP. The VL and BF muscles EMG signals and strength data were collected during three maximum isometric contractions in knee flexion and extension movements to determine the NME of the BF and VL muscles. The assessment protocol was applied before and two months after the ACL surgery.

Results: There was no difference in the NME of the VL muscle from before to after the operation. However, the NME of the BF in the non-operated limb was increased, two months after the surgery.

Conclusions: The neuromuscular efficiency of the VL and BF had still not been reestablished two months after the ACL reconstruction surgery, at the time when loading in the open kinetic chain within rehabilitation protocols is usually started.

Keywords: anterior cruciate ligament reconstruction, neuromuscular efficiency, vastus lateralis, biceps femoris, electromyography

SUBMISSION ID 365

H/Q ISOKINETIC RATIO OF BOTH KNEES IN MEN AND WOMEN WITH ACL RUPTURE

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Introduction: Anterior cruciate ligament (ACL) rupture is one of the most common sport injuries, particularly in women.

Objectives: The aim of this study was investigating the interaction between gender and injured limb on the isokinetic ratio of H/Q on both healthy and affected sides in patients with ACL rupture. This original study was semi-experimental, retrospective, and single blind.

Materials and Methods: In this study, eighteen athletes (7 women and 11 men) in the ages of 20 to 35 years participated voluntarily. All the participants had the experience of ACL partial tearing more than 6 months, which were symptom-free at the time of our study and they return to full activity by the help of conservative treatment. After warming up, they performed an isokinetic test for knee flexion and extension at a constant speed of 60° per second. Each movement was performed 10

times with three repetitions and the average ratio of hamstrings to quadriceps (H/Q) calculated by the device software was transferred to spss23 software and it was investigated through the statistical test of two-way analysis of variance ($\alpha=0.05$).

Results: In the results of the present study, the H/Q ratio was significantly higher in the affected leg of women and there was a significant difference between the healthy and affected sides in women ($P=0.044$). However, comparing the healthy and affected legs in men and also the comparison of the healthy leg of men and women and the affected leg of men and women were not significantly different ($P>0.05$).

Conclusions: Perhaps this can be attributed to the feeling of greater instability in the affected knee of women after ACL injury and their greater dependence on ACL. So, women show greater hamstring/quadriceps activity in their affected side to support their injured knee, and also compensate dynamic instability due to ACL deficiency.

Keywords: gender, knee isokinetic, ACL rupture, H/Q ratio

SUBMISSION ID 38

INCORPORATION OF A DUAL-TASK EXERCISE DOES NOT AFFECT UNSUPPORTED SEATED BALANCE IN ADAPTED PARA-SPORT ATHLETES

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Introduction: Balance is a key component of sports injury evaluation and rehabilitation. Athletes living with spinal cord injury and pathologies that secondarily affect the spinal cord, use a wheelchair for sport and daily living, making validated balance measures unreliable. As tandem gait often incorporates a dual-task condition to increase difficulty, dual-tasks have yet to be explored during balancing in para-sport athletes.

Objectives: To determine if dual-task exercise during unsupported sitting on a stable and unstable surface induces greater balance errors in adapted para-sport athletes.

Materials and Methods: 52 uninjured collegiate, adapted para-sport athletes from across the United States completed a balance assessment consisting of single and dual-task unsupported upright seated balancing on a stable and unstable surface out of their wheelchair. Measures included errors consistent with the Wheelchair Error Scoring System during the 2 (task) x 2 (surface) battery. Wilcoxon Signed-Rank Tests were used to compare single and dual-task errors between surfaces.

Results: There were no significant differences on errors between single and dual-task balancing on both stable ($Z=-1.000$, $p=0.317$) and unstable ($Z=-1.857$, $p=0.063$) surfaces. While the majority (96.1%, $n=50$) did not commit any errors during single task on the stable surface, only 1 athlete who committed errors, had an increase (+1 error) during dual-task. Regarding the unstable surface, only 5 (9.6%) athletes committed errors during single task, but a total of 4 athletes saw an increase in errors during the dual-task condition (+1 error $n=2$, +2 errors $n=2$).

Conclusions: Incorporating a dual-task conditioning during unsupported, seated balancing in adapted para-sport athletes does not increase the number of committed errors. It appears that dual-task effects may be more specific to dynamic postural control, rather than static balance, in which a wheeling task using wheelchair pressure mapping may be needed, due to lower extremity disability and impairments in this population.

Keywords: balance, postural control, disability, spinal cord injury, evaluation, rehabilitation

SUBMISSION ID 134

HEALTH GUARDING SOCIETY - MIND THE GAP FOR RED-S CASE STUDIES IN ELITE AND HIGH PERFORMANCE ATHLETES

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Introduction: Developing healthy societies need a framework for awareness of health. Elite and high-performance athletes do have a role model function in popular sports and also for our society

and daily living. Awareness and understanding of RED-S among those athletes, their personal surroundings, coaches, healthcare professionals, sport societies, associations and the general environment of competitive athletes is essential for the effective management of prevention, early identification and treatment of RED-S.

Objectives: One of the main motivations of our multi-professional and interdisciplinary approach is to evolve health- and safeguarding processes, which is commonly known as one of the main topics in scientific and clinical issues in sports medicine in general.

Material and Methods: Since the latest IOC Consensus Statement concerning RED-S was published in 2023, we shared the information among our healthcare professionals and added the revisited REDs CAT2 tool to our current comprehensive evaluation and annually sport medical examination in weight-sensitive and endurance athletes.

Results: To introduce our experience in applying knowledge to our daily business work with adolescence and adult elite and highperformance sports will be part of the presentation.

Additionally, it is aimed to display some representative case studies in order to point out the special needs of those athletes to qualify and optimize the effectiveness of the management of RED-S.

Conclusions: To share these findings with the participants of the FIMS Congress and responsible decision-makers concerning health guarding societies and especially to mind the gap in RED-S, I would be delighted to cheer up this topic and discuss possible ways among FIMS participants in order to tighten the gap in RED-S.

Keywords: RED-S, elite athletes, health guarding, performance, interdisciplinary approach

SUBMISSION ID 344

ACTUAL DIAGNOSTIC METHODS IN SPORTS. THE EXPERIENCE OF USING THE BIOMECHANICAL LABORATORY NORAXON IN THE ZENIT FOOTBALL CLUB

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Introduction: Despite the expansion of knowledge in rehabilitation, the indicators of re-injuring rate (RIR) and return to play (RTP) remain unsatisfactory. There are a number of strategies and prospects for the development of rehabilitation: optimization of protocols, providing the necessary volume and intensity of training and a comprehensive assessment, which includes analysis of neuromuscular regulation and the quality of athletes' movements. Biomechanical research of kinetic and kinematic parameters allows objectively assess the condition of athletes at all stages of rehabilitation, develop individual protocols, which accelerates the process of tissue repair and prevents repeated injuries.

Objectives: To optimize individual protocols for the rehabilitation of athletes using biomechanical tools in the diagnosis of the state of the musculoskeletal system.

Materials and Methods: The study group included 17 athletes with muscle, joint and ligament injuries aged 19 to 33 years undergoing rehabilitation at the Zenit Football Club Medical Rehabilitation Center (Russia, St. Petersburg) in 2024. All patients were examined at the Noraxon biomechanical laboratory at different stages of rehabilitation using Ultium motion, Ultium EMG and Ultium Insoles sensors when walking, running and exercising.

Results: Individual rehabilitation protocols, including physiotherapy, physical therapy and manual therapy, have been compiled for all patients based on the results of testing in the biomechanical laboratory of Noraxon. 11 athletes have completed the rehabilitation cycle and returned to training and competition. The coaching staff received recommendations from doctors on the prevention of repeated injuries. 6 patients continue to undergo rehabilitation according to individual programs.

Conclusions: Biomechanical analysis makes it possible to comprehensively assess the condition of the athlete's musculoskeletal system, which allows us to develop individual rehabilitation plans aimed at restoring proper biomechanics of movements, improve athletic performance and reduce the risk of repeated injuries

Keywords: biomechanics, biomechanical laboratory, rehabilitation, sports medicine, injury, noraxon

SUBMISSION ID 389

MUSCULOSKELETAL DETERMINANTS OF BATTING SPEED IN CRICKET- A CROSS- SECTIONAL STUDY

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Introduction: Batting in cricket is a complex task that demands coordination of movements inThe goal of this study is to abridge batting biomechanics and to thoroughly understand and analyze the musculoskeletal elements that influence batting performance order to smash a fast-moving ball.

Recent research suggests that batting biomechanics has improper joint ranges and musculoskeletal alignments, resulting in inefficient performance. The goal of this study is to abridge batting biomechanics and to analyze musculoskeletal components that influence batting tasks.

Objectives: To determine the relationship of Musculoskeletal components and Batting speed in cricketers.

Material and Methods: A cross-sectional study with 80 district & state level cricketers underwent a series of musculoskeletal and a performance tests. Shoulder internal/ external rotation ROM was measured using a Baseline Bubble inclinometer. Shoulder internal/ External rotator strength, Handgrip strength, thoraco-lumbar lateral flexion and rotation, Eccentric hamstring strength were measured using handheld and half grip dynamometer. Batting speed was measured using Batsense. Subjects training & injury histories were also obtained.

Results: There was a significant strong correlation between left shoulder internal rotation, handgrip strength and batting speed ($r = -0.675$, $p < 0.001$). There were no correlations between other musculoskeletal components and batting speed.

Conclusions: The study concludes that MSK components are not associated with batting speed. although, due to their significance to one other component, improvement of those factors or training programs to enhance the Shoulder Internal & External ROM, Shoulder Internal & External rotator strength, Handgrip strength, thoraco-lumbar Rom and Eccentric hamstring strength along with other training regimens can help enhance their batting performance and help in good biomechanics to hit powerful shots.

Keywords: cricket batting speed, musculoskeletal components, biomechanics, sports performance, athletic training

SUBMISSION ID 271

IMPACT OF THE PICKLEBALL TRAINER APP AIM7 ON SLEEP, STRESS AND OVERALL WELL-BEING IN ADULTS

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Introduction: Despite the increasing popularity of pickleball (PB) as a form of physical activity and its recognized health benefits, specific research into its impacts on sleep and stress management is limited.

Objectives: This study aims to explore the effects of the specialized PB trainer app, AIM7, on these critical health outcomes among adult users, potentially influencing both public health and individual lifestyle choices.

Materials and Methods: The AIM7 app uses wearable data and user-reported well-being measures to generate a daily readiness score and provide autoregulated recommendations for exercise, sleep, and mental fitness, tailoring the type, intensity, and duration of activities to individual needs. We conducted a retrospective analysis of subjective data reported by AIM7 users who recorded their

scores (on a scale of 0-10) at least 30 times over a 3-month period. We assessed longitudinal changes in sleep and stress scores using mixed models using R (version 4.3.1) with packages lme4, car, and lsmeans.

Results: Our initial findings indicate significant improvements in sleep and stress. Sleep scores increased by 5.60%, with mean scores rising from 6.46 ± 2.00 at month-1 (N=1214) to 6.82 ± 1.94 at month-2 (N=394, $p < 0.0001$), and further by 3.58% to 7.06 ± 1.97 at month-3 (N=256, $p < 0.05$). Stress scores decreased by 11.3% from 3.88 ± 2.17 at month-1 to 3.44 ± 2.25 at month-2 ($p < 0.0001$), and by 5.80% to 3.25 ± 2.26 at month-3 ($p < 0.0001$). Similar positive changes were also observed in subjective scores of energies, mood, motivation and soreness.

Conclusions: Our preliminary results suggest that the regular use of the AIM7 app and its autoregulation system can significantly enhance sleep quality and reduce stress among adult PB players. These findings support the potential of integrating digital health interventions with physical activities such as PB to promote better health outcomes.

Keywords: pickleball, AIM7 app, sleep quality, stress reduction, digital health interventions

SUBMISSION ID 145

EXERCISE INDUCES ANDROGEN PATHWAYS TO REGULATE MITOCHONDRIAL FISSION AND AUTOPHAGY IN PREVENTING LIVER CANCER

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Introduction: The roles of autophagy and mitochondrial fission in liver cancer development have been established. Studies confirmed that they can be modulated by exercise. However, whether this is the mechanism of exercise in preventing tumors remains inconclusive.

Objectives: This study aimed to examine the impact of exercise on mitochondrial fission and autophagy in preventing liver cancer

Materials and Methods: Normal BEL-7402 cells and cells overexpressing DRP1 were injected into the subcutaneous tissue of mice. A 4-week aerobic exercise intervention was implemented using a mouse treadmill set at a speed of 12 m/min for 1 hour per day, 5 days per week.

Transmission electron microscopy was utilized to examine mitochondrial morphology and autophagic vesicles. Immunohistochemistry and TUNEL assays were employed to assess autophagy and cell death. Furthermore, protein chip analysis was conducted to investigate the effects of exercise on mitochondrial fission to reduce autophagy and promote apoptosis in tumor cells.

Results: After the overexpression of DRP1, tumor tissue exhibited fragmented mitochondria with observable swelling of mitochondrial cristae and accumulation of autophagic vesicles. Additionally, increases of Beclin1, PINK, and Parkin leading to the inhibition of cell death. Exercise mitigate the increased mitochondrial fission and autophagy resulting from DRP1 overexpression, ultimately promoting apoptosis in tumor cells. Protein chip analysis revealed a total of 25 differentially expressed proteins. Subsequent GO and KEGG analyses indicated a significant increase in the androgen signaling pathway in tumor tissue after exercise.

Conclusions: The upregulation of DRP1 has been shown to enhance autophagic processes and impede apoptosis in tumor cells. Exercise has been demonstrated to mitigate the upregulation of mitochondrial fission and autophagy caused by DRP1 overexpression, thereby facilitating tumor cell death. Androgen signaling is posited as a pivotal pathway in modulating mitochondrial fission to attenuate autophagy and facilitate apoptosis in tumor cells.

Keywords: exercise, liver cancer, mitochondrial fission, autophagy, androgen pathway

SUBMISSION ID 267

SPORTS PARTICIPATION AMONG ALBANIAN YOUNG ADOLESCENTS AND ITS IMPACT ON THEIR LIFESTYLE

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Introduction: Physical inactivity is considered a worldwide pandemic. Considering WHO recommendations, almost 80% of adolescents have physical inactivity, and a trend for increasing physical inactivity is observed with advancing age during adolescence.

Objectives: The study aims to investigate the prevalence of sports participation among 11 to 15-year-old adolescents in Albania and its impact on their lifestyle patterns.

Materials and Methods: Cross-sectional study on 11 to 15-year-old students attending nine public schools in Tirana. Students answered a self-report questionnaire regarding sports participation, physical activity, hours of sleep per night, and hours spent in front of screens per day (watching TV, computer/phone use for playing games/videos, and social media).

Results: A total of 2020 students participated in the survey, 48.9% girls and 51.1% boys; mean age 11.98 ± 1.25 (10-15) years old. Out of these, 1343 students (66.5%) reported participating in sports, 791 boys (76.65% of boys) and 552 girls (55.87% of girls). According to WHO recommendations, only 220 students, 16.38% of students participating in sports or 10.9% of all interviewed students, were sufficiently physically active (60 minutes of moderate to vigorous physical activity per day). The group of students involved in sports spent more time on physical activity compared to the group that did not participate in any sport, respectively 8.23 ± 3.99 & 3.49 ± 2.22 hours per week, $P < 0.0001$, and spent less time in front of screens, respectively 2.63 ± 1.56 & 2.87 ± 1.78 hours per day, $P = 0.001$. There was no difference regarding the sleep hours per night.

Conclusions: Only a tenth of Albanian young adolescents are sufficiently physically active; even those participating in sports do not meet WHO recommendations. Students who participated in sports demonstrated a more active lifestyle, spending less time in front of screens than their non-sporting peers. Adolescents' lifestyle patterns affect their health and well-being, not only temporarily but, most importantly, throughout their life course; therefore, new strategies should be considered to increase adolescents' sports participation.

Keywords: sport, physical activity, screen time, adolescent, lifestyle

SUBMISSION ID 114

TREATMENT WITH AUTOLOGOUS CONDITIONED SERUM COULD SHORTEN RETURN TO PLAY TIME IN ATHLETES WITH MUSCLE INJURIES

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Introduction: There are individual reports about shortened recovery times in athletes with muscle injuries after treatment with autologous conditioned serum (ACS), which brings considerable competitive advantages in professional sports. It is obvious that more randomized, controlled, meta-analysis studies are necessary.

Objectives: The aim of this study is to evaluate return to play time in athlete with muscle injuries after treatment of ACS.

Materials and Methods: We evaluate return to play time and ultrasound findings of 20 athletes with muscle strain grade 2 (clinical and ultrasound classification) after treatment with ACS and standard rehabilitation program, comparing with control group of 16 athletes treated only with standard rehabilitation protocol.

Results: A significant difference in return to play time was demonstrated (17.1 ± 0.8 in ACS treated instead of 24.2 ± 1.4 in standard treated). Ultrasound findings supported observed acceleration of the lesion recovery time.

Conclusions: This study supports few reports for ACS treatment as a promising approach in reducing return to play time in athletes with muscle injuries.

Keywords: autologous conditioned serum, athletes, muscle injuries, return to play time, ultrasound

SUBMISSION ID 331

CHARACTERIZATION OF AUDIOVISUAL INTEGRATED PROCESSING BRAIN NETWORKS IN PATIENTS WITH SUBJECTIVE COGNITIVE DECLINE BASED ON EVENT-RELATED POTENTIALS

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Introduction: Subjective Cognitive Decline (SCD) refers to individuals perceiving a decline in cognitive function without significant cognitive impairment in clinical assessment. These patients often experience a decline in motor performance along with cognitive decline. Previous research has suggested that multisensory integration can facilitate the motor process in healthy older adults. However, it's not clear whether the decrease in motor performance in SCD patients is related to a decline in multisensory integration.

Objectives: This study aimed to investigate the brain network connectivity in SCD patients during an audiovisual integration task using event-related potentials-based functional connectivity analysis method.

Materials and Methods: This study utilized event-related potential (ERP)-based functional connectivity analysis to investigate changes in brain network connectivity during an audiovisual integration task in SCD patients. The experiment involved 12 SCD elderly individuals and 17 healthy elderly participants. All participants performed the audiovisual integration task in a shielded room, identifying spatial information in unisensory conditions (visual-only or auditory-only) and multisensory conditions (combined visual and auditory) while their brain electrical signals were recorded.

Results: The findings indicated that SCD patients had lower audiovisual processing abilities compared to healthy elderly individuals. Analysis of functional network connectivity matrices revealed a general decrease in connectivity strength in SCD patients, but abnormal strengthening between left temporal and right central/frontal electrodes. Additionally, functional network properties analysis showed a higher average shortest path length and betweenness centrality in SCD patients at a sparsity of 0.38. Global efficiency, degree, and closeness centrality were lower in SCD patients compared to healthy elderly controls.

Conclusions: These findings suggest there are alterations in brain network reorganization and compensatory mechanisms in SCD patients during the early stages of cognitive and motor deterioration. These changes might represent adaptive modifications aimed at preserving cognitive and motor function efficiency as these abilities decline.

Keywords: subjective cognitive decline, audiovisual integration, event-related potentials, brain network connectivity, motor performance

SUBMISSION ID 246

EFFECTS OF 6-WEEK TELEREHABILITATION EXERCISE PROGRAMME ON CHRONIC NON-SPECIFIC NECK PAIN IN FEMALES: A PILOT RANDOMIZED CONTROLLED TRIAL

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Introduction: One of the most prevalent musculoskeletal disorders that affects a person's work and lifestyle is chronic non-specific neck pain. Physiotherapy techniques such as stretching, and strength training have clearly demonstrated beneficial effects on neck pain. Telerehabilitation exercise programmes could readily address the growing concern of patient adherence to home-based exercise programmes, while being time- and cost-effective.

Objectives: The purpose of this study is to determine the effectiveness of telerehabilitation exercise

intervention by measuring pain score, disability index, cervical range of motion (CROM), cervical muscle endurance and patient adherence.

Materials and Methods: In this randomized controlled trial, 31 females (mean age 22.7 ± 2.1 years) were divided into two groups: telerehabilitation or conventional. They were given a 6-week home-based exercise programme that was administered either through the online software (N = 15) or exercise manual (N = 16), depending on their assigned group. Outcome measures were collected at baseline and after 6 weeks. These included VAS Pain, NDI questionnaire, CROM using the CROM instrument and cervical muscle endurance through CCFT. All statistical analyses were done using SPSS version 26.0.

Results: There was no baseline differences found between the two groups, as found from independent samples t-test. Based on mixed model ANOVA measures (at 0 week and 6 weeks), within-group comparisons for both groups showed statistical significance in favour of the exercise programme, for all variables ($p < 0.05$). Telerehabilitation group showed significantly more increase in cervical rotation ROM R (0.006) and L (0.03) post-exercise programme, and longer duration of treatment session (0.02). Between-groups comparisons for all other variables concluded no significant differences.

Conclusions: Based on our findings, both groups showed significant improvement in neck pain, disability, cervical ROM and cervical muscle endurance, however, no group was found superior to the other. Both groups showed good adherence to frequency of sessions, telerehabilitation exhibited better adherence to duration of exercise session.

Keywords: telerehabilitation, neck pain, home-based exercise, chronic pain management

SUBMISSION ID 196

MENTAL HEALTH DISORDERS AMONG ELITE ATHLETES

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Introduction: Despite considerable potential of sports to improve mental health and wellbeing, in recent years there has been an increase in mental health challenges among high-performance athletes, posing detrimental effects on their sports performance. Published data indicated that these challenges may affect up to 35% of professional athletes, but as experts emphasize, there are no reliable assessment tools to evaluate athletes' mental health. Recognizing the significance of the issue, the International Olympic Committee (IOC) has developed the Sport Mental Health Assessment Tool (SMHAT-1) to address athletes' mental health. The IOC advocates for the implementation of this tool to evaluate and manage the well-being of athletes.

Objectives: In this study we aim to evaluate of the prevalence of mental health disorders among Polish elite athletes.

Materials and Methods: The study included 500 athletes who, during routine periodic medical examinations at the National Center for Sports Medicine, had their mental health assessed using SMHAT-1 consisting of several psychometric tests screening for mental health symptoms such as anxiety, depression, sleep disturbance, alcohol and drug(s) misuse, and disordered eating.

Results: Elevated score in at least one of the screenings was observed in 262 (52%) athletes, out of which 112 (22%) required additional supervision from either a psychologist or psychiatrist. Among them, 28 (6%) needed psychiatric care, with 16 having prior treatment and 12 newly diagnosed.

Notably, 24 of those needing psychiatric care were female, while only 4 were male, aligning with females scoring notably higher in anxiety, depressive symptoms, and eating disorders. The most frequent diagnoses included: depressive episode (16), other anxiety disorders (8), specific personality disorders (2), sleep disorders not due to substance or known physiological condition (3), attention-deficit hyperactivity disorders (1), bipolar disorder (1).

Conclusions: Assessment of the mental health status of professional athletes should be a permanent element of preparticipation physical evaluation.

Keywords: mental health disorders, elite athletes, psychological supervision, prevalence

SUBMISSION ID 31

RELATIONSHIP BETWEEN PARTIAL REPAIR OF MASSIVE ROTATOR CUFF TEARS AND ABDUCTION ABILITY OF THE SHOULDER

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Introduction: Massive rotator cuff tears (MRCT) represent the terminal stage of rotator cuff injury progression, severely impacting the shoulder joint function and quality of life of patients. Due to extensive tissue damage, complete repair of the rotator cuff is challenging. Partial repair is a surgical treatment for MRCT with a shorter learning curve and has shown some efficacy in clinical applications. However, its methodology remains unclear.

Objectives: This study aims to establish a MRCT model, conduct repairs on different parts of the rotator cuff (anterior, superior, posterior), and perform mechanical evaluations using a biomechanical testing platform, hoping to provide a mechanical basis for the selection of partial repair sites for massive rotator cuff tears.

Materials and Methods: Dynamic biomechanical tests were conducted on 5 specimens to establish seven different models sequentially: normal, MRCT, anterior rotator cuff repair (A), posterior rotator cuff repair (P), anterior+superior rotator cuff repair (A+S), anterior+posterior rotator cuff repair (A+P), and superior+posterior rotator cuff repair (S+P). Dynamic lateral load tests were performed under load conditions (0-90°). In this system, a full lateral extension could bear a load of approximately 2.75 kg, serving as the maximum load reference value. During testing, we set three load levels (0%, 45%, 90% of maximum load) and recorded deltoid muscle force, subacromial pressure, glenohumeral joint pressure, and the maximum lateral extension angle under different load conditions to assess the restoration of lateral extension function with different partial repairs and under different load conditions.

Results: Under 0% load, MRCT led to a significant increase in subacromial pressure and deltoid lateral force ($P < .01$), and a significant decrease in glenohumeral joint pressure/deltoid lateral force ($P < .01$). Any partial repair could restore subacromial pressure and deltoid lateral force to normal levels, but the A group showed poorer glenohumeral joint stability. Under 45% load, MRCT and A could not fully extend laterally, while the P group also experienced partial loss of lateral extension function under 90% load. The other groups could complete lateral extension under all load conditions. Under 90% load, A+P, A+S, and P+M could complete the lateral extension test, with no significant difference in maximum deltoid muscle force, but subacromial pressure and glenohumeral joint stability in P+M were significantly better than in other groups.

Conclusions: For patients who can only undergo partial rotator cuff repair, prioritizing posterior rotator cuff repair may provide better mechanical effects than anterior cuff repair. For most repairable patients, prioritizing posterior+superior rotator cuff repair might achieve better therapeutic outcomes.

Keywords: mental health disorders, elite athletes, sport mental health assessment tool, psychological supervision, prevalence study

SUBMISSION ID 292

CONSERVATIVE MANAGEMENT OF ACUTE LATERAL ANKLE SPRAIN: A REVIEW OF SYSTEMATIC REVIEWS

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Introduction: Acute lateral ankle sprains (ALAS) are one of the most observed musculoskeletal sports injuries. However, the findings are frequently ambiguous and challenging to compare.

Objectives: The present review aimed to evaluate the effects of physiotherapeutic treatment as a mainstay of treatment under conservative management of lateral ankle sprain injuries in terms of significant differences in the outcome being observed between treating severe lateral ankle sprains surgically and conservatively. This review aimed to analyze the various systematic reviews from Jan 2010 to March 2024 to evaluate the best evidence-based conservative management of ALAS.

Materials and Methods: The PRISMA guidelines were followed while conducting the current systematic review. Various popular search engines including PubMed, Scopus, Web of Science, and EMBASE were searched. Out of a total of 2357 citations, 26 studies were evaluated then 20 systematic reviews were included based on eligibility criteria.

Results: The quality of the included studies in this analysis was high using the AMSTAR quality score. Functional physiotherapy is better for managing ALAS even though not fully conclusive in certain parameters, compared to passive treatment (External support, Rest Ice Compression Elevation (RICE), immobilization).

Conclusions: Ankle sprains have been extensively studied in the literature; however, the findings are frequently ambiguous and challenging to compare and contrast. The effectiveness of nonsurgical PT functional therapy and management in treating acute ankle sprains is well supported by high-quality research. Exercise and manipulative therapy are recommended in the early phase of management to prevent ankle injury recurrence and regain dorsiflexion.

Keywords: lateral ankle, sprain, injuries, conservative management, AMSTAR, ALAS

SUBMISSION ID 283

TRIATHLON – IS IT SAFE FOR EVERYBODY?

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Introduction: Triathlon has become an increasingly popular endurance activity in Poland, particularly among adult recreational athletes. It is connected with healthy lifestyle including such benefits as regular exercise, change in nutrition and, as a consequence, reduction of body mass and better wellbeing.

Objectives: Unfortunately, the number of race-related fatalities during triathlon seems to be twice higher comparing to running competition but efficiency of resuscitation significantly lower.

Materials and Methods: The table presents a summary of the most relevant statistics on deaths in triathlon competitions in Poland and the U.S. Tragic episodes most often occurred during swimming, just before the start or soon after it, although this component is the shortest in terms of the distance to be covered as compared with the next ones.

Results: The increased risk of death during the start in triathlon competitions, apart from the sport discipline itself, results from: no compulsory initial medical assessment (it is recommended by Polish Triathlon Association, but in practice medical certificate is not necessary); problems with effective resuscitation in water, therefore only few actions can be successfully performed; older (especially male) athletes' participation in triathlon (about 80-85% male and 15-20% of female competitors); the fact of debuting in sports competition, strong pre-competition stress, low training experience.

Conclusions: Current regulations in Poland do not protect older recreational athletes from loss of life and health because medical screening before taking part in competition is voluntary, not obligatory. Health professionals should be responsible for education of athletes and informing about an existing danger and importance of medical screening before taking part in competition.

Keywords: triathlon, resuscitation, healthy lifestyle, wellbeing

SUBMISSION ID 215

THE EFFECTS OF LONG-TERM WEIGHTLIFTING ON CARDIAC FIBROSIS AND BIOMARKERS IN ELITE ATHLETES

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Introduction: Cardiac fibrosis and its implications for elite athletes remain a topic of significant interest, yet the impact of long-term weightlifting on cardiac morphology and related biomarkers is not well understood.

Objectives: This study aims to investigate the presence of cardiac fibrosis and the effect of weightlifting on blood biomarkers that may stimulate cardiac remodeling and fibrosis in elite weightlifters.

Materials and Methods: Thirteen elite male weightlifters from the Turkey Olympic Preparation Center and thirteen age, height, and weight-matched healthy male controls were included. Athletes' mean age was 19.16 ± 1.86 years, and the control group was 20.11 ± 1.44 years ($p=0.122$). The athletes had been training for 5-10 years. Echocardiography and cardiac magnetic resonance imaging (MRI) assessed heart morphology. Blood levels of biomarkers (cardiac Troponin, Galectin-3, ST2, TNF- α , TGF- β , Endothelin-1) were measured at rest and after a training session.

Results: No significant differences in wall thickness, septum thickness, or ejection fraction were found between athletes and controls ($p>0.05$). However, strain echocardiography revealed lower AP 2 LS, AP 3 LS, and global LS levels in athletes ($p<0.05$). MRI showed longer global mean preT1, midventricular preT1, and apical preT1 times in athletes ($p<0.05$), with no difference in ECV values ($p>0.05$). Post-training, Galectin-3 levels significantly increased ($p<0.01$), while TGF- β levels decreased ($p=0.046$).

Conclusions: No cardiac fibrosis was detected in elite weightlifters with a minimum of 5 years of training. However, strain echocardiography and MRI revealed detectable but healthy cardiac changes. The rise in Galectin-3 post-training without increased TGF- β aligns with the absence of morphological fibrosis.

Keywords: cardiac fibrosis, weightlifting, biomarkers, echocardiography, cardiac mri, elite athletes

SUBMISSION ID 126

CRYOTHERAPY EFFECTS ON KNEE PROPRIOCEPTION IN HEALTHY INDIVIDUALS

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Introduction: Proprioception, a vital sense concerning joint position and movement, is essential for detecting joint angles and movements. It relies on proprioceptors to maintain stability by adjusting muscle activity based on signals about external environments and forces, with impaired feedback potentially disrupting balance and increasing injury risk. Various methods, including passive motion threshold, directional motion perception, and joint position sense, among others, are used to measure proprioception. Cryotherapy, the application of cold to reduce tissue temperature, is employed to treat injuries and alleviate pain and inflammation, with studies indicating its impact on

proprioception. Cooling can slow nerve conduction, affecting joint control and potentially impairing athletic performance. Research on cryotherapy's proprioceptive effects shows inconsistent findings, largely focusing on active joint position sense measurements.

Objectives: The study aims to examine how cryotherapy affects knee joint proprioception in healthy individuals of both genders, offering insights into its impact on performance and injury prevention strategies.

Materials and Methods: 32 individuals (17 males and 15 females) aged between 19 and 23 were recruited. The Cryogel packs were applied over the anterior thigh and knee for 20 minutes. An isokinetic dynamometer measured knee proprioception at baseline, immediately after, and at 10 and 20 minutes following the cryotherapy application.

Results: The study's findings indicated consistent proprioception scores throughout all test phases, pre, immediate, 10-minute, and 20-minute post-cryotherapy with no significant changes between tests or between genders ($p > 0.05$).

Conclusions: The results of this study suggest that a 20-minute application of cryotherapy does not impair knee joint proprioception in healthy individuals, reinforcing the treatment's safety for use before or during physical activities. Given the maintained accuracy of knee proprioception post-treatment, cryotherapy can be considered a reliable method for managing acute injuries without impairing joint sensory function.

Keywords: cryotherapy, proprioception, ice, knee joint, isokinetic, injury

SUBMISSION ID 372

HIGH RATES OF RAMP LESIONS IN PATIENTS UNDERGOING PRIMARY ACL RECONSTRUCTION AND EVEN HIGHER IN REVISION CASES: A PROSPECTIVE STUDY OF 302 PATIENTS

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Introduction: Although first described in 1983 by Hamberg et al, medial meniscus ramp lesions have regained interest in recent years. They are frequently associated with ACL injuries, with prevalence ranging from 9% to 41% depending on the series. Repair of these injuries is associated with improved knee biomechanics.

Objectives: The aim of this study was to determine the prevalence of ramp lesions in a large cohort of patients operated on for ACL reconstruction.

Material and Methods: A single-center prospective review of patients operated on between 2020-2024 for ACL reconstruction was performed. The presence of a ramp lesion was determined by systematic arthroscopic inspection of the posteromedial compartment during surgical management for ACL reconstruction. If detected, ramp lesions were sutured.

Results: Three hundred and two patients undergoing primary ($n=273$) or secondary ($n=29$) ACL reconstruction were included. The presence of a ramp lesion was found in 43% of patients undergoing primary ACL reconstruction, rising up to 66% in cases of secondary reconstruction.

Conclusions: Ramp lesions can be anticipated in almost half of patients undergoing primary ACL reconstruction, and even two-thirds in revision cases. These numbers are higher than those previously described, and should therefore lead to a high level of clinical suspicion and systematic evaluation of the posteromedial compartment to detect them.

Keywords: ramp lesions, acl reconstruction, prospective study, musculoskeletal ultrasound, posteromedial compartment

SUBMISSION ID 149

METABOLOMICS: A NEW TOOL FOR ULTRA-MARATHON RUNNERS MONITORING

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Introduction: Metabolomics, which aims to correlate variations in the metabolic profile with pathological conditions, is a key tool for personalised medicine and biomarker discovery. In athlete follow-up, capturing dynamic metabolic signatures resulting from training load, intensity, effort, and recovery is vital.

Objectives: This study aimed to explore whether a nuclear magnetic resonance (NMR)-based metabolomic approach can yield insights into metabolic changes during a mountain ultramarathon.

Materials and Methods: A longitudinal cohort of athletes participated in the famous "TOR des Géants" ultramarathon covering 330 km with a positive altitude difference of 24000 m was enrolled. Plasma samples were collected at four time points: pre-race (T1), post 158 km (T2), race end (T3), and post 3-day recovery (T4). Using ¹H-NMR, more than 60 metabolites were quantified. Metabolic changes during exercise and recovery were correlated with muscle, cardiac, inflammatory, and renal biomarkers. Multivariate tools for longitudinal study design were employed for data analysis, allowing assessment of specific changes in the metabolome and clinical biomarkers over time.

Results: The data reveal significant metabolic alterations during the race, persisting even after 3 days of recovery, indicating an incomplete return to baseline. Innovative pathway analysis, combining single-sample pathway analysis and kPCA methods, highlighted critical signaling pathways in exercise and recovery.

Conclusions: This preliminary study underscores the importance of metabolomics in athlete monitoring. Metabolomic analysis enhances understanding of physiological responses to extreme exercise in endurance sports. Providing valuable real-world insights, this methodology offers new tools for athlete monitoring, facilitating assessments of fitness, performance prediction, nutrient supplementation, and personalized follow-up, promoting a rational and healthy approach to extreme endurance sports.

Keywords: metabolomic, ultra-marathon, cardiac biomarkers, nuclear magnetic resonance, personalised medicine

SUBMISSION ID 101

THE EFFECT OF SPENCER MUSCLE ENERGY TECHNIQUE ON PAIN AND ROM AMONG FROZEN SHOULDER CASES.

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Introduction: Spencer Muscle Energy Technique (SMET) is a unique technique that consists of a series of standardized shoulder treatments focusing on the glenohumeral and scapulothoracic joints, with the client putting forth the initial effort and the practitioner facilitating the process.

Objectives: This systematic review focuses on studying the Spencer muscle energy technique (SMET) and its short-term effects on pain, range of motion (ROM), and function while finding the optimal dosage for frozen shoulder patients. This led to the research question "What is the effect of Spencer Muscle Energy Technique on Pain and ROM among Frozen Shoulder Cases?".

Materials and Methods: The review included recent RCTs and comparative studies from 2013 to 2023 with the adult population. And the search was conducted using Google scholar, PubMed,

Science Direct, PEDro and EBSCO. Terms such as Frozen Shoulder, Adhesive capsulitis, Spencer muscle energy technique (SMET), pain, ROM, and functional disability have been used to look for articles studying the effect of SMET application on Frozen shoulder patients when compared to other intervention based on the eligibility criteria.

Results: This review included 8 randomized controlled trials (RCTs) with 314 participants that investigated the effect of SMET on pain, ROM, and functional disability on frozen shoulder cases. When compared to other interventions, most of the results showed that SMET had a positive impact on pain, shoulder ROM (flexion, abduction, and ER), and functional disability in adult frozen shoulder's patients when the following dosage was used: 3-5 repetitions per set, 1-3 sets per day, 3-6 days per week, for a maximum of four weeks.

Conclusions: Most evidence shows improvements in pain, ROM (ER, abduction, and flexion), and functional disability among frozen shoulder patients when the proper dosage of SMET is applied either in conjunction with other conventional interventions or not.

Keywords: frozen shoulder, adhesive capsulitis, spencer muscle energy technique, pain, rom, functional disability

SUBMISSION ID 315

THE EFFECT OF BETAINE SUPPLEMENTATION ON EXERCISE PERFORMANCE, TESTOSTERONE AND INFLAMMATORY CYTOKINES IN SPEED-STRENGTH ATHLETES

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Introduction: Betaine (BET) is a natural substance found in a variety of foods and supplements. Athletes and physically active people are among those most interested in supplementing BET, because of its beneficial effect on health and hypothetically sports performance. Objectives: The aim of the study was to evaluate the effect of 3-week BET supplementation on Crossfit performance, muscular power, cytokines and hormones concentrations in Crossfit training males.

Objectives: The aim of the study was to evaluate the effect of 3-week BET supplementation on Crossfit performance, muscular power, cytokines and hormones concentrations in Crossfit training males.

Materials and Methods: The study was designed in a double-blinded randomized cross-over fashion. Forty-three participants completed the entire study. Crossfit performance was measured using the Fight Gone Bad (FGB) workout and muscle power was evaluated in a Wingate Test. Body composition was determined by air-displacement plethysmography. Blood was drawn fasted in the morning of each of the four study meetings.

Results: BET supplementation led to an $8.7 \pm 13.6\%$ improvement in FGB total score ($p < 0.001$), whereas no significant changes were observed with placebo ($-0.4 \pm 10.0\%$, $p=0.128$). There were no significant changes in Wingate Test performance or body composition with BET. Testosterone concentration increased by $7.0 \pm 15.4\%$ following BET supplementation ($p=0.046$), with no significant change observed with placebo ($1.5 \pm 19.6\%$, $p=0.884$). No significant effects were found on insulin-like growth factor or cortisol concentrations. BET supplementation significantly reduced homocysteine levels (from $17.1 \pm 4.0 \mu\text{mol/L}$ to $15.6 \pm 3.5 \mu\text{mol/L}$, $p=0.009$, $\eta^2=0.164$), but had no impact on the concentrations of cytokines IL-1 β , IL-6, and TNF- α .

Conclusions: A 3-week BET supplementation may enhance CrossFit performance, increase testosterone levels, and reduce homocysteine concentrations in training males. These findings could be beneficial for males looking to improve CrossFit performance and for populations with reduced testosterone levels, such as older males. Further research is needed to explore the effects of BET in different populations.

Keywords: betaine supplementation, exercise performance, testosterone, inflammatory cytokines, speed-strength athletes

SUBMISSION 374

PHYSIOTHERAPISTS' PRACTICE PATTERNS FOR THE DIAGNOSIS AND MANAGEMENT OF PATIENTS WITH CHRONIC CONTRACTED FROZEN SHOULDER IN THE UNITED ARAB EMIRATES

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Introduction: Adhesive capsulitis or contracted shoulder, known as frozen shoulder, is a persistent painful condition that may last over three months. It is a common disease-causing morbidity that causes pain and loss of shoulder range of motion. Physical therapy is advocated for restoring a pain-free state and normal use of the upper extremity, along with other interventions.

Objectives: This study aimed to explore the level of current clinical practice for managing chronic contracted frozen shoulder (CCFS) among physiotherapy professionals in the United Arab Emirates (UAE) compared to well-established evidence-based practices and to identify the most common therapy practiced in UAE to manage CCFS.

Materials and Methods: This study was based on a cross-sectional quantitative analysis using an adapted questionnaire. The main themes of questions were the presence of special interest in CCFS, management options, symptoms, diagnosis, referral, and best physiotherapy intervention recommendations. The results were analyzed using simple descriptive analyses, such as frequency, mean, and percentage of total responses; additionally, thematic and content analyses were performed for open-ended questions.

Results: Overall, 101 physiotherapy professionals participated in the survey: 62% female and 38% male; 59% were bachelors- and 36% were masters-degree holders, respectively. In the closed-ended question regarding the interest in CCFS, male physiotherapists (PTs) were more interested than females (82% vs. 68%). For the most common indication of CCFS, 76% of the participants selected "Limitation of movement" as the main indication. However, only 42% confirmed the presence of clinical protocols in their employment setting. In their opinion, the most effective therapies were patient education, superficial heat or cold, manual joint mobilization, and sustained stretching exercises.

Conclusions: A well-established professional competence exists among physiotherapists in the UAE to manage and treat patients with CCFS. The findings showed sufficient standard, theoretical, and practical knowledge among the study groups.

Keywords: physiotherapists' practice, contracted frozen shoulder, united arab emirates

SUBMISSION ID 16

INTERVENTION WITH A MULTI-COMPONENT EXERCISE PROGRAM IN MANAGING FATIGUE PERCEPTION IN INDIVIDUALS WHO EXPERIENCED COVID-19: A QUASI- EXPERIMENTAL STUDY

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Introduction: Following the acute phase of respiratory illness caused by the SARS-COV-2 virus, persistent fatigue has been reported in a significant number of patients. Fatigue is considered debilitating and incapacitating, impacting the quality of life, work performance, and social relationships of those affected. The dosing and prescription of multi-component exercise, in its various forms, have proven to be a preventive and therapeutic strategy in various medical conditions. However, to date, there is limited evidence regarding fatigue secondary to SARS-COV-2 coronavirus infection, including its assessment and treatment.

Objectives: To assess the effect of a multi-component exercise program on self-perceived fatigue, aerobic capacity, lower limb muscle strength, body fat, and muscle mass in individuals aged 30 to

60 with a history of COVID-19 infection.

Materials and Methods: In a quasi-experimental study (pre-test/post-test trial), 15 individuals reporting fatigue on the Fatigue Severity Scale (FSS) and with a history of more than 12 weeks post SARS-COV-2 infection were included. All participants underwent a multi-component exercise program for 12 weeks. The primary outcome was the reduction of fatigue. Secondary outcomes included aerobic capacity, lower limb muscle strength, body fat, and muscle mass percentages.

Results: Self-perceived fatigue decreased by 2.5 points (95% CI: 1.7 – 3.2; $p=0.001$). Aerobic capacity increased by 10.8 mL/Kg/min (95% CI: 5.7 – 19.9; $p=0.006$). No statistically significant changes were found in lower limb muscle strength, muscle mass, and body fat percentages at the end of the follow-up.

Conclusions: The multi-component exercise program for reducing post-COVID-19 fatigue can be considered an effective tool for managing post-COVID-19 sequelae in the population segment that persists with symptoms and has not received treatment in this regard.

Keywords: SARS-COV-2 infection, fatigue, post-COVID-19, multicomponent exercise

SUBMISSION ID 322

EARLY KNEE OSTEOARTHRITIS, ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION, QUADRICEPS MUSCLE TENSION, PATELLAR MALALIGNMENT

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Introduction: Early knee osteoarthritis (OA) has been reported in individuals with anterior cruciate ligament reconstruction (ACLR) at 1 year post surgery. It is important to identify factors associated with the incidence of early knee OA in amongst these individuals.

Objectives: This study aimed to explore whether patellar alignment and passive quadriceps muscle tension at 6 months post-ACLR would associate with early knee OA at 1 year.

Materials and Methods: Twenty-eight individuals (15 males, age 30.68 ± 6.62 years, BMI 23.49 ± 3.00) were recruited at an average of 6.43 ± 1.79 months post-ACLR. Patellar alignment was assessed using magnetic resonance imaging conducted in supine lying position with 25% body weight. Passive quadriceps muscle tension was evaluated using shear wave elastography. Outcome measures included bisect offset (BO), patellar tilt angle (PTA) and passive quadriceps muscle tension. Early knee OA at 1-year post-ACLR was evaluated using Luyten's criteria. Spearman correlation was used for preliminary analysis, follow by forward likelihood ratio logistic regression, adjusted for age, gender, and BMI.

Results: Patellar alignment including BO (OR=1.41, $p=0.03$) and PTA (OR=1.45, $p=0.04$) at 6 months post-ACLR were significantly associated with early knee OA at 1 year, while quadriceps muscle tension showed as a potential risk factor (OR=0.33, $p=0.06$). A model combining quadriceps muscle tension (OR=0.02, $p=0.03$) and PTA (OR=4.47, $p=0.04$) explained approximately 80% of early knee OA risk (Nagelkerke $R^2=0.80$).

Conclusions: Greater patellar malalignment together with lowered passive quadriceps muscle tension at 6 months post-ACLR were risk factors for early knee OA symptoms at 1 year. These findings may help identify high-risk patients at the completion of functional rehabilitation at 6 months post- ACLR.

Keywords: early knee osteoarthritis, anterior cruciate ligament reconstruction, quadriceps muscle tension, patellar malalignment, neuromuscular efficiency

SUBMISSION ID 53

DOSE OF PHYSICAL ACTIVITY TO MITIGATE ADVERSE EFFECTS OF RISK BEHAVIORS ON MENTAL HEALTH

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Introduction: People tended to increase physical activity to mitigate the potential adverse effects of risk behaviors on mental disorders. However, the dose of physical activity for mitigation remain unexplored.

Objectives: This study aimed to examine the dose of physical activity which could mitigate the adverse effects of unhealthy behaviors, and present the results to colleagues focusing on physical activity and health promotion at FIMS Dubai 2024.

Materials and Methods: Self-reported physical activity (by IPAQ), risk behaviors including smoking, drinking and short/long sleep duration, and outcomes including depression, anxiety and stress (by PHQ- 9, GAD-7 and PSS-4, respectively), were extracted from Psychology and Behavior Investigation of Chinese Residents in 2023, a cross-sectional survey based on a representative national sample of Chinese adults. Given the nonlinear relationships between physical activity and mental disorders, restricted cubic spline and piecewise logistic regression were applied to examine the associations. The mitigation effect was calculated by dividing the coefficients of risk behaviors by that of physical activity, respectively.

Results: Among 30,054 adults (43.0±16.6 years, 50.1% female), 51.4%, 41.8% and 52.7% reported depression, anxiety and stress symptoms, respectively, with a median physical activity 3.2 METs-hour per day. Physical activity was significantly associated with depression ($\beta=-0.20$, OR=0.81[0.77-0.86]), anxiety ($\beta=-0.20$, OR=0.78[0.74-0.82]), and stress ($\beta=-0.11$, OR=0.89[0.87-0.92]). Smoking was significantly associated with depression, drinking and both short and long sleep durations were significantly associated with all three outcomes, with β values ranging from 0.20 to 0.76. Physical activity of 1-3 METs-hour per day could mitigate the negative effects of smoking or drinking on depression. Physical activity of 4-6 METs-hour per day could mitigate the negative effects of short or long sleep duration on depression, anxiety and stress.

Conclusions: Physical activity can partially mitigate the negative impacts of some unhealthy habits on mental health, and public health interventions should be tailored accordingly.

Keywords: physical activity, mental health, risk behaviors, depression, anxiety

SUBMISSION ID 268

CORRECTING VITAMIN D INSUFFICIENCY IMPROVES ASPECTS OF PHYSICAL PERFORMANCE DURING WINTER TRAINING IN YOUNG ACTIVE CHILDREN

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Introduction: Vitamin D (VD) plays an important role in optimizing health and preventing disease. Due to its key role in the musculoskeletal system VD levels may directly affect an athlete's overall health and athletic ability.

Objectives: This study was devised to examine the effects of vitamin D₃ supplementation on physical performance during training in VD insufficient children.

Materials and Methods: Thirty-six active children with low serum 25(OH)D concentration (18.8 ± 1.10 nmol/L) were randomly assigned to single dose (200 000 IU) of VD₃ (n = 19) or placebo (n = 17). Plasma 25-hydroxyvitamin D (25-OHD) was assessed and measures of physical performance (i.e., vertical and standing broad jumps, triple hop, 10-m and 30-m sprints, shuttle run) were performed before and 12 weeks after the loading dose. Mixed ANCOVA models were performed and effect size was estimated by partial eta squared (η^2). Baseline 25-OHD and physical variables were equivalent in the 2 groups.

Results: Twelve weeks after VD loading, plasma 25-OHD increased and physical variables improved only in the VD group. There was a significant interaction effects for group by time for vertical jump ($F = 14.9$, $p = 0.001$, $\eta^2 = 0.394$), triple hop jump ($F = 24.2$, $p < 0.001$, $\eta^2 = 0.513$), 10-m ($F = 4.46$, $p = 0.046$, $\eta^2 = 0.162$) and 30-m ($F = 6.56$, $p = 0.017$, $\eta^2 = 0.222$) sprints.

Conclusions: VD supplementation elevates serum 25(OH)D concentration to sufficient levels. Correcting vitamin D insufficiency improves jumping ability, agility, and running speed in children. Correcting VD deficit might be beneficial for physical performance.

Keywords: vitamin d insufficiency, physical performance, children, winter training, athletic ability

SUBMISSION ID 87

PHENOTYPING OF CHRONIC LOW BACK PAIN: AN ORIGINAL PILOT STUDY USING THE LOW BACK PAIN PHENOTYPING (BACPAP) CONSORTIUM'S INTERNATIONAL AND MULTIDISCIPLINARY CONSENSUS

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Introduction: The classification of chronic low back pain (CLBP) as characterized by dominant nociceptive, neuropathic or nociplastic mechanism is a clinically important issue.

Objectives: The primary aim of this cross-sectional pilot study is to examine the prevalence of pain phenotypes in CLBP considering the low back pain phenotyping (BACPAP) consortium's international and multidisciplinary consensus. A secondary aim entails examining whether disability level and health related quality of life differs between the main pain phenotypes in CLBP.

Material and Methods: Patients with CLBP were asked to complete the numeric pain rating scale for pain, Margolis Pain Diagram, Central Sensitization Inventory, Oswestry Disability Index and Short Form 12 (SF-12). Following administration of questionnaires, quantitative sensory examinations were applied. To determine the prevalence of the predominant type of pain, a recently proposed classification system by BACPAP consortium's international and multidisciplinary consensus was used. The classification process was carried out by a blind researcher to the assessments.

Results: Of the 42 participants, 12 (28.05%) had dominant neuropathic pain, 8 (19.04%) had dominant nociceptive pain and 22 (52.38%) had dominant nociplastic pain. 32 participants (76.19%) were classified as having mixed pain. One-way ANOVA revealed a significant difference between the four pain groups for level of disability ($F = 14.093$, $p < 0.001$) and the SF-12 mental scores ($F = 3.205$, $p = 0.027$).

Conclusions: This study found that the predominant pain type in CLBP is nociplastic pain, but mixed pain appears to be the most prevalent phenotype in these populations. Furthermore, it was found that, compared to patients with predominant neuropathic and nociceptive pain, patients with predominant nociplastic and mixed pain have higher disability level with lower HRQoL scores. Since this is a pioneering study to investigate pain phenotypes in CLBP, further researches with higher sample sizes are needed to support these findings.

Keywords: chronic low back pain, central sensitisation, neuropathic pain, nociceptive pain, nociplastic pain, mixed pain

SUBMISSION ID 357

UNIMPAIRED CARDIAC FUNCTION AFTER SARS-COV-2 INFECTION IN ELITE ATHLETES

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Introduction: Possible mild myocardial involvement has been observed in the form of reduced left ventricular global longitudinal strain (LV GLS) in athletes after SARS-COV-2 infection compared to healthy athletes. It is not yet clear whether these changes are caused by SARS-COV-2 or are possibly due to detraining.

Objectives: This study investigates whether there are differences in cardiac function in elite athletes (INFAt) before and after SARS-COV-2 infection and whether cardiac involvement in post-infection INFAt is present compared to healthy control athletes (CON).

Material and Methods: Transthoracic echocardiography was performed in 32 elite athletes. 16 INFAt (22.63 ± 5.34 years, 10 male) were examined before (t0) and at a median of 52 days after (t1) SARS-COV-2 infection and 16 healthy controls (CON). LV GLS and global circular strain (GCS) as well as RV free wall longitudinal strain (RV FWSL) and RV GLS were assessed offline by a blinded experienced investigator.

Results: There was no change in LV GLS (t0 -21.8 vs. t1 -21.7, p=0.649), GCS basal (t0 -32.9 vs. t1 -26.6, p=0.403), GCS midventricular (t0 -23.7 vs. t1 -29.9, p=0.589) and RV FWSL (t0 -31.9 vs. t1 -33.0, p=0.326) or RV GLS (t0 -29.1 vs. t1 -28.7, p=0.626) in INFAt from pre to post-SARS-COV-2 infection. Overall LV GLS (-21.7 vs. -22.7, p=0.318), GCS basal (-26.6 vs. -25.8, p=0.409) and GCS mid-ventricular (-29.9 vs. -29.0, p=0.788) and routine echocardiography parameters were not different between INFAT and CON.

Conclusions: Cardiac function does not appear to be impaired in athletes with mild infection in the form of a significant reduction of left or right ventricular strain. Studies on left and right ventricular changes in athletes with moderate and severe disease courses are required, as are studies on other viral infections, to issue a specific recommendation on return-to-sport after viral infections.

Keywords: sport, COVID-19, speckle tracking echocardiography, elite athletes, myocardial inflammation

SUBMISSION ID 337

THE PREVALENCE AND COMORBIDITY OF LOW BACK PAIN AND SLEEP DISTURBANCE IN ELITE CHINESE ATHLETES: A LARGE-SCALE CROSS-SECTIONAL SURVEY

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Introduction: Low back pain (LBP) and sleep disturbance are common among elite athletes. It is important to investigate comorbidity and identify associated factors in this population.

Objectives: To investigate the prevalence and comorbidity of sleep disturbance and LBP among elite Chinese athletes.

Materials and Methods: The survey was conducted from November to December 2023, involving full-time elite athletes from various sports teams in China. Three physicians distributed the Nordic Musculoskeletal Questionnaire and Pittsburgh Sleep Quality Index to participants for self-reporting. Multiple regression models were conducted to evaluate factors associated with LBP in the last 7 days or sleep disturbance.

Results: Of 530 respondents (Mean = 19.20; SD = 4.35), LBP and LBP-related disability were most prevalent among all body sites. The 12-month and 7-day prevalence of LBP were 43.2% and 27.2%, respectively. The 30-day and 7-day prevalence of sleep disturbance were 60.8%, and 60.6% respectively. The coexistence of 7-day LBP and sleep disturbance accounted for 18.7%. The top

five sports with the highest comorbidity rates of LBP and sleep disturbance were wushu (41.2%), volleyball (33.3%), trampoline (25.9%), badminton (23.4%) and weightlifting (20%). Sleep disturbance and years of training were associated with the presence of LBP in the last 7 days, while females, adults, and years of training were associated with the presence of sleep disturbance in the last 30 days.

Conclusions: This is the first large-scale study to evaluate the prevalence of musculoskeletal pain and sleep disturbance among elite Chinese athletes. LBP is the most prevalent musculoskeletal symptom. About 60% of elite athletes have sleep disturbance. Comorbidity of LBP and sleep disturbance is common among elite athletes. Sleep disturbance in the last month was associated with LBP in the last 7 days. Females, adulthood, and more years of training are independently associated with sleep disturbance in the last 30 days.

Keywords: low back pain, sleep disturbance, epidemiology, prevalence, comorbidity, elite athletes

SUBMISSION ID 287

ROLE OF DECORIN ON CARDIOMETABOLIC FUNCTION AFTER ENDURANCE EXERCISE

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Introduction: Decorin is a member of the small leucine-rich proteoglycan family of extracellular matrix proteins that interact with collagen fibers secreted from myotubes in response to exercise. Decorin plays a vital role to repair and regenerate skeletal and cardiac muscle. The increase of decorin levels after exercise has been reported, as well as its effects in skeletal muscle; however, the involvement of decorin in cardiometabolic function after endurance exercise has not yet been investigated.

Objectives: The association of decorin levels with cardiometabolic function before and after endurance exercise were investigated.

Materials and Methods: Fifty-six male amateur runners, aged 30 to 55 years, participated in this study. Plasma decorin levels were determined and cardiopulmonary exercise test (CPET) was performed using a breath-by-breath system before and after the marathon. Correlations between decorin and CPET parameters were performed by Spearman test. Runners were categorized into percentiles based on decorin concentration and differences between percentiles were evaluated using the Kruskal-Wallis test followed by Dunn's post-test.

Results: After the race, decorin levels were positively correlated with Speed and VO₂ consumption (mL/kg/min) in anaerobic threshold ($r = 0.49$, $p = 0.0001$ and $r = 0.36$, $p = 0.013$, respectively), respiratory compensation ($r = 0.52$, $p < 0.0001$ and $r = 0.36$, $p = 0.009$), and Peak ($r = 0.54$, $p < 0.0001$ and ($r = 0.31$, $p = 0.033$),) as well as with Oxygen Uptake Efficiency Slope (OUES) ($r = 0.34$, $p = 0.010$) in CPET. The change in OUES after race was greater and positive in runners with the highest decorin levels (>75th percentile, 1.4 ± 0.8) compared to negative change observed in those with lowest decorin levels (<25th percentile, -1.8 ± 0.8).

Conclusions: Decorin may be an important molecular mechanism involved in cardiometabolic adaptations induced by endurance exercise contributing to understand the importance of extracellular matrix in muscle regeneration.

Keywords: myokine, runners, metabolism, physiology, decorin

SUBMISSION ID 323

CONSENT AS A CENTRAL FEATURE OF HEALTHY SPORT – SOME CONSIDERATIONS FROM AN ETHNOGRAPHY WITH VISUALLY IMPAIRED AND GUIDE RUNNING

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Introduction: Consent sits at the foundation of all healthy sports participation. It serves as an indicator of what is considered desirable and undesirable, and welcomed and unwelcomed forms of conduct in a particular sporting context. Much of previous sports research on this topic has been to understand situations where consent is absent, misunderstood or violated, such as (sexual) exploitation, harassment or injury. This means that, how sportspeople might gain and maintain agency over their actions and manage their emotional, mental and bodily sovereignty in sporting interactions with others, has received little attention, and thus remains theoretically and empirically underdeveloped. As such, there is a gap in understanding this central feature on how healthy sport commences and proceeds.

Objectives: This presentation aims to explore how consent is communicated between sporting partners, particularly in the context of visually impaired and guide running, and to provide specific examples that highlight the general issues underlying healthy participation in sport. The study seeks to understand what the study of guided running can teach us about healthy sports and consent in sport in general.

Materials and Methods: This presentation will firstly consider consent as a broad social phenomena and then explore how it is communicated between sporting partners, in particular in an ethnographic case study of visually impaired and guide running, using reflective fieldnotes, a qualitative survey and qualitative interviews. The aim here will be to provide specific examples of much more general issues that underpin healthy participation in sport. What can the study of guided running teach us about healthy sports and consent in sport in general?

Results: Data collection for this study is ongoing, with the follow-up expected to be completed in the summer of 2024. The study design and preliminary findings will be presented at the conference.

Conclusions: The study concludes that sports practices are unhealthy if they are performed without an individual's consent. It emphasizes that understanding and establishing consensual interactions in sports is crucial for defining the absence of consent, which can help prevent ineffective, unhealthy, or abusive practices in sports. The study suggests that further investigation into how sportspeople communicate consent and the development of interventions to improve consent in sports are necessary.

Keywords: consent, healthy sport participation, visually impaired athletes, guide running, ethnography

SUBMISSION ID 185

PREVALENCE OF MELANOMA AND NON-MELANOMA SKIN CANCER IN OUTDOOR ATHLETES AND SPORTING ENTHUSIASTS IN AUSTRALIA

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Introduction: Each year, approximately 10 million Australians participate in outdoor sporting activities including surfing, swimming, running and cycling which expose these individuals to significant levels of ultraviolet radiation (UVR), which is the main cause for developing skin cancer.

Objectives: The aim of this study was to investigate the prevalence of non-melanoma (NMSC) and melanoma (MM) skin cancer in aquatic and non-aquatic outdoor sporting enthusiasts.

Materials and Methods: A cross-sectional study design incorporating a survey (physiological demographics, sporting activity-specific sun exposure, skin cancer prevention strategies, skin cancer risk and history), followed by total body skin cancer screening by a medical practitioner specialised in skin cancer detection, and confirmation of skin cancer by histopathology, were

performed in 951 aquatic (surfers, swimmers) and non-aquatic (walkers, runners and cyclists) outdoor sporting enthusiasts.

Results: A total of 951 participants (52.5% female) completed the survey and total body skin cancer screening. The outdoor sporting enthusiasts consisted of walkers, runners and cyclists (n=585), and surfers and swimmers (n=366). The standardised rate (per 100,000) for MM was 5,362 for all outdoor sporting enthusiasts (non-aquatic was 4,273 per 100,000; aquatic was 7,103 per 100,000). At least one NMSC was identified in 21.0% of aquatic participants, compared to 25.3% of non-aquatic sporting participants. The aquatic participants spent less time outdoors (7,083 lifetime hours) than the land-based sporting participants (9,581 lifetime hours), however the aquatic sporting participants were significantly ($p < 0.001$) more likely to train during peak UVR exposure times (aquatic 83.1%; land 53.0%).

Conclusions: The standardised rates of MM observed in outdoor sporting enthusiasts were significantly higher than the reported rate for the Australian general population (57 cases per 100,000). Hence, sporting enthusiasts who train outdoors require better education on sun-protection and their skin cancer risk and should ensure they incorporate better sun protection strategies into their training regime. These individuals should also undergo regular skin cancer screening for the early detection of skin cancer.

Keywords: melanoma, skin cancer, surfing, swimming, running, cycling

SUBMISSION ID 92

MANAGEMENT OF CHRONIC INSERTIONAL ACHILLES TENDINOPATHY WITH LOW LOAD BLOOD FLOW RESTRICTION (BFR) – RESISTED EXERCISE PROGRAM: CASE SERIES

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Introduction: The achilles tendon is prone to injury when exposed to repetitive high loads. Blood flow restriction (BFR) is a training method partially restricting arterial inflow and fully restricting venous outflow in working musculature during exercise. BFR resisted exercise is achieved using a pneumatic tourniquet system. Low load-BFR induces adaptations in Achilles tendon Cross section area (CSA), mechanical properties as well as in muscle mass and strength.

Objective: To monitor the clinical outcome in athletes with chronic insertional achilles tendinopathy after 6 weeks of BFR-resisted exercise program.

Materials and Methods: A total of 12 athletes participated in this study. The participants were prescribed a standardized BFR-RE protocol using pneumatic tourniquet band (pneuma air) for a duration of 15 minutes per session for 2 days in a week for a period of 6 weeks. The pneuma air band is connected by Bluetooth to a smartphone. Functional outcome was measured using Victoria Institute of sports assessment- achilles questionnaire (VISA-A). Outcomes were measured before the start of the program, at the end of 3 weeks, and at the completion of the study at 6 weeks.

Results: VISA-A score measured at 3rd & 6th week were statistically significant compared to day 0 by using paired t test (p value < 0.05).

Conclusions: The present study demonstrated that, chronic insertional achilles tendinopathy managed with low load blood flow restriction (BFR)-resisted exercise improves the VISA-A scores, indicating an improvement in functional outcome and pain in athletes with insertional achilles tendinopathy.

Keywords: bfr resisted exercise, achilles tendinopathy, visa a score assessment, functional outcome in achilles tendinopathy

SUBMISSION ID 180

SEVERE UNREMITTING PIRIFORMIS SYNDROME FOLLOWING YOGA AND PILATES: A CASE REPORT

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Introduction: Piriformis syndrome is known as the compression or irritation of the sciatic nerve due to spasm piriformis muscle, resulting in debilitating pain and discomfort. Due to its lucrative nature, it is challenging to diagnose in a clinical setting, particularly when influenced by unusual triggers such as physical activity including Yoga or Pilates. Although anatomical factors and physical strain are commonly attributed to the etiology of the condition, studies have shown that psychosomatic influences can contribute to the development and persistence of symptoms [2,3]. There have not been studies on the role of psychiatric medications in controlling persistent pain in patients with Piriformis syndrome and underlying psychiatric co-morbidities.

Objectives: This study explores the atypical management of severe piriformis syndrome, and the role of considering an integrated approach to sport-related pain syndromes.

Materials and Methods: The case report describes a 60-year-old woman with a history of Generalized Anxiety Disorder (GAD) who developed Piriformis Syndrome following Yoga and Pilates sessions. The patient's pain remained severe and unremitting despite receiving standard treatments for pain control. An integrated approach was prioritized, which included optimizing her current antidepressant therapy and adding Amitriptyline to the treatment regimen. This led to a reported improvement in clinical signs

Results: Following an incorporation of Amitriptyline and an increased dose of her home medication Duloxetine, she has noted a rapid reduction in pain intensity and an improvement of overall symptoms. She continued to improve on these medications and enhanced pain control on an as needed basis.

Conclusions: The use of psychiatric medication for pain management in patients with Piriformis syndrome or other sport-related injuries must be investigated further. This case underlines the importance of addressing holistic factors in managing musculoskeletal pain syndromes.

Keywords: piriformis muscle syndrome, musculoskeletal pain, myalgia, psychophysiological disorders, case report

SUBMISSION ID 162

PREDICTORS OF OVERUSE SHOULDER INJURIES IN MALE KUWAITI VOLLEYBALL PLAYERS

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Introduction: Overuse shoulder injuries are common amongst volleyball players. Knowledge about risk factors is crucial for understanding sports injury causes. However, none of the existing studies specifically focused on sub-elite volleyball athletes.

Objectives: This study aimed to investigate physical, personal, and training-related risk factors of overuse shoulder injuries among male competitive volleyball players in Kuwait.

Materials and Methods: Following institutional ethical approval, 173 Kuwaiti competitive male volleyball players were followed throughout an 8-month season. All players completed an electronic single registration form and 30-weeks course study season monitoring self-report. The weekly self-report consists of four questions on the identification of overuse injury and training session duration, frequency, and volume. According to the evidence-based filtration, only 72 players data were eligible for the study and then 57 players of them were examined clinically. A digital goniometer was used to examine external rotation (ER) and internal rotation (IR) range of motion (ROM). A handheld dynamometer measured bilateral shoulder ER eccentric strength and isometric strength of both IR and ER. Visual observation was used to identify scapular dyskinesis.

Poisson regression was run to predict overuse shoulder injuries based on the personal risk factors; participant age, competitive level, volleyball experience and training-related risk factors. One-way ANOVA (Post-Hoc) had been used to compare the means of ER ROM, eccentric ER strength, isometric IR strength and isometric ER strength values. However, to compare means of IR ROM values, Kruskal-Wallis H test had been used. The Chi-Square test had been utilized to compare scapular dyskinesia codes.

Results: Although, there were no significant personal or training related risk factors (RR=0-4%), rotator cuff muscle weakness (IER=10, IIR=13.5, EER=13.6) and glenohumeral ROM deficiencies (ER=6.4°, IR, U = 149.5) of ER and IR were indicated as a significant physical risk factors of overuse shoulder injuries ($P \leq 0.05$).

Conclusions: The findings are a call to action for translating this research into injury prevention programs.

Keywords: volleyball, overuse injuries, shoulder, risk factors, training, physical

SUBMISSION ID 275

ANALYSIS OF ELECTROCARDIOGRAPHIC (ECG) SCREENING IN YOUNG ATHLETES

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Introduction: Participation in competitive sports has increased significantly among young people in India. However, intense physical activity can lead to changes in the heart's structure and function, known as "Athlete's heart." Athletes are at a higher risk of developing sudden cardiac death (SCD) compared to the general population. Electrocardiography (ECG) is a valuable tool for detecting cardiac abnormalities in athletes during pre-participation screening.

Objectives: The primary goal was to estimate the prevalence and types of ECG variations among young Indian athletes. Secondary objectives included estimating the incidence of ECG variations across different sports disciplines, observing the influence of gender and duration of training, and identifying pathological ECG changes requiring further evaluation.

Materials and Methods: This observational cross-sectional study enrolled 300 state-level or national-level athletes aged 10-18 years from various sports. A senior sports physician interpreted the 12-lead ECGs of the participants based on the latest international guidelines. Athletes with pathological variations were referred to cardiologists for further management.

Results: Among the participants, 66.1% exhibited ECG variations, with 92% being physiological changes and 8% suspected pathological changes. The most common physiological variations were early repolarization/ST-segment elevation (43.6%), T-wave inversion (18.6%), and sinus bradycardia (12.3%). Male athletes had a higher incidence of physiological and pathological ECG variations, except for T-wave inversion, which was more prevalent in females. ECG changes were significantly associated with the duration of training and were more common in team sports and anaerobic sports.

Conclusions: This study highlights the importance of ECG screening in young Indian athletes, as a significant proportion exhibited ECG variations. While most variations were physiological, we also observed pathological changes that require further evaluation, underscoring the need for comprehensive pre-participation screening to prevent SCD and protect athletes' cardiovascular health.

Keywords: electrocardiography, athletes, sudden cardiac death, pre-participation screening, athlete's heart, Indian athletes

SUBMISSION ID 49

SLEEPING MORE THAN 8 HOURS: A SILENT FACTOR CONTRIBUTING TO DECREASED MUSCLE MASS IN CHINESE OLDER ADULTS

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Introduction: Muscle mass loss is an age-related process that can be exacerbated by lifestyle, environmental and other factors, but can be mitigated by good sleep. Objectives: To investigate the correlation between varying time lags of sleep duration and the decline in muscle mass among individuals aged 60 years or older by using real-world health monitoring data obtained from wearable devices and smart home health monitoring devices.

Objectives: To investigate the correlation between varying durations of sleep and the decline in muscle mass among individuals aged 60 years or older, utilizing real-world health monitoring data obtained from wearable devices and smart home health monitoring systems.

Materials and Methods: This study included 86,037 observations from 2,869 participants in the Mobile Support System database. Missing data were supplemented by multiple imputation. The investigation utilized generalized estimating equations and restricted cubic spline curve to examine the relationship between sleep duration and low muscle mass. Various lag structures, including 0, 1, 2, 0-1, 0-2, and 1-2 months, were fitted, and the interaction effect of observation time with sleep duration was estimated for each lag structure. Additionally, subgroup analyses were conducted.

Results: The results of the generalized estimating equation showed a significant correlation ($p < 0.001$) between sleep duration of 8 hours or more and low muscle mass in older adults, using 6-7 hours of sleep as a reference. This effect was seen over time and prolonged sleep accumulated over multiple months had a greater effect on muscle mass loss than a single month. The effect of long sleep duration on muscle mass loss was significantly greater in females than in males and greater in the over-75 than in the under-75 age group. Restricted cubic spline plots showed a non-linear relationship between sleep duration and low muscle mass ($p < 0.001$).

Conclusions: Consistently sleeping more than eight hours at night is one of the most important causes of muscle mass loss in older adults, especially older women.

Keywords: sleep duration, low muscle mass, longitudinal data, older adults

SUBMISSION ID 232

THE COMPARISON OF PHYSICAL ACTIVITY LEVEL, BODY COMPOSITION, BALANCE, POSTURE, PERCEIVED STRESS, AND QUALITY OF LIFE BETWEEN ATHLETES AND NON-ATHLETES IN YOUNG ADULTS.

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Introduction: In modern society, the importance of physical fitness and well-being has gained significant recognition. Regular physical activity has been associated with numerous health benefits, including improved posture, balance, quality of life, and stress levels. Athletes who engage in structured training and competitive sports are often regarded as the epitome of physical fitness, in contrast with non-athletes who have sedentary lifestyles. Current literature shows significant differences in athlete and non-athlete population in terms of physical activity, balance and posture. Factors such as body composition, stress and quality of life and their influence thereof has not been studied yet.

Objectives: This study aims to address the differences between athlete and non-athlete young adults in terms of physical activity, body composition, balance, posture, perceived stress and health-related quality of life (HRQOL) in university students.

Materials and Methods: A total sample of 80 participants was selected (40 male and 40 female), between the ages of 18 and 25. Three questionnaires were used: IPAQ (International Physical Activity Questionnaire) to measure physical activity, PSS (Perceived Stress Scale) for perceived stress, and SF-36 (Short Form-36) for HRQOL. Three research devices were used: Tanita's Bioelectrical Impedance Analysis BIA for body composition, Biodex Balance System (BBS) for dynamic balance, and PostureScreen (mobile screening app) for posture evaluation in lateral and posterior views. Shapiro-Wilk's test determined that data was not normally distributed. Thus, Mann-

Whitney U test ($p < 0.05$) was used to compare data from both groups.

Results: There was no significant difference found between both group in perceived stress, HRQOL, balance and posture. Based on SF-36 scores, both groups showed poor HRQOL, particularly emotional wellbeing in athletes. Based on PSS scores, both groups showed moderate stress.

Conclusions: Athletes have better physical activity levels, as expected. However, athletes as well as non-athletes show poor HRQOL and increased stress levels.

Keywords: physical activity, body composition, balance, posture, stress, quality of life

SUBMISSION ID 211

ARE ACCELEROMETER-MEASURED SITTING AND PHYSICAL ACTIVITY TIMES ASSOCIATED WITH MUSCLE MASS AND STRENGTH IN HEALTHY YOUNG ADULTS IN THE UAE?

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Introduction: A high prevalence of obesity, sedentary behavior, and physical inactivity could affect muscle mass and strength in young adults in the United Arab Emirates (UAE). Therefore, we investigated the association of sex, body mass index (BMI), and accelerometer-measured sitting and physical activity (PA) times with skeletal muscle mass index (SMI), hand grip, and thigh muscle strength in healthy young adults in the UAE.

Objectives: To investigate the association of sex, body mass index (BMI), and accelerometer-measured sitting and physical activity (PA) times with skeletal muscle mass index (SMI), hand grip, and thigh muscle strength in healthy young adults in the UAE.

Materials and Methods: In this cross-sectional study, 156 healthy young adults (age 21.68 ± 3.01 years, BMI 25.40 ± 4.79 kg/m², 52.6 % women) were included. BMI and muscle mass were recorded using a bioelectrical impedance analyzer. Maximum hand grip strength and thigh muscle torque were assessed using the Jamar-smart hand-dynamometer and Biodex System-4-Pro, respectively. Participants wore a triaxial Fibion accelerometer on their anterior thigh for >10 h per day for 4–7 days to measure their sitting and PA times. Multiple linear regression analyses were used.

Results: Participants spent most of their time sitting (11.37 ± 1.10 h), followed by standing (2.92 ± 0.86 h), walking (1.58 ± 0.55 h), and vigorous intensity PA (4.79 ± 5.85 min) per 16-h day. Sex ($p < 0.001$) and BMI ($p < 0.001$) were negatively associated with all muscle mass and strength variables. Men had more muscle mass and strength than women. As BMI increased, muscle mass and muscle strength decreased. Accelerometer-measured sitting and walking times were negatively associated with concentric hamstrings ($p = 0.044$) and quadriceps torques ($p = 0.031$), respectively.

Conclusions: Sex, BMI, and accelerometer-measured sitting and walking times were associated with muscle mass and/or muscle strength in healthy young adults. Women and those with a high BMI need interventions to improve their muscle mass and strength. The paradox regarding the association of PA with muscle mass and strength in younger adults may be due to possible influences from other factors (e.g., resistance training, dietary intakes, etc.) superseding that of accelerometer-measured PA.

Keywords: accelerometer, sedentary behavior, physical activity, muscle mass, muscle strength

SUBMISSION ID 321

INTERVENTIONAL SPINAL INJECTIONS IN ATHELETS A SCOPING REVIEW

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Introduction: Spinal pain and injuries are common in athletes and a major concern for physicians who treat athletes. Most lumbar and cervical injuries in athletes are managed conservatively, however in certain cases spinal injections are necessity. The outcome of spinal injections in the general population has been documented. However, efficacy of these injections as a diagnostic or

therapeutic intervention among athletes has not been documented.

Objectives: Mapping the published studies on spinal injections in athletes.

Materials and Methods: In this scoping review which conducted based on the recommendation of the PRISMA extension, the PubMed database was searched using queries: sports, athletes, and spinal injection until April 2023. All studies, including case reports, case series, and reviews were included. We mapped these studies based on the diagnosis and also reviewed the efficacy and return to sport rates.

Results: In total 24 studies were included in which 335 injured athletes were identified. The majority of these patients were adolescents and young adults, and football and baseball were the most prevalent sports. We mapped these studies into five categories based on the diagnoses. 1-Disc herniation, 2- Degenerative disc disease, 3- Facet joint pain, 4- Sacroiliac joint pain 5- Others including spondylolysis, sacralization and endplate vertebrae changes. Characteristics of athletes, types of interventions including epidural steroid injections and facet joints blocks and return to sport rates were reported. Corticosteroids were the most commonly used material for injection in the reviewed studies.

Conclusions: We mapped reported studies on interventional spinal injections in athletes. These studies were mainly case reports and case series. High quality studies are needed in this area.

Keywords: spinal injections, low back pain, neck pain, disc herniation, transforaminal epidural injection

SUBMISSION ID 249

COMPARISON BETWEEN THE EFFECT OF 10 WEEKS OF MORNING OR EVENING AEROBIC EXERCISE ON WEIGHT LOSS AND PHYSICAL FITNESS OF OBESE COLLEGE STUDENTS: A RANDOMIZED CONTROLLED TRIAL

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Introduction: The physiological and metabolic processes are influenced by biological rhythms. Numerous studies have shown that the different timing of exercise has different effects on weight loss, body shape, cardiovascular system, athletic and physical fitness. Obesity is currently a serious problem among college students, who are physically inactive and in poor physical health.

Objectives: To assess the effects of chrono-exercise on weight loss and physical fitness in overweight and obese college students.

Materials and Methods: A total of 31 overweight and obese Chinese university students (18–22 years old) were randomized to exercise in the morning exercise (6.00-12.00a.m., n = 16) or evening (5.00-11.00p.m., n = 15). The intervention was aerobic running exercise for 60 min five times a week for 10 weeks. Weight, body mass index (BMI), waist circumference (WC), scapular skinfold thickness (SST), body composition, resting heart rate (RHR), systolic blood pressure (SBP), diastolic blood pressure (DBP), muscular strength (sit-ups/Chin-ups/squats), endurance (1000/800-meter), explosive strength (50-meter/standing long jump), flexibility (sit-and-reach), and dietary intake were measured before and after the 10-week intervention.

Results: Compared to participants who trained in the evening, participants who trained in the morning showed significant reductions in WC ($p < 0.05$) and SST ($p < 0.01$), suggesting that exercise in the morning could improve body shape. Meanwhile, compared to pre-intervention, weight ($p < 0.05$), BMI ($p < 0.05$), WC ($p < 0.05$), SST ($p < 0.01$), SBP ($p < 0.05$) and explosive strength ($p < 0.01$) in the morning group, endurance ($p < 0.05$) in the evening group, and RHR ($p < 0.05$), strength ($p < 0.05$) and flexibility ($p < 0.05$) in both groups were significantly improved after intervention.

Conclusions: Compared to exercise in the evening, exercise in the morning has superior beneficial effect on weight loss and improving body shape in overweight and obese college students.

Keywords: chrono-exercise, body shape, physical fitness, obese college students

SUBMISSION ID 43

IS SCHOOL SPORT NECESSARY TO IMPROVE CHILDREN'S COGNITION?

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Introduction: Physical activity (PA) is beneficial for children's health in many ways, with particular emphasis on its role in supporting cognitive performance and learning. Given the increasing physical inactivity and declining fitness of children as they age, there is growing interest in promoting PA at school. However, according to the World Health Organization, further studies are needed to clarify which PAs at school promote cognitive abilities the most and to what extent.

Objectives: The key objective within this thesis was to investigate the relationship between different characteristics of PA and cognitive performance in schoolchildren aged up to 12 years from long-term perspective.

Materials and Methods: The evaluation was based on studies (PMID: 34438560 and PMID: 36360379) with a focus on school sport, fitness, and gender.

Results: The success of long-term interventions depend on improvements in fitness over time and children's compliance. More attention should be paid to improving endurance performance, even though coordination skills seem to be beneficial for cognitive abilities. Girls perform worse than boys in fitness tests, which can lead to slower reaction times in cognitive tasks. Additional sport lessons embedded in the curriculum have the potential to promote the cognitive functions.

Therefore, five or six hours of school sports per week instead of three regular lessons are of interest. For children who are not sufficiently active outside of school, the usual three hours of physical education at school are often the only physical activity during the day. The amount of physical activity should be based on individual physical ability to avoid physical over- or under-exertion.

Conclusions: Promoting school sport seems to be necessary for the development of long-term favourable health behaviour and for improving cognition, but should be adapted to the interests of girls and boys.

Keywords: physical activity, school sport, cognition, gender differences, fitness

SUBMISSION ID 355

MENTAL HEALTH AND LIFESTYLE BEHAVIOURS OF MALAYSIAN ESPORTS PLAYERS: UNVEILING HIDDEN CHALLENGES

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Introduction: Esports has rapidly emerged globally, with Malaysia seeing significant growth, boasting 14 million participants annually. Malaysia plans to be a leading esports hub in Southeast Asia by 2025. The International Olympic Committee's plan for the first "Olympic Esports Games" in 2025 underscores esports' recognition. Despite its popularity, limited research has explored the lifestyle behaviours and mental health of esports players.

Objectives: This study investigates the mental health status and lifestyle behaviours among Malaysian mobile esports players, examining their correlation and providing insights into their challenges.

Materials and Methods: A cross-sectional online survey was conducted among semi-professional players during a national esports' tournament in 2022. The study included Malaysian citizens or permanent residents who consented to participate, yielding 401 valid responses. Data were collected using validated questionnaires, including the International Physical Activity Questionnaire – Short Form (IPAQ-SF), Depression Anxiety Stress Scale (DASS-21), and a lifestyle questionnaire adapted for esports players.

Results: The study revealed that nearly half of the respondents reported abnormal anxiety levels, with moderate anxiety being the most prevalent. Depression and stress levels were generally mild or normal. Lifestyle behaviours showed low physical activity, with 55.1% of players not meeting

WHO recommendations. A significant proportion (66%) did not engage in traditional sports. Vaping correlated with stress, while average sleep quality during tournaments linked to depression and anxiety. No significant correlations were found between mental health and behaviours such as alcohol consumption, smoking, and average sleep duration during non-tournament periods.

Conclusions: Malaysian esports players face considerable mental health challenges, particularly anxiety, influenced by vaping, poor sleep quality and low physical activity during high-stress periods. These findings can guide esports organisations, healthcare professionals, and policymakers in developing comprehensive support systems to enhance the health and well-being of esports players. The study underscores the critical importance of addressing mental health and lifestyle behaviours in the rapidly growing esports industry.

Keywords: esports, mental health, lifestyle behaviours, anxiety, physical activity

SUBMISSION ID 104

ASSESSING THE GAPS IN UNDERSTANDING AND CREDIBILITY OF SELF-HEALING FOR MUSCULOSKELETAL PAIN AMONG HEALTHCARE PROFESSIONALS: A GLOBAL SURVEY STUDY

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Introduction: Musculoskeletal (MSK) pain is optimally managed with conservative modalities, non-pharmacologic and pharmacologic approaches. There is a rising trend towards incorporating multi-modal integrative medicine into MSK treatment guidelines worldwide, partly due to notable adverse effects from drug therapies. These strategies seek to utilize the body's innate ability to self-heal with the aim of offering drug-free pain relief. However, healthcare professionals (HCPs) and patients do not have enough education on self-healing techniques.

Objectives: To identify gaps in understanding and credibility of self-healing among HCPs who manage MSK pain and identify the contributing factors.

Materials and Methods: An international cross-sectional survey was administered online to HCPs (N=398) who manage/treat MSK pain across the U.S., Australia, Brazil, France, Germany, and Vietnam. The HCPs were asked to rate their levels of confidence and agreement regarding their beliefs about self-healing, specific treatment modalities, and barriers to drug-free therapies, before and after exposure to a self-healing concept. Repeated-measures analysis compared the responses to key variables pre- and post-concept exposure and linear regression analysis identified the driving factors.

Results: Though HCPs had less confidence in the body's self-healing ability and effectiveness of certain alternative approaches such as acupuncture, infra-red therapy, etc., the results indicated their openness to drug-free pain management approaches and to alternatives that address the underlying causes of pain. They recognize the importance of early intervention with multi-modal integrative medicine to prevent pain from becoming chronic. Post-concept exposure, there was a slight increase in confidence and agreement among HCPs regarding the effectiveness of self-healing in addressing MSK pain, and empowering individuals for long-term well-being through self-healing. These beliefs varied by HCP tenure, country, and specialty.

Conclusions: The positive shift in HCPs' beliefs 'post-concept' exposure about self-healing in MSK pain management suggests there is potential impact of evidence-based information in enhancing their confidence.

Keywords: drug-free therapy, musculoskeletal pain, multi-modal integrative medicine, pain-relief, self-healing

SUBMISSION ID 304

OPTIMIZING RECOVERY THROUGH NUTRITION: STRATEGIES FOR ENHANCING ATHLETIC PERFORMANCE

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Introduction: Post-exercise protein intake is crucial for stimulating muscle protein synthesis, essential for muscle repair and adaptation. High-quality proteins rich in essential amino acids, particularly leucine, play a pivotal role in maximizing these processes. The timing and quantity of protein intake post-exercise are critical factors influencing recovery rates and subsequent athletic performance.

Objectives: This abstract explores key nutritional strategies aimed at optimizing athletes' recovery, highlighting variations in individual dietary needs and preferences. Factors such as metabolism and training intensity can significantly influence athletes' nutritional requirements, affecting their protein, carbohydrate, and anti-inflammatory nutrient needs post-exercise.

Materials and Methods: This section is not explicitly detailed in the provided abstract. However, it is implied that the methods would involve a review of current nutritional strategies, an analysis of dietary needs based on exercise intensity and individual metabolism, and the examination of the role of protein, carbohydrates, and anti-inflammatory nutrients in post-exercise recovery. The study may also consider the effects of timing and quantity of nutrient intake on muscle protein synthesis and glycogen resynthesis rates.

Results: Carbohydrate intake following exercise is essential for replenishing glycogen stores depleted during physical activity, supporting subsequent training sessions or competitions. Optimal carbohydrate intake post-exercise depends on exercise intensity and duration, aiming to maximize glycogen resynthesis rates. Incorporating anti-inflammatory nutrients such as omega-3 fatty acids and polyphenols assists in mitigating exercise-induced inflammation, facilitating faster recovery and reducing the risk of overtraining. The potent antioxidant properties of these nutrients aid in the repair of cellular damage and promote overall recovery.

Conclusions: This abstract synthesizes recent empirical research on nutritional strategies tailored to enhance athletic recovery, acknowledging the variability in athletes' nutritional requirements based on individual factors. By optimizing protein and carbohydrate intake and integrating anti-inflammatory nutrients into post-exercise nutrition protocols, athletes can enhance recovery efficiency, optimize performance outcomes, and mitigate the risk of injury.

Keywords: recovery nutrition, athletic performance, muscle repair, glycogen restoration, anti-inflammatory nutrients

SUBMISSION ID 140

ASSOCIATION BETWEEN ACTN-3 c.1729C>T (rs1815739) POLYMORPHISM AND MATCH-PLAY MAXIMAL RUNNING SPEED IN ELITE FOOTBALL PLAYERS: A PRELIMINARY REPORT

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Introduction: Genetic variants in the alpha actinin-3 (ACTN-3) gene have been associated with

elite sport athletic performance. The C allele and the CC genotype of the ACTN-3 polymorphism seems to advantage the ability to generate powerful and forceful muscle contractions, required during sprinting performance. High-intensity running is a key element in modern football and it is able to discriminate between elite football players and players of a lower competitive level. We hypothesized that football players harbouring the C allele would have a higher maximal running speed (MRS) during matches than those footballers with the TT genotype.

Objectives: This study examined, for the first time, the influence of the ACTN-3 c.1729C>T (rs1815739) polymorphism on maximal running speed performance ($\text{km}\cdot\text{h}^{-1}$) during official matches for top level football players.

Materials and Methods: MRS was collected using a Global Position System (GPS) (K- Sport, Montelabbate, Pesaro Urbino, Italy) from 17 top-level football players (age 18.2 ± 0.8 years) from the same professional team during 26 official matches of a season. Genomic DNA was extracted using a buccal swab, and the ACTN-3 c.1729C>T genotype was carried out using a RFLP PCR method.

Results: The main finding was that CC players performed significantly higher MRS ($\text{km}\cdot\text{h}^{-1}$) than TT players ($\text{CC}=33.7\pm 0.5$ vs $\text{TT}=30.4\pm 2.0$, $p=0.036$). Moreover, the players harbouring a copy of the C allele showed a trend toward higher MRS than players carriers of the TT genotype ($\text{CC}+\text{CT}=32.6\pm 1.7$ $\text{TT}=30.4\pm 2.0$, $p=0.06$).

Conclusions: We found, for the first time, an association between the ACTN-3 polymorphism and match-play maximal running speed in elite football players. If our finding will be replicated in larger research, it could be used in future to early detection potential traits of practical utility, helping to adapt the training protocols during growth and development, thus enhancing the capabilities and skills for attainment of peak football performance.

Keywords: alpha-actnin 3, gene, velocity, soccer, sprint performance

SUBMISSION ID 351

INTER-MONITOR RELIABILITY AND VALIDITY OF THE FIBION ACCELEROMETERS WORN ON THE THIGH AND IN A FRONT TROUSER POCKET DURING FUNCTIONAL ACTIVITIES

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Introduction: Accelerometer-based physical activity monitors are designed for placement on several body locations, with popular sites being the wrist, waist/hip, and thigh. Thigh placement is particularly valued for its accuracy in measuring postures and related energy expenditures. However, exploring the efficacy of different thigh wear locations remains an area for further research.

Objectives: To investigate the inter-monitor reliability and validity of Fibion accelerometers for

assessing energy expenditure and classifying activities when worn on different locations on the thigh and in a front trouser pocket during selected functional activities within a laboratory setting.

Materials and Methods: Thirty healthy, young adults (aged 21.83 ± 2.80 years; 15 females) wore six Fibion accelerometers on three locations (proximal thigh, 10 cm above the patella, and the front trouser pocket) on both thighs while performing 11 functional activities for 70 minutes in a laboratory setting. Inter-monitor reliability for measuring energy expenditure of the employed tasks and accuracy for activity type and intensity classification were assessed.

Results: Reliability estimates (intraclass correlation coefficients (ICC 3, k) implied good to excellent inter-monitor reliability for measuring energy expenditure during nearly all activities. Furthermore, energy expenditure measurements were equivalent between accelerometers in both trouser pockets, and proximal and distal thighs within a bound of ± 1.60 kcal. The mean activity classification accuracy ranged from 87-92% for activity type and 91-94% for activity intensity for the chosen activities, irrespective of the accelerometer location or side of body (right vs. left).

Conclusions: The fibion accelerometers reliably measure energy expenditure and accurately classify activity type/intensity for nearly all functional activities, regardless of the thigh wear location or side of the body. However, similar studies in free-living settings are further warranted.

Keywords: accelerometer, accuracy, precision, functional activity, kilocalories

SUBMISSION ID 311

DEVELOPMENT OF AN EXERCISE PRESCRIPTION USING HYDRAULIC RESISTANCE TRAINING TO IMPROVE OUTCOMES IN ELDERLY TYPE 2 DIABETES PATIENTS

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Introduction: Type 2 diabetes mellitus (T2DM) is a chronic condition that affects a significant portion of the elderly population, leading to a decline in physical fitness and an increase in cardiovascular risks. Hydraulic resistance training is a form of exercise that utilizes fluid resistance for muscle strengthening and has been considered a potential intervention for improving physical fitness and disease control in this population.

Objectives: To explore the impact of hydraulic resistance circuit training on physical fitness and disease control in elderly patients with type 2 diabetes mellitus.

Materials and Methods: This study adopted a single-center, controlled trial design. The treatment period was 12 weeks, with participants undergoing hydraulic resistance circuit training three times a week, each session lasting 45 minutes. During the treatment period, the original hypoglycemic medication regimen was not actively changed. Any adjustments due to factors such as hypoglycemia were made individually by the study doctor, primarily adjusting the dosage rather than the type of medication.

Results: A total of 68 elderly patients with type 2 diabetes were recruited from the outpatient departments of a tertiary hospital and randomly divided into control and intervention groups. Fifty-two participants completed the study (control group: 21, mean age 64.9 ± 9.7 years, 13 males; intervention group: 31, mean age 65.0 ± 8.0 years, 12 males). No adverse events, such as exercise injuries or hypoglycemia, occurred during the intervention. At baseline, there were no significant differences between the exercise and control groups in BMI, body fat percentage, skeletal muscle index, body circumference, walking speed, grip strength, 2-minute step test, HbA1C, FPG, TC, TG, LDL-C, and HDL-C ($P > 0.05$). Post-intervention, the control group showed an increase in weight (60.50 ± 9.39 vs 68.54 ± 10.02 kg, $P < 0.0001$), while the exercise group showed a decrease in weight (68.54 ± 10.02 vs 68.20 ± 10.12 kg, $P < 0.0001$), with the exercise group performing better than the control group ($P = 0.021$). The exercise group showed significant improvements over the control group in body fat percentage (25.74 ± 7.39 vs 30.18 ± 7.34 %), skeletal muscle mass (27.42 ± 6.73 vs 22.35 ± 5.45 kg), and skeletal muscle index (10.18 ± 1.97 vs 9.28 ± 1.65 kg·m⁻²) ($P < 0.05$).

Additionally, the exercise group experienced reductions in upper arm circumference (29.7 ± 4.0 vs

32.3±4.1 cm, P=0.001) and thigh circumference (46.3±4.3 vs 51.3±4.2 cm, P<0.0001), with improvements superior to the control group (P<0.05). After the 12-week clinical intervention, the exercise group showed greater improvements in walking speed (0.97±0.17 vs 0.83±0.26 m/s, P=0.020) and the 2-minute step test (210.42±26.82 vs 254.05±48.70 steps, P<0.0001) compared to the control group (P<0.05). Furthermore, the exercise group exhibited greater reductions in HbA1C (7.07±0.61 vs 7.16±0.99 %, P=0.021), TC (166.89±28.51 vs 184.71±32.43 mg/dL, P=0.044), LDL-C (92.90±25.80 vs 109.38±26.01 mg/dL, P=0.032), and HDL-C (45.23±13.78 vs 63.26±21.60 mg/dL, P=0.001) than the control group.

Conclusions: A 12-week hydraulic resistance training program can effectively improve cardiorespiratory endurance, muscle fitness, and balance in elderly diabetic patients. It can also reduce body weight and body fat percentage and improve blood glucose and lipid control. No adverse events such as hypoglycemia or exercise injuries occurred during the intervention, making this an effective exercise treatment for elderly diabetic patients.

Keywords: hydraulic resistance training, type 2 diabetes, exercise prescription, physical fitness, disease control

SUBMISSION ID 50

PHYSICAL ACTIVITY THRESHOLDS TARGETED AT BODY COMPOSITION STANDARD IN CHINESE ADOLESCENTS AGED 12-15 YEARS

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Introduction: The body composition of adolescents has become one of the most prominent influential factors of several health issues. Physical activity (PA) has been recognized as a key player in body compositions.

Objective: This study aims to identify the minimum thresholds of the moderate-vigorous physical activity (MVPA) for reaching different body composition standards.

Materials and Methods: 196 males (13.61±0.91 years, 171.80±7.93cm, 63.80±14.87kg) and 326 females (13.34±0.91 years, 163.12±5.88cm, 52.62±9.38kg) were measured body composition using the Bioelectrical Impedance Analyzer BCA-2A and completed the 7-days PA monitoring task wearing the ActiGraph wGT3X-BT. The MVPA minimum thresholds for reaching different body composition standards were determined using Receiver Operator Characteristic (ROC) curve analysis. Area Under the Curve (AUC) was calculated for the predictive value of ROC model, and MVPA cut points that maximized Youden Index were determined as the MVPA thresholds.

Results: For males, the MVPA thresholds were identified as 30.89 mins/d (AUC=0.639, P=0.045, the maximized Youden Index=0.545) for the LM standard (695.22g/kg body mass) and 36.23 mins/d (AUC=0.562, P=0.043, the maximized Youden Index=0.406) for the BMC standard (36.32g/kg body mass) and 30.89 mins/d (AUC=0.654, P=0.022, the maximized Youden Index=0.612) for the FM standard (304.78g/kg body mass). For females, the MVPA thresholds were identified as 29.57 mins/d (AUC=0.783, P=0.045, the maximized Youden Index=0.732) for the LM standard (633.87g/kg body mass) and 27.75 mins/d (AUC=0.655, P=0.001, the maximized Youden Index=0.453 for the BMC standard (37.06g/kg body mass) and 29.57 mins/d (AUC=0.796, P=0.000, the maximized Youden Index=0.630) for the FM standard (366.13g/kg body mass).

Conclusions: The MVPA thresholds, generated based on different body composition standards of Chinese adolescents aged 12-15 years old, were approximately 30 minutes per day and were lower when compared to the WHO PA recommendation (i.e. 60 minutes per day) for adolescents.

Keywords: physical activity, body composition, adolescents, moderate-vigorous physical activity, health standards

SUBMISSION ID 95

NECK FUNCTIONAL CAPACITY IN HIGH ACHIEVEMENT SPORTS AND PARA SPORTS

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Introduction: Sports and para sports improve a physical and mental health, but an athlete's and para athlete's goal to achieve higher result in every competition often makes to balance on the border of health risk. The demand of neck functional capacity is sports specific. Movement mistake like imperfect head and neck position influences aerodynamics, impacts result and could causes health and injury risks which are high in elite sports and para sports. Variability in neck movements and functional capacity like endurance, strength, speed, and stereotype of movements could be linked to neck injury patterns.

Objectives: To evaluate neck functional capacity and related health risk in high achievement sports and para sports with significant acceleration, contact sports, and targeting sports.

Materials and Methods: In the research performed at the "Sports Laboratory"-FIMS CCSM was tested 60 athletes and 15 para-athletes in high achievement sports with significant acceleration, contact sports, and targeting sports and control groups, males aged 20-35 years by using anthropometry, CPET, neck functional assessment: digital goniometry, dynamometry, chronometry, video analyse in standardised and sports specific positions, and data analyse with IBM SPSS29.

Results: The neck muscle strength could be predicted by neck circumference in sports with significant acceleration. In contact sports and targeting sports were observed higher range-of-motion in extension and rotation compare with flexion and side-flexion than in sports with significant acceleration. Higher neck strength was observed in high achievement sport athletes and para-athletes in sports with significant acceleration: more in extension comparing with side flexion, then rotation and flexion compared with individuals of general population.

Conclusions: Specific sport has different demand in neck functional capacity. It increases the stability of the cervical spine, allows to make more proper movements, and absorb the external forces.

Keywords: high achievement sport, para sport, neck functional capacity, neck strength, acceleration, neck head injury risk

SUBMISSION ID 370

COMPARISON OF CARDIORESPIRATORY ENDURANCE BETWEEN HATHA YOGA AND FLOW YOGA EXERCISE FOR 8 WEEKS IN MIDDLE-AGED WOMEN

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Introduction: Hatha yoga and flow yoga are both forms of exercise that can potentially influence cardiorespiratory endurance in middle-aged women. This study aims to compare the effects of these two types of yoga on cardiorespiratory endurance to understand their potential benefits for this demographic.

Objectives: The objective of this study is to compare the cardiorespiratory endurance outcomes between hatha yoga and flow yoga exercises in middle-aged women after an 8-week intervention. The study seeks to determine which form of yoga is more effective in improving cardiorespiratory endurance and flexibility in this age group.

Materials and Methods: 42 healthy women aged 45-59 years were recruited. They did not practice yoga or other exercise in the last 3 months. Subjects were randomly divided into the flow yoga group (FY, n=21) and the hatha yoga group (HY, n=21) randomly. The two groups were given 60 minutes exercise each day, 5 times per week for 8 weeks. A polar watch was used to monitor heart rate during exercise, The maximal oxygen uptake was calculated by a two-step experiment. All

participants did not engage in any other physical activity except 60 minutes of yoga a day. All subjects maintained regular routine diet and gave the formal consent of the experiment.

Results: During the 8-week yoga intervention, two subjects of Hatha yoga group were missed, and two subjects in the Vinyasa group whose attendance rate did not reach 70 % were excluded from the study. 1) The cardiopulmonary endurance of Hatha yoga group ($29.90 \pm 4.37 \text{ mL} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$ VS $33.86 \pm 4.94 \text{ mL} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$) and flow yoga group (32.50 ± 3.51 VS $37.79 \pm 4.34 \text{ mL} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$) were significantly improved ($P < 0.01$). Flow yoga has much better effect in comparison with Hatha group ($P < 0.05$). 2) Compared with the flow yoga group, the flexibility improvement effect of Hatha yoga group was significantly different ($P < 0.05$). 3) There were significant differences in the improvement of resting heart rate and systolic blood pressure in the two groups before and after exercise intervention respectively ($P < 0.01$), but significant improvement in diastolic blood pressure were not found.

Conclusions: Both Hatha yoga and flow yoga have improved cardiorespiratory endurance in middle-aged women, and flow yoga displayed more obvious effect. To improvement effect of flexibility, Hatha yoga is better than that of flow yoga.

Keywords: flow yoga, hatha yoga, cardiopulmonary endurance, flexibility