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10^{ème}/th INTERNATIONAL ANKLE SYMPOSIUM



Société Française
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RESEARCH < IMPACT > PRACTICE



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Ankle and hip isometric strength program for ankle instability weakness : Pilot randomized controlled trial



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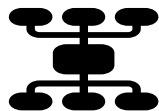
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*Gros Emilie, Bouchet Maeva, Moncel
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Grandjean, Aguilaniu Aude*

Introduction

Chronic ankle instability weakness



Hertel Model



**Hip abduction and external rotator
strength deficit**

(McCann RS and AI, J Athl Train. 2018
-Powers CM and AI, J Athl Train. 2017)



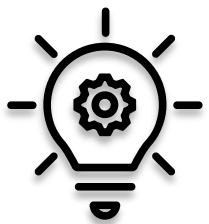
Ankle muscles strength deficit
(Smith BI and AI, J Sport Rehab. 2018)



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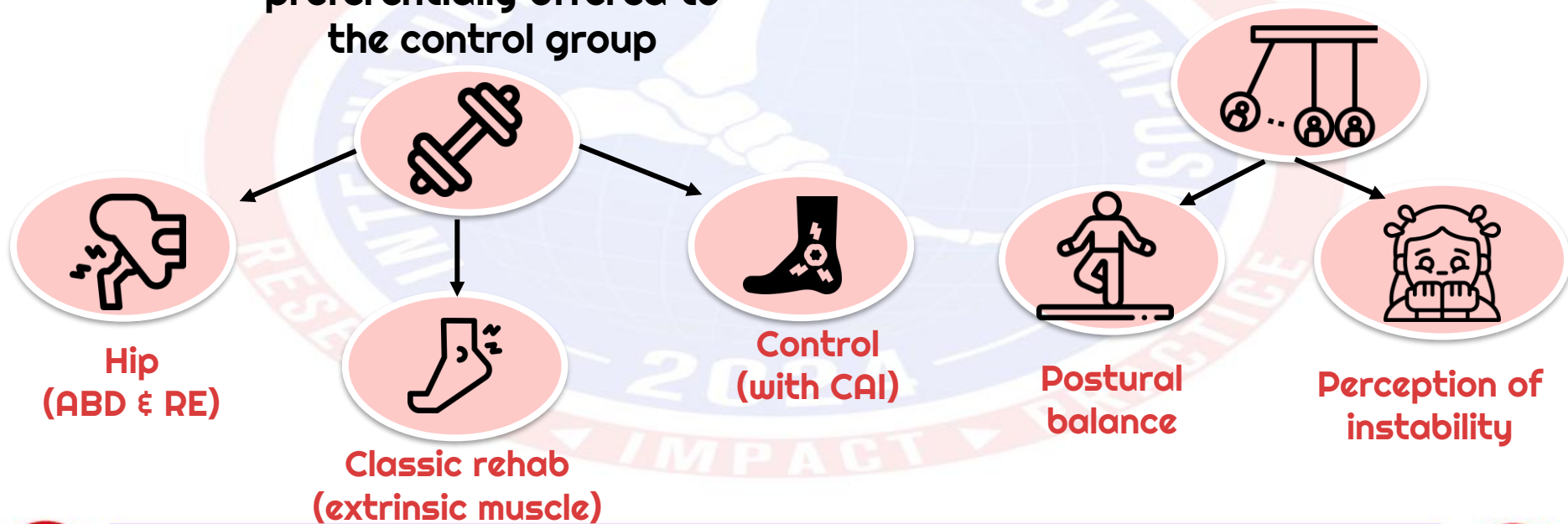




Research objectives

Compare the effectiveness of the two reinforcements preferentially offered to the control group

Impacts of these two types of reinforcement



Materials and methods

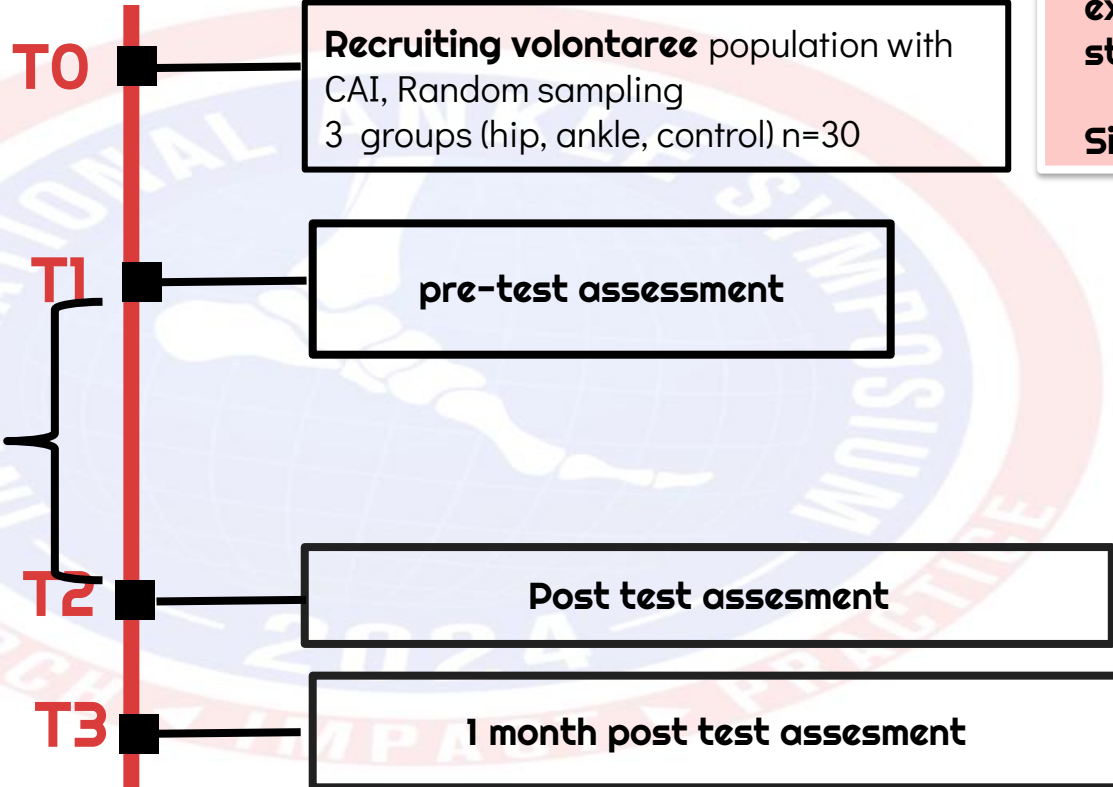
Study progress

Randomized
controlled
experimental
study

Single blind

Strengthening

4 weeks
3 times a week



Assessment

	Parameters Studied	Assessment Tool	Unit
	Self-assessment of feeling of ankle instability	FAAM sport and ADL (Foot and Ankle Ability Measure)	
	Strength of the hip abductors and external rotators	Manual Dynamometer	Newton
	Strength of the inverter, evertor, dorsiflexor and plantar flexor of the ankle	Manual Dynamometer	Newton
	Static Balance	Single Leg Stance on firm surface (SLS)	Number of errors
	Dynamic postural balance	-Side hop test -Figure of 8 hop test	Seconds
	Planter flexor endurance	Heel rise	Number of repetitions
	Ankle dorsiflexion	WBLT (Weight Bearing Lunge Test)	cm

Isometric strengthening

Hip



Abductor



External Rotators



Clam shell

- Warm-up: 10 jumps on both feet
- 12 strengthening sessions
- 4 sessions of hypertrophic strengthening
- 8 sessions to develop muscular strength

Isometric strengthening

Ankle



Invertor



Evertor



Dorsiflexion



Plantar flexion

**Hypertrophic strengthening: 70-80 % force intention, for 3 to 30 seconds.
Total contraction time : 80 to 150 seconds.**

**Strength sessions : 80-100% the force intention, for 3 to 5 seconds
Total contraction time : 30 to 90 seconds**

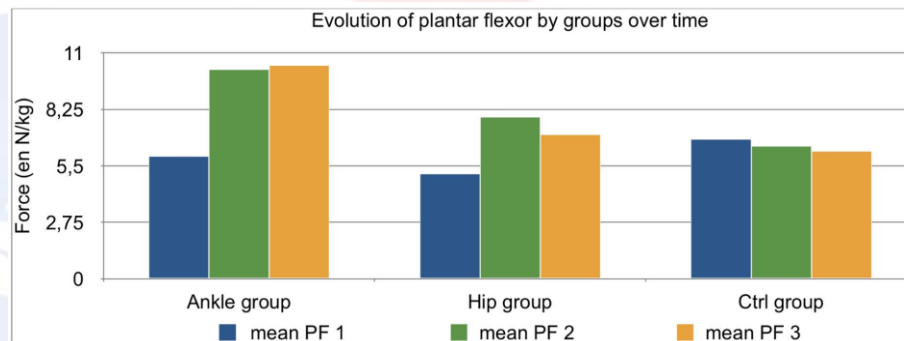
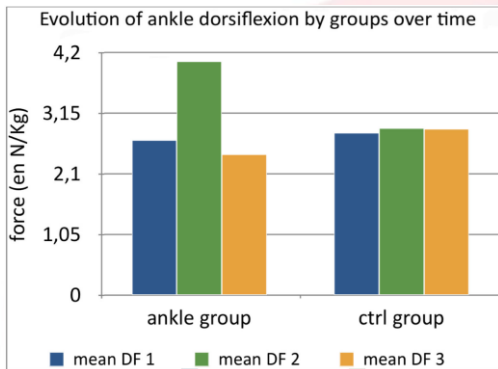
-> 1 RM : evaluated at the start of each new session

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Improve strength of plantar flexors and extensors for the ankle group



- Increased strength of plantar flexor muscles (80%) Pvalue: 0.0006 with student Test and dorsal flexor muscles (58%) Pvalue : 0.003 with Student test
- Strength maintained one month after strengthening

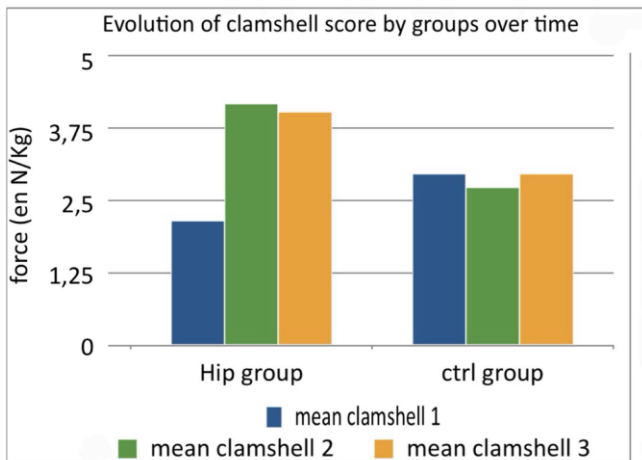
Increased evertor muscle strength (46% => 48% for Wang study)
Increased invertor muscle strength (36%)
Improved plantar flexor endurance (15%)

No statistical difference





Improve strength for the clamshell in the hip group



-112% progress on the clamshell (p-value : 0.009 Student test)
Strength maintained one month after reinforcement

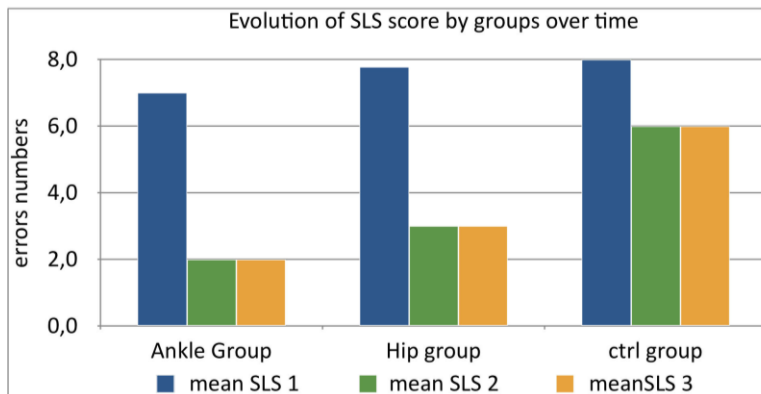


49% in external rotation
51% in abduction

No statistical difference with control group



Improvement of static postural control of the hip group



static postural control of the hip group (decrease in the number of errors 166%)

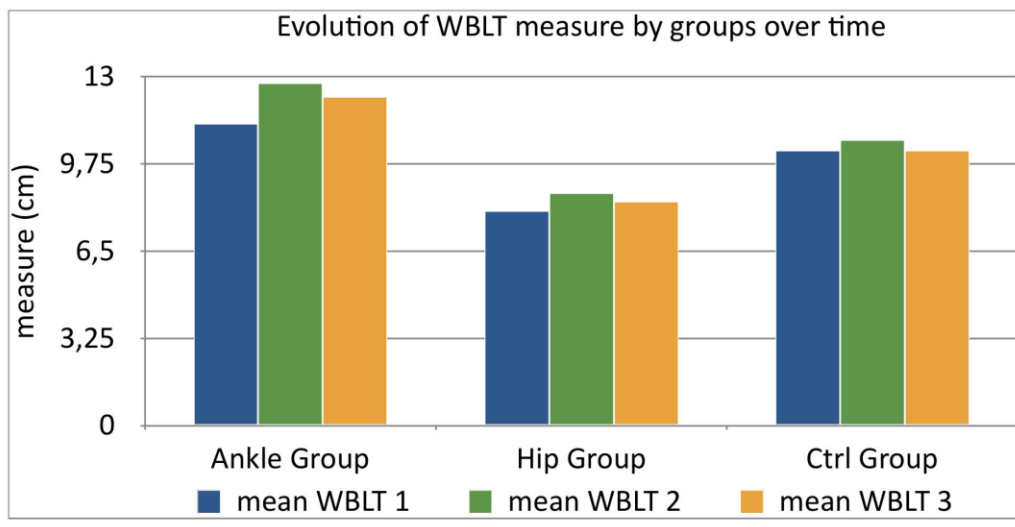


**-12% on the figure of 8 in the ankle group
-100% on the side hop in the ankle group**

No statistical difference



Improve ankle dorsiflexion in the ankle group



11% in dorsiflexion in the ankle group



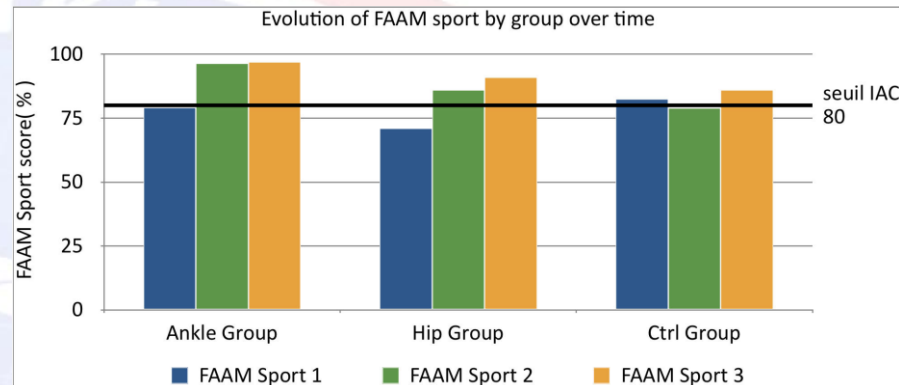
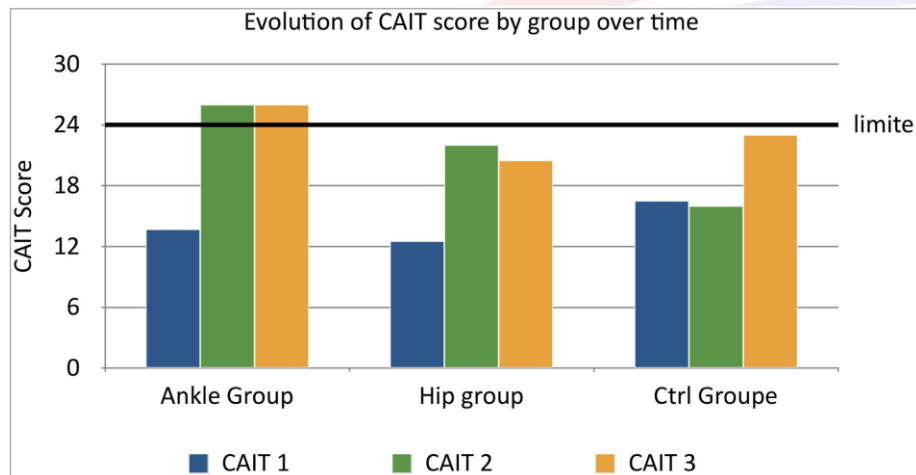
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Improvement of CAIT, FAAM and FAAM Sport for the ankle group



of the 3 tests for the ankle group



Moderate benefit of hip strengthening on perception of instability



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DISCUSSION

Limits

- A lot of
- Duration of muscles strengthening
- Transfer to dynamic ?

Perspectives

- Have a larger population
- Organised the participants based on their disabilities

CONCLUSION

Strength gain
despite short
period with
isometric
strengthening



Isometric is
suitable for people
with CAI

Principle of muscle
irradiation



Balance sheet
interests for
assessing
deficits



**Thank you
for your
attention**

Bibliography

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