Food intake of Tibetan children living in Kashin-Beck disease endemic areas in Central Tibet

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Preliminary data

• Kashin-Beck Disease:
  – Endemic bone and joint disease in Central Tibet
  – Short stature, deformities, lack of mobility and pain
  – Unknown etiology

• High prevalence of growth retardation, rickets, signs of chronic malnutrition

→ Need for a precise evaluation of the food intake
Methodology (1)

• Location:
  – Lhasa and Lhoca prefectures

• Period:
  – January, March, July and September 2002
  – For at least 2 days during each season

• Population:
  – Children (♀ and ♂) aged 9 to 16 years

• Data collection:
  – Direct observation at home / in schools
  – Precise description of recipes
  – Observation of the preparation
  – Weighing of:
    • the different food items before prepreparation
    • the prepared food
    • the food given to the child
    • the food left by the child

→ enabling precise calculation of the amount of food eaten
Methodology (2)

- Data obtained:
  - food consumption data
    - for 44 children
    - for 1 to 4 seasons
    - for 1 to 4 days per season

- Utilisation of the data:
  - As such
  - Translation of volume units (standardized cups and bowls) in weight unit
  - Extrapolation of some recipes

- Exclusion of some files in order to keep the most precise information
  - minimum 3 seasons per child
  - minimum of 2 days per season

→ Inclusion of 36 children
Methodology (3)

- Software and tables of food composition used:
  - Encoding of the data in Kid Menu\textsuperscript{R} and Microsoft Office Excel
  - American table of food composition: USDA Nutrient data
  - For the vitamin D, use of the Souci Fachmann table

- The nutrient intake was compared to the Dietary Reference Intake (DRI) of the US Food and Nutrition Board

- Anthropometrical data (weight and height) were compared to WHO child growth standards (www.who.int/childgrowth/en)
Results (1)

• General observation:
  – Poorly diversified diet, essentially cereals, butter and tea
  – Very few vegetables, meat, eggs
  – No fish
  – Consumption of alcohol
Results (2)

- Weigth and heigth data:
  - Mean Body Mass Index: -1.1 +/- 0.81 Z-score; Max: 0.25 Z-score; Min: -3 Z-score
Results (3)

- Weight and height data:
  - Mean Height for age ratio: -1.7 +/- 1.02 Z-score; Max: 2.75 Z-score
  - Min: -3 Z-score

Growth, nutritional status, and signs of rickets in 0–5-year-old children in a Kashin–Beck disease endemic area of Central Tibet

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Results (4)

Nutrient data:

- Mean energy intake: 87% +/- 0.26 of DRI; Max: 157%, Min: 57%
Results (5)

- Nutrient data: Protein, Lipid and carbohydrate intake
  - Mean energy intake due to protein: 10% +/- 0.01 of total energy intake; Max: 13%, Min: 7%
  - Mean energy intake due to lipid: 19% +/- 0.05 of total energy intake; Max: 31%, Min: 8%
  - Mean energy intake due to carbohydrate: 70% +/- 0.05 of total energy intake; Max: 78%, Min: 59%
Results (6)

Nutrient data:

- Mean Calcium intake: 20.6% +/- 0.17 of DRI; Max: 91.8%; Min: 20.6%
- Mean Phosphorus intake: 97.4% +/- 0.87 of DRI; Max: 387%; Min: 46%
Results (7)

Nutrient data:

- Mean calcium / phosphorus ratio: 0.56 +/- 0.25, Max: 1.1, Min: 0.18

![Bar chart showing the ratio of Ca/P. The majority of the data falls in the range of 0-1, with 97% of the values within this range. There is a small percentage (3%) in the range of 1-5.](chart.png)
Results (8)

Nutrient data:

- Mean vitamin D intake: 14.2% +/- 0.1 of DRI, Max: 41%, Min: 1.3%

None of the children has an adequate vitamin D intake, all of them have less than 50% of the DRI.
Conclusions (1)

- High prevalence of severe stunting (low height / age ratio)
- Lower prevalence of wasting (low weight / height ratio)
- Low energy intake
- Very low fat consumption
- Very low calcium intake
- High phosphorus intake → low Ca/P ratio
- Low vitamin D intake
Conclusions (2)

– Confirmation of previous clinical and biological observations
  • High prevalence of stunting
  • Lower prevalence of wasting
  • High prevalence of rickets
  • Very low levels of serum calcium
  • High levels of serum phosphorus
  • Low levels of vitamin D

– Suggests other deficiencies:
  • Trace elements: zinc, selenium, iron ...
  • Low intake of fat soluble vitamins: A and E
Conclusions (3)

- New studies:
  - Supplementation in vitamin D and Calcium
  - Nutritional assessment of minerals intakes

→ Both in Kashin-Beck Disease endemic area
Calcium and vitamin D supplementation (1)

• Compare in a rural endemic area the effect of calcium or vitamin D, both of them or none on:
  – Sign of rickets
  – Growth
  – Kashin Beck disease
  – Dental statut
Calcium and vitamin D supplementation (2)

- Prospective study on 207 children living in rural endemic area for KDB in Central Tibet
- From January 2010 until January 2013
- 4 groups
  - Vit D 25000 UI/ mouth
  - VitD 25000 UI/ mouth + Calcium 1500 mg/ day (carbonate)
  - Calcium 1500 mg/day
  - None
- Children from 0-5 years old
Calcium and vitamin D supplementation (3)

- Final results not already known
- Different effects of each supplement on the several aspect: dental health, growth, rickets, Kashin-Beck Disease
- Different mechanisms disturb bone and joint metabolisms with different clinical disease
Nutritionnal assessment of minerals intakes (1)

Aim of the study:

• Assessment of minerals intakes of young children living in endemic areas for Kashin-Beck disease

• Compare the calculated intakes with Chinese and internationale DRI’s

Secondary objective:

• Set up a food composition table for local and traditional foods
Nutrition assessment of minerals intakes (2)

- Cross-sectional survey
- 250 children of Lhasa prefecture, 3 counties, 2 seasons
- Interactive 24-hour food recall
- Food sampling and analysis (± 1200 samples, ICP-MS, in CFSA, Beijing)
- China food composition table (for non local foods)
Nutrition assessment of minerals intakes (3)

Preliminary results:

• Significant differences between food composition tables and traditional food in Central Tibet

• Original data for special food items such as dry yak meat and traditional cheese
General conclusion

• Central Tibet is an endemic area for bone and joint diseases

• Nutritional status of children is poor

• Lack in vitamin D and calcium may play a role, effect of a supplement will help us to prevent bone and joint diseases and to better understand physiopathology of the diseases

• Exact composition of the food will permit to have a better evaluation of the mineral deficiencies