**Calcium Intake at the National Level In Children and Adolescents**

**Introduction**

The Australia Bureau of Statistics (ABS) claims that the usual intake of nutrients of Australians is characterized by deficiency in calcium. These statistics indicate that one in two males and one in four females meet their calcium requirements in food. Studies have indicated that calcium is a mineral which is required for the formation of strong and healthy bones. (5) Low calcium intake is associated with osteoporosis, a condition that is linked to low bone density. In the Australian diet, it has been confirmed that dairy foods are the riches source of calcium. (6) Calcium requirements are higher for females aged 12-18 years than any other age groups. However, in this age group, only one in ten females have adequate calcium intakes.

**Calcium Methodology**

The participants in the Australian Health Survey included individuals of all the populations living in private dwellings such as houses, tents, flats and other residential structures used by individuals during the time of the study within the geographical scope of the survey. (1) However, this study excluded indigenous communities and very remote communities. Within the selected private dwellings, one child whose age ranges between 0-17 years (NHS), one child whose age ranges 2-17 years and one adult who is 18 years and older were recruited in the study. (3) All the respondents included in the survey were also encouraged to take part in the voluntary Biomedical Component of all the surveys.

Data for the study was collected from the usual residents of private dwellings in rural and urban areas of Australia through face-to-face interview by the 2011-12 NHS and NNPAS. Information was also collected through telephone for the second hand NNPAS interview. (1) The interview covered about 97 per cent of the individuals living in Australia. Individuals who were interviewed in the survey within each sampled private dwelling were those who had been identified by an adult as a usual resident of that dwelling.

The total dietary intake including calcium intake was measured using the Automated Multiple – Pass Method (AMPM). The method includes five steps which were used in measuring dietary intake. The first step involved collecting the list of beverages and foods which had been consumed the previous day. (1) The second step involved probing for any foods that had been missed. The third step was collecting tine and eating occasion for each food. The fourth step was describing the foods, the amounts of foods and additions whereas the final step was probing for anything else.

The Automated Multiple – Pass Method (AMPM) is a good method of collecting data associated with dietary intake since it enables the researchers to collect a list of all foods and beverages consumed in a period of 24 hours, thus making it easy to measure the accurate dietary intake of a population. (1) For instance, the AMPM captures information that includes the description of food, quantity of food consumed, the time and eating occasion, use of salt in preparing food, water consumption and whether the quantity of food eaten by an individual on the recall day is usual, less than usual or more than usual.

The Automated Multiple – Pass Method (AMPM) has widely been employed in the study involving dietary intake in Canada and the US. Some of the studies where this method has been used include the Canadian Community Health Survey which was conducted in 2004. (5) Also, the method has been used in “What We Eat in America, NHANES” which is conducted yearly since 2002 among other studies in the United States. One of the strengths associated with this AMPM method is that it accurately estimates nutrient intake and group total energy. However, the method can also lead to underestimating of actual energy, protein, carbohydrate and fat intake.

**Table 1: Calcium intake and Calcium Nutrient Reference Values**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Calcium intake****(mg/day)** | **EAR****(mg/day)** | **RDI****(mg/day)** | **UL****(mg/day)** |
| **Boys** | 800 | 1050 | 1300 | 3000 |
| **Girls** | 600 | 1050 | 1300 | 3000 |
| **Total (Boys and  Girls)** | 1400 | 2100 | 2600 | 6000 |

In table 1, the Estimated Average Requirement (EAR) refers to the amountof a given dietary approximateddaily to sustain the nutrient requirements of half the persons with good health in a given population. The Recommended Dietary Intake (RDI) is the estimated level of daily nutrient intake which is adequate to sustain the dietary requirement of about 99 per cent of healthy personsin a given population. (2) However, Upper Level of Intake (UL)is the maximumamount of daily dietary intake which is expectedto cause no undesirable health outcomesto almost all persons of a given population.

According to the Nutrient Reference Values (NRV), the EAR for children and adolescents aged 14-18 years, both boys and girls ought to be 1050 mg/day. (3)The RDI for the same age group and gender ought to be 1300 Mg/day whereas UL ought to be 3000 mg/day (table 1). Comparing the Nutrient Reference Values (NRV) with the data for calcium intake among kids and adolescents (from the Australian Health Survey) it is evident that girls and boys aged14‐18 years consuming insufficient calcium.

**Health Implications of Calcium**

There are several health implications associated with calcium intake among children and adolescents.  (4) Sufficiency calcium intake plays a major role in facilitating the formation of healthy bones among children and adolescents. The study reviews normal born acquisition in adolescents, children, and infants and discusses factors which affect born health in this age group. Deficiency calcium intake during growth among children and adolescents may lead to increased bone fractures. Therefore, routine calcium and vitamin D supplementation is recommended where there are low levels of calcium intake. However, healthy children and adolescents are encouraged to increase their dietary intake to meet the daily requirements.

Calcium needs vary across different life stages. (5) For instance, during adolescencecalcium needs are greater than in adulthood and childhood. However, studies recommend that the maximum level of calcium intake for adolescents should be about 1300 mg/day. According to this study, during growth, there is the need for sufficient calcium intake. Deficiency of calcium in the dietary intake is likely to increase the risk of bone fractures among children and adolescents due to the weak bone formation.

The formation of bone tissue requires calcium as one of the main mineral components.  (6) A diet which has insufficient quantities of calcium can negatively affect the skeletal formation thus affecting the entire process of growth and development. It has been confirmed that low absorption or intake of calciumis likely to limit the structural growthamong children and adolescents. Therefore, this study recommends that calcium should be supplied in sufficient quantities during these critical growth phases.

**Evaluation of the Health Implications of Calcium**

One adverse health outcome in children and adolescents associated with calcium intake, according to the above peer-reviewed articles, is increased fractures. (2) During growth, there is an increase in bone size and mass especially in childhood and adolescence. When the ingested calcium is poorly absorbed or when the intake of calcium is low, the breakdown of bone tissue increases since most of it gets utilized to maintain normal biological functions thus leading to its deficiency.

As mentioned above, calcium is an essential element for bone accretion and formation of strong bone among adults and children. Studies indicate that the intake of calcium during childhood and infancy affects bone mass acquisition. Research shows that 99 per cent of the total calcium is found in the skeleton. (3) Adequate calcium in the diet is connected to reduced risk  of bone fractures among children and adolescents and higher BMC among children and adolescents.

According to the above articles, therefore, we can conclude that sufficiency calcium intake during growth is fundamental for bone formation and development. Therefore, there should be a sufficient quantity of calcium intake in the diet of every individual to enable them attain their maximum growth potential.  (4)A low level of calcium intake among children and adolescents has an adverse effect on their bone metabolism and skeletal health. **Conclusion**

It istherefore important to increase the dietary intake of calcium to achieve the RDI value.  Since the Australia Bureau of Statistics (ABS) shows the usual intake of nutrients of children and adolescents is characterized by a deficiency in calcium, an increase in dietary intake in this age set is encouraged to reduce the risk of bone fractures and skeleton malformation among these individuals.

**Reference List**

Australian Bureau of Statistics (2013). 4363.0.55.001 - Australian Health Survey: Users' Guide, 2011-13. [online] Abs.gov.au. Available at: http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/D1A83EE0703D6E8FCA257BBB0014C443?opendocument [Accessed 1 Aug. 2018].

Vlachopoulos D, Gracia-Marco L, Barker AR, Huybrechts I, Moreno LA, Mouratidou T. Bone Health: The independent and combined effects of calcium, vitamin D and exercise in children and adolescents. InCalcium 2015 Oct 6 (pp. 530-546).

Corkins MR, Daniels SR, de Ferranti SD, Golden NH, Kim JH, Magge SN, Schwarzenberg SJ. Nutrition in children and adolescents. Medical Clinics. 2016;100(6):1217-35.

Golden NH, Abrams SA. Optimizing bone health in children and adolescents. Pediatrics. 2014 Sep 1:peds-2014.

Matkovic V, Visy D. Nutrition and bone health during skeletal modeling and bone consolidation of childhood and adolescence. InNutrition and Bone Health 2015 (pp. 199-216). Humana Press, New York, NY.

Bueno AL, Czepielewski MA. The importance for growth of dietary intake of calcium and vitamin D. Jornal de pediatria. 2008;84(5):386-94.