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Original Research Article

Assessment of nutritional status and physical activity in the school population as an indicator of the quality of bone-promotion of management plane

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School population, nutritional status, physical activity

A B S T R A C T

Well- built bone mass in a given period of school age is a prerequisite for the prevention of osteoporosis in the adult population. The aim of our study was to determine the nutritional status and physical activity in school children aged 11 years as a management plane for prevention of osteoporosis. The study was done using questioner in 60 children from a primary school in Bitola, aged 10-12 years. The questioner is consisted of determination of nutritional status through consumption of foods containing calcium and physical activity and inactivity (using video-). Nutritional status revealed that intake of milk is 49%, of fishis 41 %, 73 % consumed green products and 30 % consume Coke once a week. In terms of physical activity, 63 % of them 6 hours a week are active outside the education system and 78 % use video- 6 hours a day. According to the WHO, in developed countries it is a major health problem having increased body weight and decreased physical activity. Conclusion: There should be a national plan in the future, assessment of physical activity and nutritional status for school children to decrease possibility of many illnesses.

Introduction

In healthy children there can be interaction between quality of bone tissue and nutritional status and physical activity. These effects are most relevant when the speed of bone growth is at its peak and it is between 10-14 years. With it the risk fracture in this period of growth as a result of trauma depends on genetic factors, the status of calcium and vitamin D. Immobilisation is an additional reason for the loss of bone mass and is associated with many diseases as comorbidity affecting bone and especially nerve system. The putative mechanism is lack of bone formation due to mechanical stimulation of suboptimal bone (Adams J et al. 2004, Bianchi LM 2007). Some diseases such as malabsorption due to allergy to certain substances in the diet and diseases directly related to the food system is a secondary reason for the emergence of weak bone structure. Systemic and local inflammation such as rheumatoid arthritis

and chronic hepatitis are the same reasons that can occur in childhood, then hormonal disorders of low estrogen status, changes in level of thyroxine and endogenous growth hormone are also important. The pathophysiology of low bone mass in children is a low remodeling activity of osteoblasts, and increased resorption. Children with low bone mass or osteoporosis as adolescents present with probability of fracture, presence of comorbidity that disrupts bone building and low nutritional status. It is manifest with pain in the back, hips and feet, and difficulty in walking. These fractures are localized in bone metaphyses and not confirmed etiology as osteoporotic unlessit affects vertebral fractures as a result of compression (Manios K et al.2006).

In our environment it is common to investigate the quality of bone in children only in the presence of rachitis or some genetic and systemic diseases. The treatment is consisted of supplements of calcium and vitamin D. The prescription of bisphosphonates, in children is allowed if the child is more than 3 years old (Ward L et al.2007).

In several onsulted studies, nutritional status and physical activity are key for building healthy bone mass.

The aim of our study was through a study of a small population of school children, to test the possibility of screening children for nutrition associated bone deformities

Materials and methods

To complete our research we have made in a given survey questionnaire in a primary school in Bitola on population of 60 children aged 11-12 years. Students questionnaire were to fill with the permission and supervision of a parent. The questionnaire consisted of general information: gender and age, some assessment of nutritional status on entry of calcium, vitamins and mineralsThen part of the assessment of physical activity and no activity with dailywithuse of video-terminals. The content of the questionnaire for nutritional status were to determine daily intake of milk, how many times a week theyconsume\fish, how many times a week they eat fruits and vegetables, as well bean products (beans, lentils, peas). To estimate the intake of harmful substances we asked how many times a week they consumed 500ml Coke. Assessment of physical activity had two questions , how many hours per week are they playing sports outside school (norm.4 hours a week min.) And how many hours daily they use video-terminals out of the education system (2h per day allowed). The results were statistically processed nominaly and with percentage and significance of $r<0.05$, tested by t - test, and the difference of proportions.

Result and Discussion

From 45% male and female 55% questioned we have the following results showed in tables. The daily intake of calcium by milk is showed in table 1 and the weekly of fish in table 2. The 67% are not consuming milk alt at all(under minimum, $T=2.6, P<0.05$). It is significant.

The level of fish intake 2 and more time a week is 46%, $T=0.62, p>0.05$, is not significant. The weekly consummation of been and other legumes is showed in table 3, and daily intake of vegetables and fruits in tables 4 and 5.

The legumes intake is 84%, $T=5.3$ $p<0.05$, is significant. The consummation of cola drinks in one week of 500ml is showed in table 6.

Table.1 Daily intake of milk

Milk intake	No milk intake	<1/2 liter	½ liter	1 liter	Total
Frequentation	10	30	15	5	60
%	17	50	25	8	100%

Table.2 Weekly intake of fish

Fish intake	No fish intake	1 time weekly	2 times weekly	3 times weekly	Total
Frequentation	7	25	25	3	60
%	12	42	42	4	100%

Table.3 Weekly consummation of legumes

Intake	No intake	Bean	Pea	Lens bean	Total
Frequentation	10	36	13	1	60
%	16	60	22	2	100%

Table.4 Daily intake of vegetables

Intake	No intake	Cabbage	Green salad	Spinach	Total
Frequentation	0	44	10	6	60
%	0	74	16	10	100%

Table.5 Daily intake of fruits

Intake	Yes	No	Total
Frequentation	60	/	60
%	100	/	100

Table.6 Weekly consummation of cola drinks

Intake	No intake	1	2	3	Total
Frequentation	18	18	10	14	60
%	30	30	16	24	100%

From whole children 70% consumed cola drunks, T=3.07, p<0.05, it is significant.
Assess of physical activity is showing in table 7 have or not have, and in table 8 how many hours in week.

The whole school children who have 4 and more hours of physical activity are 93%. T=6.5,p<0.05. In tabel 9 is schowing daily use of videoterminals like a bad lifestyle habit. From the total school children, 83% were using videoterminal more than 2 hours a day, out of school activity.

Table.7 Assess of physical activity in week

Physical activity	Frequentation	%
Yes	56	93
No	4	7
Total	60	100

Table.8 How many hours in week have physical activity

Hours	<2	2	4	6	8	Total
Frequentation	2	2	10	32	10	56
%	3.5	3.5	18	57	18	100

Table.9 Daily use of videoterminals

Hours	<2	2	4	6	Total
Frequentation	0	10	3	47	60
%	/	17	5	78	100

Assessing dietary intake of children becames more difficult as they age. Parents have less control over intake and less able to provide a complete and accurate picture of their childrens food intake. The use of questionnaires administered directly to children at school, can provide a resonably accurate picture of their usual pattern. In our investigation, we had done the same practice (Hirrota T et al.2011,a).

Evaluation of calcium and phosphorus metabolism in children with basic blood laboratory tests have limited importance, and the use a densitometry can be used only in research not in rutine examination, especialyin our comunity. The greatest increase in bone density was observed around ages 10-14 years in girls and 12-16 in boys (Loprinzi DD et al.2012).We choose our group to be in this range of age.

Maximizing peak bone mass during adolescence is one of the most important strategies to decrease osteporotic fractures later in life. Usual nutrition status is cosistedof calcium intake by fish, milk products, fruits, vegetables and soybeans. With some children age 10-11, increased calcium intake by food was associated with good bone mass. Most of the boys 88%, had milk product intake and <30% fruit and vegetables intake in one study (Ishida,2009).In our study 67%,$p<0.05$ were not intaking milk at all, but for fruits and vegetables intake 1-2 for day it is present with all. The daily consumation of fruits and Veg is 8-10 per day.

Life style factors were important to be measured by children in same way like in adult population (Peters BS et al. 2010). Children with low intake of calcium especialy with food restriction of fish, egg yolk and vit.D defficiency had bad bone mass (Tanaka H,2008).Our group had defficincy of calcium intake by milk, but they consumed bean and 1-2 fruits by day, and 88% fisch 1-3 times per week.

Children with overwhelming physical activity like balet dancers, have special diet not to increase weigh. In them the body mass is normal only by 43%. They have

increased risk for fracture in chilhood (Burchard,P et al. 2011). In schools where childrens have eating discorders in puberty, the bone mass is lower. It is wise to instal children with good eathing habits beffore adolescence. However low intake of calcium, frequent intake of fast food, convencience food and oily snack as well as cyclical dieting is often observed as well Hirota T, 2011,b).

Also more specific lifestyle factors related to diet, have the potential to adverse skeletal effects of low calcium intake, high sodium intake and excessive coffeine consumtion have been adressed in section on nutrition. The use of colas has been associated with lower bone mass. Besides displacement of more nutritient-and calcium-rich beverages, cofeine and phosphoric acid content in colas have also been implicated as contributing to the adverse skeletal effects (Kristensen M et al.2005, Jones G et al.2004). In our study the cola intake of 500ml. per week was 70 %, and it is high.

Several nutrition factors might interact with physical activity to change bone mass (Lofgren B et al. 2011).Calcium supplement of 500 mg per day did not change mineral volumetric body mass density increases in 10 year old female gymnasts (Harris LC et al. 2009).Another important outer factor is protein nutrition. There is strong interaction between protein intake and physical activityin prepubertal children. It is with association of high body mass (Josse A P et al, 2013).

Not only calcium intake play first place. The type of exercise, age and sexual maturity at the beginning of the program of nutritional correction is important to establishe the basal level of physical activity.

Bone loss and urolitiasis are in evitable outcome in human space flights and long duration bed rest (Sakuma M et al. 2012).It is happening because osteocytes die by appoptosis in the absence of loading and their death is associated with local activation of resorption, because of the removal of inhibitory signals (Ohshima H et al.2012).

The differences in bodymass density are greater if exercising has started before puberty and the enlargment of periostal envelope is greater in males than in fameles. The increase of bone mass is associated with that of muscle mass (Cardadeiro G et al.2012, Santos D et al.2012).The physical activity during adolescence have positive effects on total body, lumbar spine and total hip bodu mass density(Nisson M et al.2010a). In those age in intensive growth, physical activity and good nutrition of calcium have important role in prevention of spine deformity. Some children who train sport profesional in adolescent age, have better bone mass than not active. There are differences in sports too. Soccer players have a higher femoral bone mineral density, gymnastics in arms, legs and spine ((Nisson M et al.2010b, Ahles C et al.2012). Children with fractures in growth age, were found with lower femoral neck and body mass density (Galding A,2007). The best effect on bone mass has jumping in school children, and it is the best if with sport asociated with jumping is starting before 13 years age, with optimum 4 hours in week. Our group have physical activity more than 4 ours weekly in 93%, and physical inactivity in front of video terminals is 83% more than 2 hours a day.

In conclusion, Physical activity and nutrition are associated with quality of bone mass building. It depens of age, sexual maturity and calcium intake with food and weekly sport activity of 4 hours, especialy if it is started before puberty. The national policies must be developed to access the nutrition

status of our school children to prevent bad bone mass density in adolescent age, bad condition and bone mass in childhood.

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