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# **Impact of Nutritional Status, Serum Calcium and Physical Activity on Bone Mass in Early Adolescence**

Thesis Submitted For Fulfillment  
For Ph D. Degree in Childhood Studies

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دراسة تأثير الحالة الغذائية ونسبة الكالسيوم  
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المراهقة

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# **Impact of Nutritional Status, Serum Calcium and Physical Activity on Bone Mass in Early Adolescence**

## **ABSTRACT**

**Marei, A.S., Mostafa, S., El-Kahky, A., El-Tobgui, M.**

**Background:** Osteoporosis is a major health problem that its roots begins from childhood and adolescence were peak bone accumulation takes place.

**Methodology:** A prospective study aimed to identify the association between bone mass including bone mineral density (BMD) with dietary intakes of calcium and phosphorus and physical activities among early adolescent boys and girls. There was a follow-up in the period between April 2008 and October 2008. Data were collected at Hoda Sharawi preparatory school for girls and Giza preparatory school for boys. The data collection included questionnaire from subjects regarding social, nutritional status, physical status, anthropometric measurements including weight, height, arm circumference and bone mineral density. The subjects were collected randomly among boys and girls between 11-16 years of age and the study ended up with 100 boys and 100 girls who continued with the study.

**Results:** The comparison between average nutrient intakes and (RDA) in boys and girls showed differences either higher or lower in boys calories (2231 vs. 2500 in RDA), carbohydrate (311.17 vs. 344 in RDA), fat (84.29 vs. 92 I RDA) and calcium (705.08 vs. 1200 in RDA) while proteins (57.12 vs. were higher than 45.00 in RDA), in girls fat (80.86 vs. 84 in RDA) and calcium (624.47 vs. 1200 in RDA) while proteins (55.15 vs. were higher than 46.00 in RDA) comparison between boys and girls in average nutrient intakes showed differences in most of the nutrients. There was a higher level of physical activities in boys than girls. The correlation between (BMD), calcium intake, anthropometric measurements and physical activity showed a weak correlation between (BMD) and daily calcium and a positive correlation with physical exercise (p-value in boys = 0.002 and in girls = 0.003), while no correlation with daily calcium intake in girls.

**Conclusion:** The study revealed a significant difference between anthropometric readings in pre and post study readings in both boys and girls but not (BMD).

**Key words:** Bone mineral density (BMD), Recommended daily allowances (RDA), Body mass index (BMI), Nutrient intakes (NI).

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## مستخلص

### هدف الدراسة

الهدف من هذه الدراسة هو اختيار العلاقة بين كثافة العظام ونسبة الكالسيوم و الفسفور فى الوجبة الغذائية مع الأخذ فى الاعتبار التمرينات و الممارسات الرياضية للعينه المختارة وهى بين ١١-١٦ سنه (سن المراهقة) لطلبة المدارس الإعدادية من الجنسين . وكذلك الكشف عن العوامل المؤثرة فى تكوين العظام و التى قد تؤثر بشكل كبير فيما بعد فى حالات الاصابه بهشاشة العظام و الكسور التى تحدث للفئة العمرية الأكثر تعرضا لهذا النوع من الاصابه و اختيار مدى تأثير التمرينات الرياضية فى الوقاية من هذه الإصابات . الدراسة عبارة عن علاقة طوليّه عن مدى تأثير هذه العوامل على كثافة العظام للعينه المختارة بداية من القراءة الأولى للوزن والطول و محيط الذراع وكثافة العظام امتدادا للقراءة الثانية بعد ستة أشهر وكانت الدراسة فى مدرسة هدى شعراوى الإعدادية للبنات و الجيزة الإعدادية للبنين . بيان الحالة الغذائية للطلبة المختارين ثم عن طريق ملاءمة الاستمارة الاسئلة الخاصة بنوعيات المواد الغذائية وكمياتها واخذ متوسط القراءة فى أربعة أيام.

### نتائج الدراسة

زيادة من قراءات نتائج الوزن و الطول و محيط الذراع بين القراءة الأولى و الثانية للطلبة من الجنسين ولكن كثافة العظام لم تشهد فرقا ملحوظا نظرا لضيق وقت الدراسة

- العلاقة بين المواد الغذائية المتناولة و كمياتها بالمقارنة بالنسبة المطلوبة غذائيا لهذه المرحلة الغذائية بين المأخوذ و المثالى و تفاق مع الكمية المثالية فى البعض الآخر.
- المقارنة بين البنين و البنات فى متوسط تناوله المعزيات المختلفة انتهت الى وجود اختلافات كبيره فى الكربوهيدرات و الدهون و الفسفور و الحديد و فيتامين (ب) و فيتامين (ج) ولم يكن هناك اختلافات فى باقى المعزيات

- المقارنة بين الجنسين فى عدد الوجبات اظهر زيادة عند الأولاد عنهم فى حالة البنات

- زيادة فى معدل ممارسة التمرينات الرياضية عند الأولاد
- العلاقة بين كثافة العظام من ناحية وكمية الكالسيوم اليومية و ممارسة الرياضة و السن وبعض القياسات من البنين و البنات أظهرت علاقة ضعيفة مع الكالسيوم و قوية مع ممارسة الرياضة اليومية وهذا يعنى إن ممارسة الرياضة كانت العامل الأكبر فى التأثير على كثافة العظام فى الأولاد و البنات إما بالنسبة للعمر فكان له تأثير كبير على كثافة العظام فى الجنسين.

الكلمات الكاشفة:

المغذيات الدقيقة – المراهقة – كثافة العظام - الهرمونات



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## LIST OF ABBREVIATIONS

### Abbreviation

### Word

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AIs:	Adequate Intakes
BMI:	Body mass index
BA:	Bone Area
BMC:	Bone Mineral Content
BMD:	Bone Mineral Density
CAPMAS:	Central agency for Public Mobilization and Statistics
CDC:	Central Diseases Control
DRI:	Dietary Reference Intake
DXA:	X-ray absorptiometry
EARs:	Estimated Average Requirements
FAO:	Food and Agriculture Organization
H/A:	Height for age
Ht:	Height
PTH:	Parthormone
RDA:	Recommended Daily Dietary Allowances
RNI:	Reference Nutrient Intake
SD:	Standard deviation
SE:	Standard Errors
ULs :	Upper Intake Levels
W/A :	Weight for age

W/H:	Weight for height
WHO:	World Health Organization
Wt:	Weight
Y:	Years