

Relationship between obesity and osteoporosis in a sample of women from Erbil-Iraq.

Muna M. Yaseen

University of Anbar - College Of Dentistry



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ABSTRACT

Contrasts in argument about obesity and osteoporosis still concerning number of researchers. Published literatures mentioned many reasons for why such contradictory results were obtained. In this study some of the factors that believed to affect osteoporosis will be considered and investigated. Age of participated women ranged between 42-79 years. Out of 110 participants, 75 (68.18%) were practicing osteoporosis whereas 35 (31.82%) were not. The study revealed that weight and age are not risk factors of fracture. Family history is not associated with osteoporosis. Vitamin D deficiency and incidence of fractures are found to be significantly associated at p-value less than 0.01. Percentage of vitamin D deficiency in women with fractures was 55.81% while those without fractures was 44.19%..

Introduction

Obesity is a state that considered in many articles as a complex disease^{1,2}. Osteoporosis is a disease that is associated with low bone density³ which indicates a state of fragile bones.

According to the Middle East and Africa Regional Audit Report, 2011, 25% of the population will be over the age of 50 in 2020 and that this part of the population will be at risk of osteoporosis.

The report was based on data collected from 17 Arabic countries including Iraq. The report also pointed out that osteoporosis is not a government priority and as a result no fund for researches concerning this issue.

The Iraqi Osteoporosis Society (IOS) that was established in 2001 by a number of Iraqi doctors interested in the field of osteoporosis made a projection for Iraqi population until 2050 and concluded that 9.5% (2.8 million) is age over 50 and those according to the Middle East and Africa Audit Report, 2011 will be at risk of osteoporosis.

Observation of real life practice in Arabic communities, obesity is commonly noticed in elderly women. Perhaps it is due to life style that is lacking physical exercises with limited social activities. Moreover, type of daily food intake that enriched with carbohydrates contributed to many diseases such as obesity.

There is no clear idea about the role of obesity in its relationship to osteoporosis. Some studies showed that obesity is a protective factor against fracture⁴⁻⁶ whereas other studies showed that obesity is a risk factor for bone fracture⁷.

Body mass index (BMI) is actually a measure of the ratio of body weight in kilogram to the square body height in meter. This index is used to indicate whether a person is obese or not and to what extent his/her obesity is approached. Many articles tackled this measure to explain its relationship to bone mineral density¹(BMD) which is measured by using dual X-ray absorptiometry. Some of the studies found a significant relationship between the two measures, whereas others found this relationship is not significant⁶.

Bone mineral content BMC is found to be associated with obesity⁶. Weight loss was found to be associated with low BMC whereas overweight and obesity are associated with high BMC⁸.

* Corresponding author at: University of Anbar - College Of Dentistry

.E-mail address:

Vitamin D produced from skin that exposed to sun light. Actually, it is produced from skin exposure to ultraviolet B (UVB) radiation in sunlight or from food sources that enriched with this vitamin. It seems as dilemma that how much food is enough to provide the amount of IU that the body needs daily⁹. Time of exposing skin to sunlight, intensity of sunlight, quality and quantity of food enriched with vitamin D, plays an important role in the deficiency of this vitamin⁹.

Vitamin D deficiency is well prevailed since 41.6% of white US adults and 82.1% of black adults were classified to a group of vitamin D deficiency¹⁰. Deborah M, et al., 2012¹¹, stated that vitamin D deficiency causes impaired calcium absorption which can lead to rickets and osteomalacia. In order to see the portion of the healthy population that will be at risk of osteoporosis, serum samples from 634 healthy adults were examined for the levels of 25-hydroxyvitamin D. The results revealed that about 39% of the participants had a 25-hydroxyvitamin D levels less than 20 (25(OH)D \leq 20) and 64% had (25(OH)D \leq 30).

It is believed that long lasting vitamin D deficiency leads to a variety of health problems that one of them is the hypo-calcaemia which can make bones weaken and fragile¹²⁻¹³.

According to the Institute of Medicine, Food and Nutrition Board (1997), a certain quantities were recommended for the daily intake of Calcium (mg/day) and vitamin D in international units with reference to age groups.

Patients and methods

Some of the private clinics of orthopedic in Erbil north Iraq were visited many times during September 2015 up to the end of March 2016 in order to collect information about obesity and osteoporosis for Iraqi women whom already residing in Erbil.

Women were first selected according to their main complain of being at the clinic:

1. Back pain, and
2. Uncomfortable walking or standing.

Any woman with any disease other than obesity or osteoporosis was excluded from this study. Women who are under medication that may cause any of the above two disease or help to develop worse status were also excluded.

A total of 110 women that been screened according to the mentioned criteria were accepted to participate in this study.

Medical records of those patients were reviewed and information of interest were recorded first on a separate sheet of papers and then coded and turned to an electronic file.

With regard to BMI groups, women with (BMI \geq 25 and BMI \leq 30) were classified as overweight, and those with BMI $>$ 30 are classified as obese.

The SPSS package was used to analyze the handled data statistically. Descriptive statistics such as mean median and range were first calculated. Inferential statistics such as two sample t-test, one-way analysis of variance and Chi-square test were applied to the data in order to give more scientific conclusion about interpretation of the results.

Results

Age of the participated women was ranged between 42 and 79 with mean and standard deviation of 60.35 \pm 8.47.

Out of 110 women considered in this study, 75 (68.18%) were practicing osteoporosis whereas 35 (31.82%) were not. Mean ages for both groups were found to be not significantly different (t=-0.14, d.f=108, p $>$ 0.05) which indicate that age does not necessarily develop osteoporosis at least for this sample.

According to the definition of the BMI, 24 (21.82%) women were have normal body weight (BMI $>$ 18.5 and BMI $<$ 25), 35 (31.82%) were overweight (BMI=25 and BMI $<$ 30), and 51 (46.36%) were obese (BMI $>$ 30).

Figure 1 shows the scatter plot of the BMI, Height and Weight versus each other. It is very clear that two groups of patients can be easily recognized. One of these groups is the that of obese (BMI $>$ 30), and the other of non-obese. Height and weight were significantly correlated (r=0.45, p $<$ 0.01) whereas BMI was only significantly correlated with weight (r=0.921, p $<$ 0.01).

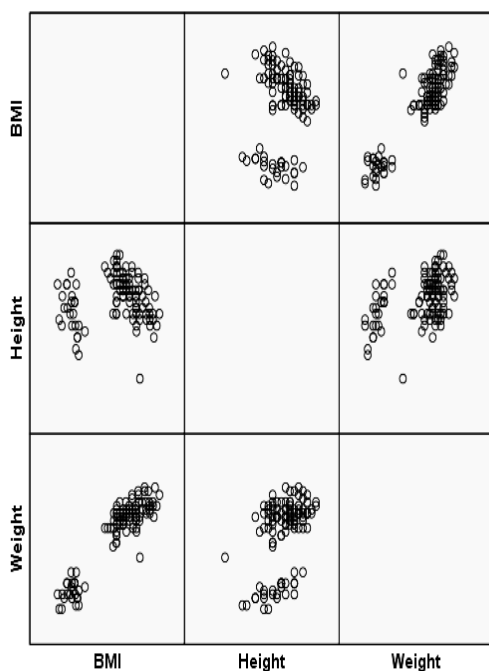


Fig.1. Scatter diagram of the BMI, Height and Weight versus each other

Mean weights of women with osteoporosis and other group were found to be not significantly different ($t=-.528$, $d.f=108$, $p>0.05$). such result indicates that mean weight does not contribute to the osteoporosis, and that osteoporosis could be a health problem that is associated with something else rather than the weight.

BMI was recoded into two main groups; normal ($BMI \geq 18.5$ and $BMI \leq 25$) as a first group, and overweight ($BMI > 25$ and $BMI < 30$) and obese ($BMI > 25$) as the second group. In order to see whether osteoporosis is associated with obesity and overweight. Osteoporosis and BMI were not associated with each other ($\text{Chi-square}=0.099$, $p>0.05$), and that obesity and osteoporosis are two different health problems.

Family history found to have no impact on the osteoporosis as it is sometimes believed that osteoporosis is a genetic disease¹¹($\text{Chi-square}=0.01$, $p>0.05$).

Neither means age nor means weight affect the status of fracture as the F-test revealed (F-ratio=1.11, $p>0.05$; F-ratio=1.359, $p>0.05$) respectively.

Vitamin D deficiency was found to be significantly associated with bone fractures ($\text{Chi-square}=18.738$, $p<0.01$).

Percentage of those with vitamin D deficiency was found to be 68.57% among those whom had fracture and was 25.33% for those with no fracture.

Discussion

Osteoporosis and obesity are two common problems particularly in the population of elderly people. According to the statistics of Osteoporosis Foundation about 200 million women all over the world, complain osteoporosis¹⁴. In this study osteoporosis is found to be not age related disease since no significant difference was detected when comparing means age of those who had osteoporosis and those who hadn't. This is actually contradict the interpretation of Patrizia and Giovanni, 2015¹⁵, which mentioned that age can be consider as a risk factor because of remodeling ability will be reduced. Moreover, the osteoblast (OBs) function is reduced with a consequent decrease in bone formation; processes involved in this mechanism have been studied with controversial results; age-related changes in OBs recruitment, differentiation, and function have been analyzed.

BMI and weight were found to be significantly associated, this result agreed with the studies conducted by Ravn¹⁶, et al., 1999 and Bjamason¹⁷ and Christiansen, 2000. BMI and osteoporosis were found to be not significantly associated and that is in agreement with Bansal S², 2017. Of course there are many studies that can be retrieved from the web sites which mentioned the same conclusion about BMI and osteoporosis or even with BMD which reflects the major indication of the osteoporosis.

Osteoporosis is found to be not associated with body weight. This result is in agreement with Ruchita Patel³, et Al, 2015 and it is disagreed with the result of Ravn¹⁶, et al., 1999 and Bjamason and Christiansen¹⁷, 2000 which concluded that obesity (weight is the essential part of this measure) is significantly decreases the risk factor of osteoporosis.

The association between obesity and osteoporosis has been investigated from epidemiological, clinical, and basic research points of view, and common pathophysiological links have been proposed: both obesity and osteoporosis are influenced by genetic and environmental factors, or the interaction between them¹⁸. This explanation is in disagreement with the underwent study that indicated no association between family history and osteoporosis.

Vitamin D deficiency has found to be significantly associated with bone fracture. Moreover, the percentage of those with vitamin D deficiency among those with fractures was more than 71% indicates that vitamin D can be considered as an essential cause for making bones weaken and fragile. For this group of patients many things may come to mind regarding this high percentage of vitamin D deficiency^{9,19}. It is either because of traditional behavior that do not allow women to have their skins exposed to enough sunlight because of their heavy clothes that allow sunlight to pass directly to skin, or may be their food is not always containing the essential sources of vitamin D. There are many other reasons of course to have low levels of vitamin D such as diseases or poor communities.

The association between vitamin D insufficiency and/or deficiency and bone fracture was the concern of many studies that found less than 60% compatibility in the intake of supplements, vitamin D, and calcium is essential to avoid the risk of bone fracture²⁰⁻²¹. In this context these results are in agreement to the findings of this underwent study.

There are many risk factors that may increase the opportunity to have osteoporosis like lung and kidney disease, low calcium intake, some effective medications such as steroids and antacids.

In some studies postmenopausal can contribute significantly to the problem of osteoporosis²².

Actually, many other variables that are missed to be handled in this study can be managed to be involved in similar studies carried out in future. These variables are values of BMD and BMC before and after fractures, how frequent fractures happened, healing duration of fractures, types of intake medication, family history and degree of degree of relationship.

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العلاقة بين السمنة وهشاشة العظام في عينة من النساء من أربيل-العراق.

منى محمد ياسين

الخلاصة:

لا يزال التناقض الجدلي حول السمنة و هشاشة العظام يشغل اهتمام عدد من الباحثين. لقد ذكرت المقالات و الابحاث المنشورة عدد من الاسباب التي ينتج عنها هذا التناقض. في هذه الدراسة تم اعتبار و تقصي بعض العوامل التي يعتقد انها تؤثر في هشاشة العظام. تراوحت اعمار النساء المشاركات في هذه الدراسة بين 24-79 سنة. من بين 110 مشاركة, 75 (68,18%) كانوا يعانون من هشاشة العظام , بينما 35 (31,82%) لم يكونوا كذلك. اظهرت الدراسة ان العمر و الوزن ليست عاملي خطورة للكسور. و ان التأريخ الصحي للعائلة غير مرتبط هشاشة العظام. وجد بأن نقص فيتامين د و حدوث الكسور مرتبطة معنويًا عند قيمة p الأقل من 1%. نسبة النساء اللائي يعانين من نقص فيتامين د و لديهن كسور كانت 68,57% بينما كانت نسبة النساء اللائي ليس لديهن كسور 25,33%.