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دکترای تخصصی داخلی
عنوان:

Determing the correlation of minor thalassemia and osteoporosis

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تقدیم به
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محمد امین

Contents:

ABSTRACT:

Introduction (Objective(s)): Osteoporosis is the most common metabolic bone disease. It has been known as a public health complication and it gets more important as average age of people in a society increases. Although some studies have been carried out regarding the relationship between β thalassemia minor and reduction of Bone Mineral Density, but it hasn't been introduced as a risk factor for osteoporosis yet. The aim of this study was evaluate bone mineral density (BMD) in adults with β thalassemia minor and control group (healthy people).

Methods: in this cross sectional study, fifty adults with β thalassemia minor aged 23- 50 yr and 59 healthy young adults aged 21-52 yr were enrolled in the study. BMD was measured once at the Lumbar spine (L1-L4) and hip by dual X-ray absorptiometry (DEXA). Osteoporosis can be diagnosed based on results of bone densitometry and it includes T-Score ≤-2.5 and osteopenia T-Score -1 to -2.5 in one or more than one place according to WHO criteria. Low BMD was diagnosed based on Z score; in this case, scores lower than -1 were considered low BMD and scores higher than -1 were considered normal

Results:

According to T Score index, more than half of patients with β thalassemia minor have abnormal BMD (<-1.0); no significant difference was found between them and control group in this respect. Chance of having low BMD for β thalassemia minor group was more than that of healthy group (OR: 1.25, P=0.61). After it was adjusted for variables like gender, age, BMI, smoking cigarette and narcotics (opium), chance of having low BMD increased partially (OR: 1.28, P=0.62); this relationship wasn't significant after adjustment.

Conclusion: based on these findings, we conclude that β thalassemia minor maybe is not a risk factor for osteopenia/osteoporosis in adults.

Keywords: Beta Thalasemia Minor, Osteoprosis, Low BMD

INTRODUCTION:

Osteoporosis has been known as a public health complication so that WHO has announced this disease as well as cancer, cerebrovascular accident (CVA) and Myocardial infarction as the main problematic of human. According to statistics, its annual mortality is more than that of cancers (1, 2). Osteoporosis is the most common metabolic bone disease which is characterized by decreased density of bone trabeculas in volume unit. Osteoporosis is the main cause of hip fracture in people aged more that 65; and 90% of fractures occurs in this age and more. Since huge amount of populations in Asia are young, it is predicted that about 894 million people will reach the age of 65 in 2050 which is six times more that what it was in 1990. In Europe, this amount will increase from 68 million in 1990 to 133 million in 2050 (3, 4). In addition to decreased bone density, there are some other risk factors which increase the risk of fracture; some of these factors include: record of bone fracture resulted from adult Osteoporosis, record of bone fracture in patient's first-grade family, female sex, high age, White race, dementia, smoking, low body mass, estrogen shortage, low calcium intake, alcoholism, sight disorders, continuous falling down, low physical activities and low health level (5).

In most patients, osteoporosis occurs due to a series of secondary factors which can cause osteoporosis (secondary) or aggravate its trend. Thus, diagnosing these factors is of great importance because if these factors are recognized and cured on time, osteoporosis and other related consequences can be prevented or at least can be postponed. For most of these secondary causes are chronic diseases which can, due to some special mechanisms which are related to that cause, reduce bone density and consequently cause osteoporosis. Thus, they require a special treatment (6).

Among them, some chronic diseases, one of which is major thalassemia (homozygote), can be found; it is a blood congenital disease which can cause severe anemia due to interference with beta-globin. Consequently, a non-effective erythropoesis and subsequently a severe hemolysis can occur. Thus, marrow tries to compensate this shortage rapidly and broadly and as marrow increases bone density decreases. Finally, patient will experience osteoporosis and its consequences (7, 8).

Recently, some discussion has appeared regarding the question whether β thalassemia minor, which can cause milder anemia and mild non-effective erythropoesis, can be considered as a risk factor for osteoporosis or whether β thalassemia minor can be placed in secondary factors of osteoporosis (9). Although a negative relationship was found in some studies like those carried out in Thailand (8) and Greek (9), in a study performed in California (11), this relationship has been considered as a risk factor. Concerning increased β thalassemia minor in Iran (especially in Kerman Province) and concerning the fact that prevalence of β thalassemia minor is high in Iran, if minor thalassemia can be considered as risk factor for osteoporosis, a lot of people can significantly be helped. The aim of this study is to determine BMD and to determine whether β thalassemia minor can be introduced as a risk factor for osteoporosis or not.

Materials and Methods:

This research is a case control study. People aged 18 or more who referred to special diseases center due to β thalassemia minor were selected as case group. Healthy people who referred to this center due to some reasons other than disease were selected as control group. Finally, 50 people were chosen as β thalassemia minor group (case group) and 59 as control group (healthy people).

After completing agreement forms, they were asked to fill in an information checklist including demographic, anthropometric information, drugs and factors related to osteoporosis. Patients with rheumatoid arthritis, thyroid, parathyroid and adrenal diseases, renal failure, hepatic failure, metabolic bone diseases, diabetes type 1, infertility, indigestion, lack of activity more than 1 week, lactation and malignant record were introduced as exclusion criteria and were excluded from the research. All patients underwent Bone Mineral Densitometry (BMD) in lumbar spine (L1-L4) and hip using lunar dual X-Ray absorptiometry scanner. Bone mineral density will be evaluated using DEXA method. BMD was measured once at the lumbar spine (L1-L4) and proximal of femor with DEXA norland densitometers (norland). The procedure was carried out by a trained operator according to the manufacturer's instruction. Machine calibration was done daily. Daily and weekly quality assurance tests were performed as recommended by the DXA machine manufacturers. Precision errors for BMD measurements were 1–1.5% in the lumbar and 2-2.5% in the femoral regions. These precision errors were obtained in each center from precision studies according to standard methods.

To evaluate BMD, at first lumbar spine (L1-L4) from front part to the back part as well as hip bone was examined using scanner; then, density was obtained based on g/cm^3. All scans were obtained by one apparatus in Kerman Special diseases center. Results were determined based on WHO criteria to determine osteoporosis based on DEXA scan in lumbar spine and hip.

Osteoporosis and osteopenia were diagnosed based on bone densitometry results which included T-score $\leq$-2.5 as osteoporosis and -1 to -2.5 as osteopenia; and finally, more than -1 were considered normal. All results will be interpreted only by a

person. To assess risk factors for Low BMD in this population, Z score was used to decrease the confounding effect of age on BMD. Then Low BMD was diagnosed based on Z score; in this case, scores lower than -1 were considered low BMD and scores higher than -1 were considered normal (No Low BMD).

STATISTICAL ANALYSIS:

Descriptive statistics, Mean ± SD and percentage were used. Independent t test and Chi square were used to compare two control and β thalassemia minor groups concerning different variables of demographic, BMD, T Score and Z score Means. After statistical analysis was achieved, Z scores were divided into two groups of "with or without low BMD". In this classification, scores -1.0≥ were considered as a group without low BMD and scores <-1.0 were considered as a group with low BMD. To show the effect of β thalassemia minor on BMD, univariate and multivariate logistic regression test was used. To analyze data, SPSS V15 Software was used and $P<0.05$ was considered significant.

RESULTS:

Demographic properties of people in both control and β thalassemia minor groups were shown in table 1. Average age in β thalassemia minor group (50 people: 24 male and 26 female) and in healthy group (59 people: 26 male and 33 female) was 35.2+-8.01 and 36.3+-8.51 respectively; statistically, it was not significant. Control group was better than β thalassemia minor group concerning weight, height and BMI; these differences were significant statistically (P<0.001). Concerning BMD indexes, no significant difference was found between two groups (except for T score in lumbar spine which was more negative in β thalassemia minor than in control group (P=0.014)). Status of smoking cigarettes and narcotics in both groups have been shown in table 1.

Table 1: Demographic and BMD values of study samples in both Groups

Variables		Studied Groups: β thalassemia minor (n=50)	Control (n=59)	P value
Age (yrs)¥		35.2 (8.01)	36.3 (8.51)	0.48
Weight (kg)¥		57.2 (12.7)	69.05 (10.7)	<0.001
Height (cm)¥		164.9 (9.05)	170.8 (9.9)	<0.001
BMI (kg/cm^2)¥		20.9 (3.7)	23.7 (3.6)	<0.001
Sex (male)*		24 (48%)	26 (44.1%)	0.68
Smoking use (yes)*		12 (24%)	15 (25.4%)	0.86
Opium use (yes)*		12 (24%)	10 (16.9%)	0.36
hip	BMD (g/cm^2)¥	0.86 (0.15)	0.88 (0.17)	0.56
	T score ¥	- 1.02 (0.67)	-1.04 (0.82)	0.90
	Z score ¥	-0.41 (0.75)	-0.36 (0.92)	0.79
Lumbar spine (L1-L4)	BMD (g/cm^2)¥	0.93 (0.36)	1.0 (0.15)	0.26
	T score ¥	-0.92 (0.58)	-0.58 (0.83)	0.014
	Z score ¥	-0.34 (0.76)	-0.19 (0.89)	0.36

¥ Data are reported as Mean ± SD, * Data are reported as N (%)

After T score and Z score were classified based on normality, osteopenia and Osteoporosis in both Hip and Lumbar spine, they were compared in two groups. As shown in table 2, more than half of study people in both groups (based on final T score index) had abnormal BMD (less than -1.0) but no statistically significant difference was found between these two groups (P=0.74). Based on final Z score