Original Research Article

Comparison of Dietary Supplement Intake between Healthy Individuals and Osteoporosis Patients in Gorgan, Iran

Mehrdad Aghaei[1], *Samira Eshghinia[2], Sima Seddighi[1], Nafiseh Abdollahi[1], Fatemeh Mohammadzadeh [3], Maryam Shafigh[4], Saeed Amirkhanlou[3], Gholamreza Veghari[5]

[1] Golestan Rheumatology Research Centre, Golestan University of Medical Sciences, Gorgan, Iran,[2] Metabolic Disorders Research Center, Golestan University of Medical Sciences, Gorgan, Iran,[3] Clinical Research Development Unit, Sayad Shirazi Hospital, Gorgan, Iran,[4] School of Medicine, Golestan University of Medical Sciences, Gorgan, Iran,[5] Ischemic Disorders Research Center, Golestan University of Medical Sciences, Gorgan, Iran

ABSTRACT

Introduction: Osteoporosis is a common disease in Iran, which is associated with insufficient intake of vitamin D and calcium. Therefore, this study aimed to compare consumption of dietary supplements between healthy individuals and patients with osteoporosis referred to bone densitometry centers in Gorgan, north of Iran. **Materials and Methods:** This case-control study was conducted on women aged over 55 years who were at least 5 years postmenopausal. Overall, two groups of 130 subjects were enrolled via convenience sampling at 95% confidence interval. The subjects were divided into two groups of healthy individuals and patients with osteoporosis using Hologic QDR 4500 Elite Bone Densitometers and T-scores (-2.5: osteoporosis, above 1: normal). Anthropometric measurements (height, weight and waist circumference), and amount of dietary intake of calcium, vitamin D, vitamin E and multivitamins supplements were recorded by trained experts. Data collected were analyzed using SPSS software (version 16). **Results:** Healthy subjects consumed significantly higher amount of calcium supplement (18.5%) compared to subjects with osteoporosis (P = 0.001). Intake of vitamin D supplement was significantly higher (23.3%) in healthy subjects compared to patients (P = 0.003). Intake of vitamin E supplement and multivitamin was slightly higher in healthy subjects, but the difference was not statistically significant. **Conclusions:** At least half and two-thirds of individuals aged over 55 years take vitamin D and calcium supplements, respectively. Intake of calcium and vitamin D is significantly higher in healthy individuals compared to those with osteoporosis.

KEYWORDS: Osteoporosis, Vitamin D, Calcium, Gorgan

***Correspondence:** Samira Eshghinia, Metabolic Disorders Research Center, Clinical Research Development Unit, Sayad Shirazi Hospital, Golestan University of Medical Sciences, Gorgan, Iran, Telephone:09113709240 Email: eshghinia@goums.ac.ir

INTRODUCTION

According to the World Health Organization, osteoporosis is defined as a bone mineral density (BMD) that lies 2.5 standard deviations or more below the average value for young healthy women. Bones in the body lose their strength during osteoporosis, which could lead to traumatic fractures [1]. Osteoporosis becomes more prevalent with age, especially among women. Although studies have shown that women are four times more likely to develop osteoporosis compared to men, the disease may sometimes occur during skeletal growth and adolescence [2]. Currently, there are 25 million women and 12 million men with osteoporosis. More than 1.5 million fractures occur annually in the US that requires more than $15 billion worth of healthcare services [3]. Bone fracture is a common clinical complication of osteoporosis resulted not only from aging but unfavorable changes in lifestyle and diet [4,5]. Prevention is the best approach to the disease. Maintaining bone health in older people requires peak bone mass at an early age and reduced rate of bone loss later in life. Nutritional factors are

among the modifiable factors contributing to this issue. In addition to risk factors defined by the National Osteoporosis Federation, development of postmenopausal osteoporosis is directly associated with factors such as inadequate calcium intake (particularly after menopause), insufficient activity, reduced estrogen, having a small body frame, northern European race, familial history of osteoporosis, smoking, excessive intake of caffeine, alcohol and protein, and underlying diseases such as rheumatoid arthritis, endocrine disorders and kidney failure [6,7]. Regarding the pathogenesis of postmenopausal osteoporosis, it has been demonstrated that estrogen inhibits the absorption activity of osteoclasts, which in turn increases the intestinal absorption of calcium and calcium reabsorption from the kidneys. Osteoblasts' survival is affected by the loss of ovarian activity and estrogen deficiency, causing increased bone loss in women at a significant rate (about 25-30% of bone mass is lost within 5-10 years) [8]. The increasing number of women with osteoporosis in Iran and reduced quality of life in these patients can impose significant negative economic consequences for the healthcare system. Therefore, it is necessity to conduct comprehensive planning and research on lifestyle and diet of people at risk, and implement preventive measures. Considering the lack of a study on the consumption of dietary supplements among patients with osteoporosis in this region, the present study aimed to investigate the intake of dietary supplements in healthy subjects and patients with osteoporosis referred to the bone densitometry center of Gorgan, Iran.

MATERIALS AND METHODS

This case-control study was conducted on two groups of healthy women (normal bone density group) and women with osteoporosis aged ≥55 years referred to the bone densitometry center at Musa-Ibn-Jafar clinic in Gorgan, Iran. The study population included 130 women with normal bone density and 130 postmenopausal women aged ≥ 55 years (at least 5 years menopausal) referred for bone density scan in Gorgan. Subjects were enrolled via convenience sampling. Bone and joint problems were found in 29.4% of patients and 15.1% of healthy subjects at 95% confidence interval in a previous study [9].

The subjects were divided into two groups of patients with osteoporosis and healthy subjects using the Hologic QDR 4500 Elite Bone Densitometer and T-score values (-2.5 index)[1]. Demographic and anthropometric data (weight, height, body mass index and waist circumference), and amount of calcium, vitamin D, vitamin E and multivitamin intake were recorded by trained experts. The subjects within both groups were matched in terms of area of residence and age. Subjects with symptoms of early menopause (menopause onset before the age of 40), taking glucocorticoid and estrogen contained drugs and those with hyperthyroidism, Cushing's syndrome, hyperparathyroidism and all diseases that could affect bone metabolism were excluded from the study.

Data were analyzed using SPSS (version 16). T-test was used to compare means between the two groups. Chi-square test was used to compare the qualitative variables. The significance level was set at $P<0.05$.

Ethical considerations

Prior to testing, necessary permissions were obtained from the Research Ethics Committee of Golestan University of Medical Sciences. Objectives of the study were explained to the subjects and written consent was obtained from each subject. Participants were allowed to withdraw from the study if unwilling to continue.

RESULTS

Mean age ± standard deviation (SD) of subjects was 61.47 ± 4.65 years. Age of healthy subjects and patients with osteoporosis had no statistically significant difference. Mean height ± SD of patients was 154.67 ± 8.48 cm. The height of patients and healthy subjects had no significant difference. Mean weight of healthy subjects was significantly higher (4.57 kg) than that of patients (P = 0.001). There was no significant difference between the two groups in terms of waist circumference (Table 1).

Table 1: Demographic characteristics of subjects

	Mean ± SD			P-Value
	Healthy subjects (N=130)	Subjects with osteoporosis (N=130)	Total (N=260)	
Age (years)	61.04±4.86	61.90±6.01	61.47±6.65	0.873
Height (cm)	154.73±11.23	154.6±5.01	154.67±8.68	0.904
Weight (kg)	74.48±10.6	69.91±13.62	72.19±12.30	0.001
Waist circumference (cm)	102.81±9.76	101.83±14.18	102.32±12.16	0.720

Table 2 shows the dietary intake of vitamins D and E, calcium and multivitamin in the two groups. The amount of vitamin D intake in healthy subjects was 23.3% higher than in patients (P = 0.003). Although vitamin E intake in the healthy subjects was higher than in the patients, this difference was not statistically significant. Consumption of multivitamins was slightly higher in patients compared to the controls. Calcium intake in the control group was 18.5% higher than in the patients with osteoporosis (P = 0.001).

Table 2: Comparison of dietary supplements consumption between healthy subjects and subjects with osteoporosis

Dietary Supplement	Healthy subjects (N=130)		Subjects with osteoporosis (N=130)		P-Value
	Positive N(%)	Negative N(%)	Positive N(%)	Negative N(%)	
Vitamin D	86(66.2)	44(33.8)	61(42.9)	69(53.1)	0.003
Vitamin E	12(9.2)	118(90.8)	10(7.7)	113(92.3)	0.930
Calcium	115(80.8)	15(19.2)	81(62.3)	49(37.3)	0.001
Multivitamin	14(10.2)	116(89.8)	18(13.9)	112(86.1)	0.671

DISCUSSION

In this study, 186 subjects (71.5%) were taking calcium supplement, 147 subjects (56.5%) were taking vitamin D, 22 subjects (8.5%) were taking vitamin E, and 32 subjects (12.3%) were taking multivitamin. Intake of calcium in healthy postmenopausal women was higher than that in women with osteoporosis. Consistent with these findings, study of Varenna et al. [10] showed the inverse relationship of calcium intake in postmenopausal women with body mass index and overweight. They also concluded that low dietary calcium intake in recently postmenopausal women can increase the risk of osteoporosis. However, its negative effects on overweight women could be modified [10]. Our results also showed that healthy women use more vitamin D supplement compared to women with osteoporosis. This is consistent with results of Rivas et al. [11] that showed a significant positive relationship between BMD and dietary intake of antioxidants. In the mentioned study, zinc intake also had a significant correlation with BMD in the youngest group. They concluded that consumption of antioxidants and antioxidant vitamins (C and E) could prevent osteoporosis [11]. Contrary to the findings, study of Sugiura et al. reported that dietary patterns and high dietary intake of vitamin E, xanthine and retinol are positively associated with risk of low BMD [12]. The present study have not investigated diet, knowledge and practice in the field of osteoporosis prevention, social and economic factors, duration of dietary supplementation and reason of the differences in dietary intake of supplements between healthy subjects and patients, which are some of the limitations of this study.

CONCLUSIONS

According to our results, at least half and two-thirds of individuals aged over 55 years take vitamin D and calcium supplements, respectively. Intake of calcium and vitamin D supplements is significantly higher in healthy individuals compared to those with osteoporosis. It is recommended to conduct more comprehensive studies on the risk factors of osteoporosis and its prevention methods.

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