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The prevalence of osteoporosis in patients with coronary artery disease, Lorestan province, Iran

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ABSTRACT

Epidemiological studies have shown a positive correlation between osteoporosis/osteopenia (OOS) and coronary artery disease (CAD). Here we aimed to study the prevalence of OOS in patients with CAD in lorestan. We performed a cross sectional study on 160 randomly selected patients with coronary artery disease from Khorammabad Heart center affiliated with Lorestan University of medical science. The study was performed fromDesember2011 to May2012. All the patients had more than 50% stenosis of at least one of the coronary arteries. There were 78 (47%) female, 38 (22%) patients with diabtes, 78 (47%) with hypertension, 51 (30.7%) hperlipidemia and 41 (24.7%) of them were smokers. The prevalence of osteopenia was 45.2%, the prevalence of osteoporosis was 31.9% and 22.9% of the patients had normal BMD. In conclusion we showed the high prevalence of OOS among patients with CAD. This finding paves the way for future studies regarding OOS and CAD.

Key words: Coronary Artery Disease (CAD), Osteoporosis(OOS), Bone Marrow Density(BMD)

INTRODUCTION

One of the major social problems nowadays is the aging society [1,2]. This reveals the importance of health care for older people. Coronary artery disease (CAD) and Osteoprosis/Osteopenia (OOS) are among the prevalent disease in elderly people [3-5]. OOS is a worldwide disease and the most prevalent metabolic disease in developed countries including United States [4]. Similarly CAD is an inflammatory condition in which the blood flows to the coronaries are disturbed mostly because of the atheroma plaque [6-8]. Epidemiological studies have shown a positive correlation between OOS and CAD [8, 9]. In Framingham study, the bone marrow density was inversely correlated with the aortic calcification [10]. Similarly other studies, mostly in women have shown a strong correlation between OOS and CAD [11]. Both CAD and OOS are of high prevalence among elderly people in Iran [12-15]. Women are also at a higher risk of both diseases [12, 14] , so early diagnosis and treatment is of great clinical importance in these patients. Here we aimed to study the prevalence of OOS in patients with CAD in lorestan.

MATERIALS AND METHODS

We performed a cross sectional study on 160 randomly selected patients with CAD from Khorammabad Heart center affiliated with Lorestan University of medical science. The study was performed fromDesember 2011 to May 2012. Coronary artery disease was defined according to the criteria of American College of Cardiology [16]. All the patients had more than 50% stenosis of at least one of the coronary arteries. Exclusion criteria were, congestive heart failure, corpulmonary, chronic kidney disease, malignancy, acute or chronic infection, history ofold MI, PCI,

CABG, pregnancy, history of musculoskeletal disorders and use of glucocorticoids. Demographic and anthropometric data including age, sex, cigarette smoking, and presence of diabetes or hypertension was recorded. Blood pressure was measured twice after 5 minutes apart in sitting position. The BMI (Kg/m^2) was calculated according to Quetelet formula.

The patients then underwent coronary angiography in the first 48 hr of admission; Indications for PCI, CABG, or medical therapy were made by the attending physician after having reviewed the coronary angiography on the basis of clinical and Para-clinical characteristics. All participants gave written informed consent before participation. The research was carried out according to the principles of the declaration of Helsinki; the local ethics review committee of Lorestan University of Medical Science approved the study protocol.

Coronary angiography

All patients underwent routine coronary angiography using standard techniques. Angiographic scoring was performed by 2 cardiologists. Coronary angiographies were interpreted visually and were analyzed in 2 orthogonal views. Stenosis of >50% in the main epicardial vessel was regarded as significant coronary artery disease. We used Braunwald's classification system to classify the patients according to their stenosis severity

Statistical analysis

The statistical package SPSS 16 for windows (Chicago, Illinois, USA), was used for analysis. Kolmogorov-Smirnov test was employed to test the normality of the variables in each group. Quantitative variables distributed normally are presented as mean ± standard deviation of mean (SD). Qualitative variables are presented as number and percent.

Bone densitometry

Bone densitometry of lumbar spine (L2-L4) and right femoral neck were measured by DEXA usin. Bone densitometry was expressed as mili-gram per cm 2 by DEXA at lumbar region. Osteopenia and osteoporosis were delineated according to WHO criteria.

RESULTS AND DISCUSSION

In this study 166 patients with Coronary heart disease In terms of developing osteoporosis were studied. The average age of patients was 56.9±12.1, with range of 24 to 80 years. 31.3% of patients were in age 40-55 years, while 11.4% were below 40 years and 57.2% of patients were over 55 years. participating in the study, 53% were male and 47% were female. The average BMI of the study population was 25.6±3.6, with range of 16.6 to 42.2 . **Table 1** presents the primary characteristics of participants. There were 78 (47%) female, 38 (22%) patients with diabtes, 78 (47%) with hypertension, 51 (30.7%) hperlipidemia and 41 (24.7%) of them were smokers. 16.1% of men and 30.8% of the women in the study had diabetes (pv=0.025). Prevalence of hypertension in men and women respectively, were 38.6% and 56.4%..(pv=0.022) . 25% of men and 37.2%of women participating in the study were hyperlipidemic (pv=0.09), and 38.6%of men and 9%of women were reported smoking history.(pv=0.001). 53(31.9%) of participants in the study were diagnosed with osteoporosis and 75 patients(45.2%) suffering from osteoporosis. Compare the prevalence of osteoporosis in men and women and in different age groups and according to body mass index in our study is detailed in Table 2.

Based on chi-square test, The difference in the prevalence of osteoporosis in men and women was statistically significant (p=0.009,table2) The prevalence of osteoporosis in women and men respectively were 43.6% and 21.6% respectively. As well as The difference in the prevalence of osteoporosis in different age groups was statistically significant(p=0.003,table2) .Osteoporosis prevalence in the age group under 40 years and the age group 40 to 55 years of age and over 55 years were 15.8% and 19.2% and 42.1%, respectively. The difference in the prevalence of osteoporosis in patients with coronary artery disease based on body mass index was not statistically significant(p=0.25,table2) Our findings clearly demonstrated that patients with coronary artery disease have a higher prevalence of OOS. Our findings are in line with those of previous studies somehow [17, 18]. Even though studies conducted in men have shown conflicting results, those preformed in women are also confirmatory [9, 11, 19, 20]. It could be questioned that CAD and OOS have a negative effect on each other. This continues to be and active research area [21]. CAD is an inflammatory condition, and inflammation has shown to have negative role on bone mineral density [21]. Patients with chronic inflammatory conditions have a lower Bone mass. The similar situation has been proposed in obesity. Because both adipocytes and osteoblasts are derived from a common multipotential mesenchymal stem cell, obesity may increase adipocyte differentiation and fat accumulation while decrease

osteoblast differentiation and bone formation [22].. The increased circulating and tissue proinflammatory cytokines in obesity may promote osteoclast activity and bone resorption through modifying the receptor activator of NF-kappaB (RANK)/RANK ligand/osteoprotegerin pathway [22]. Furthermore, the excessive secretion of leptin and/or decreased production of adiponectin by adipocytes in obesity may either directly affect bone formation or indirectly affect bone resorption through up-regulated proinflammatory cytokine production [23]. Finally, high-fat intake may interfere with intestinal calcium absorption and therefore decrease calcium availability for bone formation [22]. This emphasis the fact that patients with CAD have a higher rate of OOS. The principal limitation of the present study is its cross sectional nature which precludes the determination of the direction of causality, however we took advantage of a relatively large sample size and close similarity between groups in most of the potentially confounding variables. In conclusion we showed the high prevalence of OOS among patients with CAD. This finding paves the way for future studies regarding OOS and CAD.

The limitation of this study is the lack of a control group for comparison of Osteoporosis in patients with coronary artery disease and healthy control.

Table 1: Primary characteristics of participants

	Frequency (n=160)
Osteopenia n, (%)	75(45.2%)
Normal n, (%)	38(22.9%)
Osteoporosis n, (%)	53(31.9%)
Female n, (%)	78(47.0%)
With Diabetes n, (%)	38(22.9%)
With Hypertension n, (%)	78(47%)
With Hyperlipidemia n, (%)	51(30.7%)
Smoker n, (%)	41(24.7%)

Table 2: Frequency distribution OSS in the patients in terms of age, sex and body mass index.

variable	Osteopeni N (%)	Osteoporosis N (%)	Normal N (%)	Total N (%)	P-Value
Sex:					
Male	47(53.4)	19(21.6)	22(25)	88(100)	
Female	28(35.9)	34(43.6)	16(20.5)	78(100)	0.009
Age:					
<40	10 (52.6)	3(15.8)	6(31.6)	19 (100)	
40-55	23(44.2)	10(19.2)	19(36.5)	52(100)	0.003
>55	42(44.2)	40(42.1)	13(13.7)	95(100)	
BMI:					
<18	0(0)	1(100)	0(0)	1(100)	0.255
18-24.9	35(46.7)	27(36)	13(17.3)	75(100)	
25-29.9	35(48.6)	19 (26.4)	18(25)	72(100)	
≥30	5(35.7)	3(21.4)	6 (42.9)	14(100)	

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