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The Incidence of Osteoporotic Hip Fracture: Iranian Multi-Center Osteoporosis Study (IMOS)

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Abstract: Osteoporosis is a major dilemma of health care services, both in developed and developing countries. Osteoporotic fractures are one of the most common causes of disability and a major contributor to medical care expenditure. There is substantial variation in the incidence of hip fracture in different regions, although there is not any information about incidence of hip fracture in Iran. The results of Iranian Multi-centers Osteoporosis Study (IMOS) showed that 70% sof women and 50% of men aged 50 years and older had osteopenia or osteoporosis. This follow up study was performed to determine the incidence of osteoporotic hip fractures in 3 years follow up of in Tehran. A total number of 286 individuals aged >50 years old were selected and asked about history of hip fracture and related risk factors. Our observations demonstrated that the incidence of hip fracture increases exponentially with aging and about 90.9% of all hip fractures occur in women.

Key words: Osteoporosis, fracture, incidence, hip, dilemma, health care

INTRODUCTION

Osteoporosis is a common problem of heath systems and is considered as a hidden epidemic for modern world (Cohen and Roe, 2000). This silent disease is characterized by low bone mineral density, which leads to enhanced bone fragility and fracture (Consensus Development Conference, 1993). Osteoporotic fracture is one of the most common reasons for disability and the most common factor for cost in the hospitals of many regions around the world (Cummings and Meiton, 2002; Cooper, 1999).

It has been estimated that in European countries, one osteoporotic fracture occurs in each 30 min that leads to high morbidity and mortality (Cummings and Meiton, 2002). Many white race women may suffer from hip fracture along their lives, which is more than breast cancer rate with high mortality rate (Lau and Tee, 2001).

The number of hip fractures will increase 2 folds in next 20 years due to increasing the population and improvement of life expectancy. In 2001, 17 billion dollars (47 million dollars daily) spent for hospitalization and long period follow up for osteoporotic fractures.

It's been estimated that 24% hip fractures occur among people with age of 50 or older and may lead to death along a year. Regarding the matter that these people have had an active life before hip fractures, almost 25% of them needed to be cared in hospitals for along period of time (Fujiwara *et al*., 1993). Social consequences due to fracture will increase by aging (Cummings and Meiton, 2002).

Regarding increased life expectancy and aging in Asian population, it has been estimated that till 2050 >50% of fractures will be related to osteoporosis in Asia. The outbreak of osteoporosis fractures has been studied in some Asian countries, it has been multiplied by 2 in recent 30 years among men and women, but in China, it was less than Singapore and Hong Kong (Lau and Tee, 2001).

Unfortunately, there is no information about incidence of hip fractures in Iran. It is clear that having accurate information about burden of this complication is necessary for large-scale strategic planning to decrease fracture incidence and its consequences. Therefore, we performed this study at Endocrinology Metabolism Research Center (EMRC) to estimate incidence rate of hip fractures based on findings of Iranian Multi-center Osteoporosis Study (IMOS).

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MATERIALS AND METHODS

After reviewing and investigating the resources related to research for patient's files who attended in IMOS in 2001. In IMOS and 1200 individuals were selected as random sampling in a cluster form around Tehran city and their files were saved at EMRC. Among these people, 389 were over 50 years old, which were included in our study and were asked to fill out the questionnaires on the phone. The questionnaire was about fracture and some questions about risks factors and demographic information. After recording the requested information and data entry, we used independent t-test and chi-square (χ^2) test for data analysis.

RESULTS

Among 389 people over 50 years old, 14 died and 89 were omitted because of home address changing, transferring the phone number or being unavailable. Finally gathered information of 286 people was as fallows: the mean±SD of age was 64.9±7.51 years, 17.1% were male (mean age: 63.2) and 82.9% were female (mean age: 65.2). Among included people, 198 people (68.2%) were settled in apartment and 88 people (30/8%) in residential home. Other items related to demography variables have been determined in Table 1. The incidence of hip fracture was 30.8% (11 people) and mean age of whom suffered from hip fracture was (71.1±49.5). The results showed us that fracture is increased by aging. As we see, the hip fracture increased from 0% for <60 year's old people to 8.2% for over 70 years old people. Chi-square (χ^2) test shows the meaningful relationship between age levels and hip fracture ($p = 0.031$) (Table 2).

In osteoporosis rate just 20.4% males and 8% females over 50 years old had normal Bone Mass Density (BMD) and 34.7% males and 21/1% females in osteopenia limit and 49.9% males and 70.9% females suffered from osteoporosis and it is rate between male and female showed a meaningful statistics difference ($p = 0.001$).

The fracture incidence was calculated at hip region in 2 genders and it was 4.2 and 2.04% in women and men, respectively.

In the investigation related to osteoporosis and fracture in different regions, we noticed the meaningful relationship ($p = 0.016$) between hip fracture and osteoporosis, but in other regions this relation was not significant (Table 3).

Mean±SD of BMD at hip region in two genders is shown in Table 4 and there is a meaningful difference between two genders for BMD. There is also a significant difference ($p = 0.001$), between hip fracture and BMD, which is shown in Table 5.

Table 1: Baseline characteristics of study samples

Demographic variable	Women	Men	p-value
Age (year)	65.24±7.377	63.22±8.240	0.087
Age of menarche	13.83±1.500	-	-
Age of menopause	47.42±6.170	-	-
Height (cm)	153.11±6.010	166.48±9.670	0.001
Weight (kg)	61.32±0.120	62.60±11.06	0.615
BMI	26.14±4.800	22.60±3.600	0.001

Table 2: Relationship between age and hip fracture

	Age (year)			
	50-60	60-70	70 and higher	Total
History of hip fracture	80 (100)	128 (96.2)	67 (91.8)	275 (96.2)
No history of hip fracture	0 (0)	5 (3.8)	6 (8.2)	11 (3.8)
Total	80 (100)	133 (100.0)	73 (100.0)	286 (100.0)

Table 3: Relationship between osteoporosis and location of the fracture

BMD	N (%) osteoprotic	N (%) normal	p-value
Hip	11 (100.0)	0 (0)	0.016
Vertebral	5 (83.3)	1 (16.7)	0.700
Wrist	2 (77.8)	6 (22.2)	0.100

Table 4: Relationship between BMD in hip and vertebral column

BMD	Women	Men	p-value
Hip	0.75±0.155	0.8549±0.177	0.01
Vertebral	0.881±0.17	1.0300±0.188	0.01

Table 5: Relationship between BMD in women with hip fracture and healthy women

BMD	Women	Normal population	p-value
Hip	5.69±0.126	0.758±0.151	0.001
Vertebral	--	--	

DISCUSSION

Hip fracture in osteoporosis is a major health problem in elderly people with different prevalence among communities. Some studies in 1980s showed the rate of hip fracture is increasing (Frassetto and Todd, 2000). The investigation in 1990 showed stopping this process in Sudan and United State but the study conducted by Finsen *et al.* (2004) related to hip fracture outbreak in Norway showed that there was an increasing outbreak for hip fracture from 1980 decade and progressing process was encountered by 1312 hip fracture during 1997-1998. This number has been 10% more than last year and is completely related to aging of population (Finsen *et al.*, 2004).

We found 5-8 fold increase in hip fractures in men and women after 75 years old. In Malaysia and Thailand, the rate of increase was 3-4 folds (Lau and Tee, 2001). This study is in accordance with our results because it shows 2-3 fold increase for people over 70 years old rather than last decades.

In women, hip fracture incidence is twice rather than men at the same age. The 3.4% of all hip fractures have been seen in women. In the United State, the reported hip fracture risk after 50 years old was 17 and 6% in white race women and men, respectively. We have more women in

this rate in Iran but the incidence rate is less than that (Lau and Tee, 2001). The results in 4 Asian countries in 2001, showed us that for $180/10^5$ men in Hong Kong and $459/10^5$ women in Singapore $164/10^5$ men and women, In Malaysia $442/10^5$ 88 men, 218 women and in Thailand 114 men and 289 women suffered from hip fracture. This rate was duplicated in 1989 with similar subjects ($187/10^5$ men, $535/10^5$ women) were compared. It seems that race differences and environment factors are among the most important factors in difference of our study (Lau and Tee, 2001).

CONCLUSION

Findings of our study in Tehran show that a cross sectional study should be performed for osteoporosis fracture outbreak in people over 50 years old in our country. There is a significant relationship between fracture outbreaks with BMD in hip region which can forecast the fracture, but this rate in forecasting needs more investigation.

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