Iranian J Publ Health, 2004, A supplementary issue on Osteoporosis, pp.29-33

Incidence of Hip Fractures among Iranian Elderly Population

A Moayyeri, A Soltani, B Larijani, *F Abolhassani

Endocrinology and Metabolism Research Centre, fifth floor, Shariati Hospital, Northern Kargar Ave, Tehran 14114, Iran

Abstract

Hip fracture, the most dramatic complication of osteoporosis, constitutes a serious health problem of the elderly, with great socioeconomic consequences. Hip fracture epidemiology has been studied by many investigators. Until now, there are no reported studies in Iran regarding this issue. We studied hip fractures that occurred in Iran in 2003 and compared the findings with those of other countries. Data used were obtained from the Iranian Multicenter Study on Accidental Injuries, a large-scale population-based study conducted in 9 provinces across the country. The study was conducted by the Ministry of Health and Medical Education and continued for 135 days (4.5 months) in all centers, beginning in a date between 15 June 2003 and 15 July 2003 for each center. A total of 1482 new cases of hip fracture (1079 male, 403 female) were recorded during the study period. The crude annual incidence of hip fracture (per 100000 person-years) was 59.8 in men and 23.5 in women. The incidence rates increased exponentially after the age of 60 in both genders and nearly tripled after each decade. In comparison with hip fracture incidence rates of other countries, Iranian rates are considerably lower than other Asian, European, and American countries. The reasons for this low incidence rate remain uncertain. With increase in life span, rapid economic development and aging of the population, hip fracture will become a major health problem in Iran and studies are needed to increase awareness of osteoporosis and to monitor the epidemiology of hip fractures.

Keywords: *Osteoporosis, Hip Fracture, Mortality, Iran*

Introduction

Fractured neck of femur is a common cause of morbidity and mortality in older people and is associated with considerable health expenditure in most countries (1). The rise in age-specific incidence of hip fracture over the past century has been well documented (2-4). It is attributed to an increased risk of fall-related injuries, in turn influenced by social and lifestyle changes, reduced bone and muscle strength, more frequent use of medications, inadequate levels of calcium and vitamin D, less active lifestyles, and poorer general mobility (5, 6). This rising incidence led to the development of programs to reduce the burden of hip fracture and all injurious falls in older people of many countries(7).

Our knowledge about incidence of hip fractures among Iranian population was really restricted as there was no epidemiologic study in this regard. In the present study, we evaluated these fractures in a large scale study with prospective design.

Materials and Methods

Data used were obtained from the Iranian Multicenter Study on Accidental Injuries (IMSAI). Sixty-five cities in 9 provinces from central, western and eastern parts of the country comprised the study area. IMSAI was designed to report any incident injury resulted from unintentional accidents. Two hundred and sixty interviewers were trained for this purpose. The

***Corresponding author:** Tel: +98 21 8026902, Fax: +98 21 84902398, E-mail: abolhassanis@sina.tums.ac.ir

study was conducted by the Ministry of Health and Medical Education and continued for 135 days (4.5 months) in all centers, beginning in a date between 15 June 2003 and 15 July 2003 for each center.

The interviewers systematically searched emergency, surgery and orthopedic wards of all public hospitals in the study area for any new patient admitted with an accident-related etiology. Following their agreement to participate in the study and their signed consent, individuals or their proxies completed the interviewer-administered standardized questionnaire related to the event. Medical diagnosis was derived from the patient profiles and verified with the corresponding nurse or physician. All the cases with radiographically confirmed proximal femur or pelvis fractures were included as hip fractures.

For each province involved in the study, the population estimate for mid-summer of 2003 was obtained from the Iran Statistical Yearbook (8). The age- and sex-specific annual incidence rates were calculated by multiplying each incidence rate in 2.7 to get the annual rates. The 95% confidence intervals (95% CI) for the age- and sex-specific rates were calculated assuming a Poisson distribution.

Results

A total of 1482 new cases of hip fracture (1079 males, 403 females) were recorded during the study period. The mean age (± SD) among patients with hip fracture was 35.9 ± 23.5 in men and 56.9 ± 26.1 in women. The median age was 26 years in males and 67 in females.

The crude annual incidence of hip fracture (per 100000 person-years) was 59.8 in men and 23.5 in women. The age- and sex-specific incidence rates and the distribution of patients according to the type of trauma leading to hip fracture are presented in Table 1. A peak of hip fracture incidence was observed in the third decade of life among males, but not in females, in the younger age groups that was induced by increased traffic accidents. The incidence rates increased exponentially after the age of 60 in both genders and nearly tripled after each decade (Fig. 1).

In comparison with hip fracture incidence rates of other countries (9-15), Iranian rates are considerably lower than other Asian, European, and American countries (Table 2). The only country with lower adjusted rate was China. The female-to-male ratio for Iranian fallers with hip fracture was 1.6, which was lower than most of Western countries.

Table 1: Annualized age- and sex-specific incidence rates of hip fractures per 100 000 person-year; Iranian Multicenter Study of Accidental Injuries, 2003

Age Group	Male				Female				F:M ratio
	Total No. (fall/traffic)*	Population	Rate	95% CI	Total No. (fall/traffic)*	Population	Rate	95% CI	
0-9	78 (33/45)	941621	22.4	20.5-24.2	41 (17/24)	857675	12.9	11.4-14.4	0.6
10-19	246 (35/211)	1351191	49.2	46.9-51.4	30 (15/15)	1287346	6.3	5.5-7.1	0.1
20-29	280 (37/243)	860377	87.9	84.1-91.7	20 (6/14)	836162	6.5	5.4-7.5	0.1
30-39	115 (29/86)	602904	51.5	48.0-55.0	22 (12/10)	584690	10.2	8.6-11.7	0.2
40-49	76 (30/46)	452868	45.3	41.5-49.1	19 (8/11)	438767	11.7	9.7-13.6	0.3
50-59	45 (30/15)	240765	50.5	45.0-55.9	30 (15/15)	260201	31.1	27.0-35.3	0.6

Table 1: Continued……..

60-69	57 (34/23)	241465	63.7	57.6-69.9	59 (52/7)	208653	76.3	69.1-83.6	1.2
70-79	103 (73/30)	145143	191.6	177.9-205.3	109 (103/6)	129559	227.2	211.4-242.9	1.2
≥80	79 (71/8)	38192	558.5	512.9-604.1	73 (72/1)	34432	572.4	523.8-621.0	1.0
Total	1079 (372/707)	4874526	59.8	58.4-61.1	403 (300/103)	4637485	23.5	22.6-24.3	0.4

* Presented numbers are absolute frequency of hip fracture (number of fractures resulted from a fall event and traffic accidents in the parentheses)

Table 2: Age-standardized annual incidence rates of hip fracture per 100 000 in males and females aged ≥50 years in different populations

Place and time of the study (reference)	Age-standardized rate		Female: Male ratio
	Male	Female	
China, 1990-1992 (9)	80.5	85.7	1.1
Iran, 2003 (Current study)	96.7	152.5	1.6
Brazil, 1996-2000 (10)	59.3	168.4	2.8
Malaysia, 1997-1998 (11)	87.4	212.5	2.4
Thailand, 1997-1998 (11)	112.6	261.6	2.3
Kuwait: Kuwaitis, 1992-1995 (12)	216.6	316.0	1.5
Kuwait: Non-Kuwaitis, 1992-1995 (12)	236.2	401.6	1.7
Singapore, 1997-1998 (11)	162.9	431.7	2.7
Hong Kong, 1997-1998 (11)	193.0	484.3	2.5
United States, 1989-1991 (13)	201.6	511.5	2.5
Sweden, 1991 (14)	302.7	709.5	2.3
Norway, 1996-1997 (15)	399.3	920.7	2.3

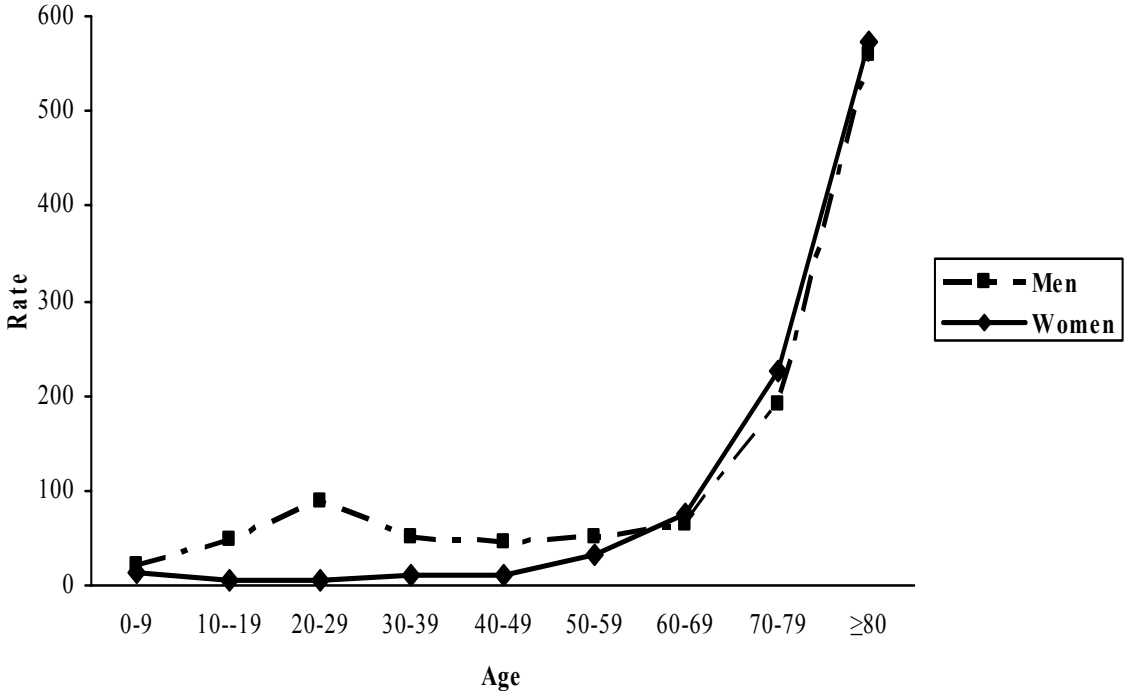

Fig. 1: Incidence rates of hip fracture in different age groups

Discussion

To our knowledge, this is the largest and the first population-based study in Iran reporting the incidence rates of hip fracture. All the injurious resulted from unintentional events were reported on a reference population of more than 9.5 million people. Until the age of 50, traffic accidents were the leading cause of hip fractures among Iranian residents. These events were significantly more common in men. However, after this age, fall events took precedence in causing hip fractures and resulted in 87.6% of fractures in men and women aged ≥70 years.

The reasons for the low incidence rate of hip fractures in Iran comparing to western countries remain uncertain and appear paradoxical since vitamin D status of Iranians is really poor (16), which might be expected to affect bone health adversely (17). In addition, the low incidence of hip fracture is unlikely to be related to bone mineral density (BMD), since recent studies have demonstrated that BMD is similar or lower among Iranians in comparison with Western populations, even after adjusting for body size (18).

Several case–control and cohort studies have identified factors which are associated with bone density and hip fractures, such as body weight (19, 20), physical activity (20, 21), smoking (19, 21), alcohol consumption (20, 21), dietary calcium and falls (21). Urbanization or industrialization, with its attendant changes in degree of physical activity, nutrition, health practices and lifestyle habits, appear to be associated with the rapidly rising fracture trends throughout the world (22), in addition to the contributions from improved accuracy of data collection.

We should stress that these low fracture rates reported in Iran should not be taken as indicating that osteoporosis is not a serious problem in this region. In fact, improvements in prenatal care and in public health systems have achieved significant increases in life expectancy among Iranian populations. Westernization, with changing lifestyles, may also result in an increase in fracture incidence. A recent multinational study conducted in four Asian countries has shown that the incidence of hip fracture is directly proportional to economic development (23). With increase in life span, rapid economic development and aging of the population, worldwide projections suggest that hip fracture will be a major health problem in Asia. Studies are needed to increase awareness of this disease and to monitor the epidemiology of fractures as longevity and the number of elderly population increase and quality of life improves (24). This combination of factors may, in fact, mean that the incidence of osteoporotic fractures will rise in the near future in Iran, a possibility that should be kept in mind by the local public health authorities.

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