

Review article

Osteoporosis in East Asia: Current issues in assessment and management

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Abstract

The greatest burden of hip fractures around the world is expected to occur in East Asia, especially China. However, there is a relative paucity of information on the epidemiology and burden of fractures in East Asia. Osteoporosis is greatly under-diagnosed and under-treated, even among the highest-risk subjects who have already suffered fractures. The accessibility to bone densitometry, the awareness of the disease by professionals and the public, and the use and reimbursement of drugs are some of the areas which need improvement especially. Cost-effective analysis on screening strategy and intervention thresholds based on local epidemiology data and economic status are available only in Japan. In addition, clinical risk factor models for the assessment of fracture probability may be ethnic specific. Further research is needed to develop a cost-effective risk assessment strategy to identify high-risk individuals for screening and treatment based on local data. Moreover, inadequate calcium and vitamin D intake is still an issue faced by this region.

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1. Introduction

As classified by the United Nations, East Asia contains Hong Kong, Japan, Macau, Mongolia, North Korea, the People's Republic of China, South Korea and Taiwan. In this region, osteoporosis is increasingly being recognised as a growing problem [1,2] because of the rapidly increasing size of the elderly population. In particular, China has the largest aged population in the world, as the population aged ≥ 60 years will reach 400 million (approximately 30% of the total population) by 2050 [3]. In Japan, the percentage of the population aged ≥ 65 years rose from 10.3% in 1985 to 20.1% in 2005 [4]; this percentage is expected to double by 2050 [4]. The corresponding percentage in Taiwan increased from 4.3%

in 1980 to 10.74% in 2010 [5]. As in the West, there is an exponential increase in the incidence of hip fractures after the age of 65 in Asian populations [6]. For example, the hip fracture incidence has more than doubled for each successive 5-year age group in Hong Kong [7].

In this review, we highlighted the differences and similarities in the assessment and treatment between the East and West. We focused mainly on hip and vertebral fractures because they account for the majority of fracture-related mortality and morbidity as well as health care expenditure. We identified data for this review by a systematic search of Medline with the MeSH terms “Osteoporosis” and “East Asia” for peer-reviewed clinical studies and other studies of clinical significance. This search was not restricted to reports written in English; articles written in a native language but that included an English abstract were included as well. The review included articles published between June 1996 and November 2015. Bibliographies of identified articles, guidelines and conference proceedings of professional societies

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were reviewed for additional references. Review articles and book chapters were cited to provide readers with additional details and references. In this discussion, we gave more weight to randomised controlled trials and meta-analyses than evidence of lower quality. Data presented here are from China, Hong Kong, Japan, South Korea and Taiwan. When selecting a study or studies over others to represent the epidemiology of a region or country, we chose national rather than regional data, if available. We used the most recent studies and also studies which examine greater number of subjects.

2. Epidemiology

While the burden of hip fractures is increasing markedly throughout the world, the greatest impact is expected to be felt in Asia; specifically, the percentage of hip fractures in Asia is expected to rise from 26% in 1990 to 37% in 2025 [8]. By the year 2050, half of all hip fractures in the world are projected to occur in Asia, particularly in China [9].

In a recent systematic review of hip fractures incidence worldwide, the age-standardised annual incidence of hip fractures was reported to be higher in Hong Kong, Japan, South Korea, and Taiwan than in the USA and some European countries [10]. This is in contrast to a study 2 decades ago which showed the hip fractures incidence to be higher in USA compared to Hong Kong [11]. The recent decline and increase in hip fracture incidence in USA and East Asia, respectively, may partly account for this [2]. For women, Taiwan was in the high-incidence category (incidence >300/100,000), ranking number 9 among all 61 countries/regions. Hong Kong, Japan and South Korea were in the medium-incidence category (200–300/100,000), ranking 23, 32 and 34, respectively. China was in the low-incidence category (<200/100,000). For men, Japan, Korea and Taiwan were among the high-incidence countries (>150/100,000), while China and Hong Kong were in the moderate-incidence category (100–150/100,000). The data used to compute hip fracture incidence in China, Hong Kong, Japan, South Korea and Taiwan in this study were from publications in the years 2011, 2009, 2006, 2008 and 2009, respectively. Updated incidence rates of hip fractures were reported from Japan and South Korea in 2009 [12] and 2011 [13], respectively. These specific hip fractures incidence rates are summarised in Table 1 [7,12–15].

Following the trend in to the West [2], the age-specific incidence of hip fractures seems to have been stabilising in the past decade, especially in the age group <80 years in Hong Kong [16], Japan [12] and South Korea [13]. The increase in BMD, healthier lifestyles (more exercise and higher vitamin D levels) and longer reproductive periods may be responsible for this [17]. Nonetheless, the overall number of hip fractures is still increasing in China [15], Japan [12,18] and South Korea [13]. It is attributable largely to the ageing populations, but may partly due also to improved reporting [19]. In Japan, the estimated number of hip fractures for both sexes per year for all age groups increased 2.78-fold from 53,200 in 1987 to 148,100 in 2007 [12]. In South Korea, from 2005 to 2008, the total number of hip fractures for subjects aged ≥ 50 years

Table 1
Annual age specific hip fracture incidence in East Asia.

Place	Sampling method	Years of study	Incidence per 10,000	Ref	
China	Beijing hospital discharge record	2002–2006	12.9	$\geq 50M$	[15]
			22.9	$\geq 50F$	
HK	Region-wide public hospitals database	2000–2004	21.22	70–74M	[7]
			36.44	70–74F	
			45	75–79M	
			83.08	75–79F	
			87.14	80–84M	
			150.38	80–84F	
Japan	Nation-wide estimate	2007	165.44	$\geq 85M$	[12]
			283.76	$\geq 85F$	
			18.12	70–79M	
			39.71	70–79F	
			61.03	80–89M	
			157.14	80–89F	
South Korea	Nation-wide	2005–2008	146.62	90 + M	[13]
			313.58	90 + F	
			2.38	50–59M	
			1.81	50–59F	
Taiwan	Nation-wide	2002	60.58	80–100M	[14]
			105.25	80–100F	
			36.23	70–74M	
			51.13	70–74F	
			59.2	75–79M	
			99.1	75–79F	
			93.83	80–84M	
			178.37	80–84F	
			153.03	$\geq 85M$	
			274.55	$\geq 85F$	

nation-wide increased by 21% (from 16,866 in 2005 to 20,432 in 2008) [13].

Comparison of the prevalence of vertebral fractures between populations is difficult due to the lack of a gold standard for the definition of vertebral fracture and also because of the different age groups included in these studies (Table 2). Similar to the situation in the West [20], about three-fourths of vertebral fractures in East Asia [21–24] were not diagnosed clinically. The updated age-specific prevalence of vertebral fractures among female populations in various East Asia countries and White Caucasian women using different methods is summarised in Table 2 [25–34]. The age-specific data on men is sparser [28,35,36]. The prevalence of hip fractures in men was considered to be higher in Japan [37], followed by Hong Kong and Taiwan [28]. Prior vertebral fracture was an important risk factor for future vertebral fractures [28,37,38] and hip fractures [38,39].

3. Impact

There is significant underestimation of the burden of osteoporosis in East Asia. While hip fractures is a useful surrogate to quantify the socioeconomic burden of osteoporosis, the incidence of hip fractures in East Asia may not be as well documented as in some Western industrialised countries where well-maintained large population databases are available. Large population databases are available in South Korea (Korean National Health Insurance Program) and Taiwan

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