

ARTICLES

The Epidemiology of Osteoporosis in Asia

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Abstract

The incidence of hip fracture has risen 2- to 3-fold in most Asian countries. In Hong Kong, the rate has shown some signs of stabilization. Given the large elderly population in Asia, osteoporosis will be a major health problem, and cost-effective means of identifying and treating patients at high risk of hip fracture are necessary. The new WHO FRAX[®] fracture risk assessment tool is invaluable in such endeavors. *IBMS BoneKEy*. 2009 May;6(5):190-193.

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The belief that osteoporosis is prevalent in the West and rare in the East is a myth. In the past, there was pronounced geographical variation in the incidence of hip fracture, with rates being highest in Caucasians living in Northern Europe, followed by rates in Caucasians living in North America. Rates are intermediate in Asians and lowest in Black populations (Table 1) (1).

A recent multi-national study conducted in four Asian countries revealed that the incidence of hip fracture has risen as economic development has unfolded. The adjusted rates in Hong Kong and Singapore were almost identical to those seen in American Caucasians (at 19 per 10,000), while the rates in Thailand and Malaysia were two-thirds and one-half, respectively, of the Hong Kong rate (2).

There is consistent evidence that epidemics of hip fracture occur with urbanization throughout Asia. This phenomenon was first observed in Hong Kong, where the incidence of hip fracture had increased by 300% from the 1960s to the 1990s (3). Changes in hip fracture incidence in Hong Kong from 1966 to 2006 are shown in Table 2.

In Singapore, the incidence of hip fracture in 1998 was 5 times the incidence observed in the 1960s. From 1991 to 1998, the

incidence of hip fracture increased by 0.7% annually in men and by 1.2% annually in women (4). In the past, hip fracture rates in Japan were believed to be among the lowest in the world. However, from 1986 to 1998, the incidence of hip fracture in Japan increased by 1.6-fold in men and 1.5-fold in women (5). Moreover, there was no sign that these rates stabilized after 1998 (6). The incidence of hip fracture in mainland China was one of the lowest incidences in the world, at 10 per 10,000 in both men and women (7). However, the incidence increased by 34% in women and 33% in men from 1988 to 1992 (7).

The above evidence suggests that hip fracture will be a major health challenge in Asia in the coming decades.

In the West, the incidence of hip fracture is showing some signs of stabilization. Melton *et al.* reported a downturn in hip fracture incidence in Rochester, Minnesota, between 1984 and 1987 (8). In Hong Kong, we have also observed that the incidence of hip fracture had ceased to increase from 2001 to 2006 (Table 2, unpublished data). The reasons for the secular decline in hip fracture incidence are unknown. The decline could be due to ecological changes, such as an increase in body mass index, or because more patients with osteoporosis are being diagnosed and treated.

Table 1. Age-adjusted rate* of hip fracture per 100,000 population for females and males, by ethnic group and year of study

<i>Ethnic group</i>	<i>Site</i>	<i>Year of study</i>	<i>Female</i>	<i>Male</i>	<i>Female to male ratio</i>
Blacks	Maryland, USA	1979-1988	345	191	1.8
	California, USA	1983-1984	241	153	1.6
	Johannesburg, South Africa	1950-1964	26	29	1.3
Hispanics	California, USA	1983-1984	219	97	2.3
	Texas, USA	1980	305	128	2.4
Asians	Hong Kong	1985	389	196	2.0
	Hong Kong	1965-1967	179	113	1.6
	Tottori, Japan	1986-1987	227	79	2.9
	Okinawa, Japan	1984-1985	325	86	3.8
	California, USA	1983-1984	383	116	3.3
	Hawaii, USA	1979-1981	224	66	3.4
	New Zealand	1973-1976	212	121	1.8
	Singapore	1955-1962	83	111	0.7
Caucasians	Sweden	1972-1981	730	581	1.3
	Kuopio, Finland	1968	280	107	2.6
	Malmö, Sweden	1950-60	468	153	3.1
	Norway	1983-1984	737	298	2.5
	Edinburgh, Scotland	1978-1979	529	174	3.0
	Oxford, England	1983	603	114	5.3
	California, USA	1983-1984	617	215	2.9
	Hawaii, USA	1979-1981	645	205	3.1
	New Zealand	1973-1976	466	139	3.4

* Rates were age- and gender-adjusted to the 1990 U.S. non-Hispanic Caucasian population. Reproduced with permission from Villa ML, Nelson L. Race, ethnicity and osteoporosis. In: Marcus R, Feldman D, Kelsey J, eds. *Osteoporosis*. San Diego, CA: Academic Press; 1996:435-447.

Table 2. Incidence of hip fracture in Hong Kong (rate per 100,000)

Year	Women	Men
1966	70	48
1985	273	113
2001	394	159
2006	379	169

E. Lau, unpublished data

Studies in various countries have shown that the costs of osteoporosis are substantial. Hip fracture is a major cause of hospital admission in the elderly. The acute care cost associated with hip fracture is tremendous in all developed countries. In the U.S., the direct cost of hip fracture was approximately \$13.8 billion in 1995 (9). In the UK, the direct cost of hip fractures was £942 million per year in 1998 (10). In Hong Kong, the acute hospital care cost of hip fracture in 2006 amounted to 2% of the total hospital budget (unpublished data).

Given the high cost associated with osteoporosis and hip fracture, early detection and treatment of high risk patients are critical (11). The WHO FRAX[®] fracture risk assessment tool utilizes bone mineral density measurement at the hip, as well as known risk factors to assess the risk of fracture (12;13). Currently, this tool allows the assessment of hip fracture risk in Chinese, Japanese and U.S. Asian populations. The calculations for Chinese populations are based on epidemiological data for mainland China (7). For Chinese individuals living in urbanized cities such as Hong Kong, it is more appropriate to use the models derived from U.S. Asian populations. It would be very useful for Asian physicians to use FRAX[®] to identify high-risk patients for treatment. Researchers in Asia should also collect fracture epidemiology data, in order to facilitate the development of FRAX[®] in their countries.

Conflict of Interest: None reported.

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