

## ORIGINAL ARTICLE

---

# The incidence of hip fracture in Malaysians above 50 years of age: variation in different ethnic groups

Joon-Kiong LEE and Amir S. M. KHIR

*Malaysian Osteoporosis Society, Petaling Jaya Malaysia*

### Abstract

**Aims:** Hip fracture is frequently studied to reflect osteoporosis related fractures. The aim of this study was to look at ethnic differences in the incidence of hip fractures between the three races in Malaysia.

**Methods:** This was a retrospective study performed for the years 1996 and 1997. Data from hospitals treating hip fractures in elderly patients were collected throughout the whole country.

**Result:** The overall incidence of hip fractures was 90 per 100 000 individuals. Sixty-three percent of patients presenting with hip fractures were Chinese. This was followed by Malays at 20% and Indians, 13%. Race-specific incidence data showed that the fracture rates are highest among the Chinese (160 per 100 000) followed by Indians (150 per 100 000) and Malays (30 per 100 000). Females were twice as commonly affected compared to males. Race and sex-specific incidence data showed that the incidence was highest among Chinese females (220 per 100 000), followed by Indian females (200 per 100 000). The age-specific incidence was 500 per 100 000 for patients above 75 years, compared to 10 per 100 000 in those between 50 and 54 years.

**Conclusion:** Hip fractures are common in Malaysia. There are differences in hip fracture incidence depending upon ethnicity.

**Key words:** Asian, ethnicity, hip fracture, osteoporosis.

### INTRODUCTION

Hip fractures in elderly patients carry a high morbidity and mortality. This is due to the fact that the majority of these fractures require surgical intervention. However, as many of our elderly individuals have concomitant medical problems, and the risk of surgery and anaesthesia is increased. It is estimated that the mortality rate of individuals sustaining hip fractures ranges from 20% to 25% in the first year after fracture. Although some deaths are attributable to acute complications of the fracture or to its surgical management,<sup>1</sup> the majority appear to be due to serious coexisting illnesses.<sup>2</sup> Only 20% of these patients are able to walk independently

following their fracture. The remainder will require some form of aid in mobilization. Up to a third of hip fracture patients may become totally dependent.<sup>3</sup> The risk of institutionalization is greatest among these.<sup>4</sup>

Hip fracture is frequently studied to reflect the prevalence of osteoporosis-related fracture. This is because hip fracture leads to hospitalization/operative procedures and therefore is well-documented in hospital records. Moreover hip fractures carry the highest morbidity and mortality rate,<sup>3</sup> and hence is of economic importance.

Malaysia is a multiracial country with three main ethnic groups, comprising Malays, Chinese and Indians. It is well known that certain illnesses affect certain ethnic group more than the others. At present, there are no data available in Malaysia on the incidence of hip fractures among elderly individuals. In addition, there are no data on hip fracture incidence in the different races. A factor that reflects cultural, religious, dietary,

*Correspondence:* Dr Joon Kiong Lee, 923A, Jalan 17/38, 46400 Petaling Jaya, Selangor, Malaysia.  
Email: osteoporosis\_jklee@yahoo.com

geographical, and other differences among races, known as ethnicity, is important in the study of disease incidence.<sup>5</sup> Ethnic-specific data would be more valuable than a broad, racial summarization because bone mineral density (BMD) and fracture rate have been shown to vary among Asian ethnic groups.<sup>6</sup>

This study was carried out with the following aims:

- to obtain the incidence of hip fractures among individuals above 50 years of age, and
- to study in terms of ethnicity and gender, the distribution of hip fracture in Malaysia

## MATERIALS AND METHODS

This is a retrospective study on the incidence of hip fractures, among individuals above 50 years of age. It was performed during the years 1996 and 1997. Data from hospitals treating hip fractures in elderly patients were collected throughout the whole country during 1998. Data was collected from hospitals treating hip fractures, both government and private hospitals. The list of hospitals visited appears in Appendix 1.

On each visit to the hospitals, the admission books, discharge books and operating theatre registers were examined. This allowed us to crosscheck the cases recorded to minimize errors in under-recording and duplication of the cases. The data collected include hospital registration numbers, identification numbers, age, sex, race, type of fracture, type of surgery, date of admission and date of discharge. Fractures due to trauma were excluded. In view of the confidentiality policy of many hospitals, we were not allowed to look into patients' case records or to contact the patients.

Data on the general population was collected from the National Statistic Department for the year 1986, 1987, 1996 and 1997. The data allowed us to study our population according to age group, race and sex. This provided us with some demographic data on the Malaysian population.

The incidence of hip fracture for each race and sex was calculated as follows: (no. of cases of fracture for a particular race and sex over 50 years of age) divided by (total no of population of the same race and sex over 50 years of age).

## RESULTS

In 1996, the total population of Malaysia was 19 780 600. Malays made up 61.8% of the total population, Chinese 27.2%, Indians 7.7% and others accounted for 3.3%. Similarly, in 1997, the total population of

Malaysia was 20 196 600, of which the Malays were the majority at 62%, followed by Chinese at 27%, Indians at 7.6% and others at 3.4%.

The population above 50 years by race is shown in Table 1 for 1996 and 1997. The proportion of the population above 50 years of age was 12.3% in 1996 and 12.5% in 1997. Malays accounted for 53.6%, Chinese 35.7%, Indian 7.3% and others 3.4% in 1996. In 1997, the distribution was 53.5%, 35.9%, 7.3% and 3.4%, respectively. Therefore, there were 2.5 million individuals at risk of developing osteoporosis and osteoporosis-related fractures in Malaysia in the years 1996 and 1997.

The mean age of individuals with hip fracture was 74.5 years for both 1996 and 1997, with females slightly older at 75.5 years and 72.3 years for males. The overall incidence of hip fracture among individuals above 50 years of age was 0.9 per 1000 for Malaysia for years 1996 and 1997. The overall age-adjusted hip fracture rate was 218 per 100 000 for females and 88 per 100 000 for men. Tables 2 and 3 show the incidence by age group in 1996 and 1997, respectively. Analysis of the incidence of hip fracture in these individuals by age group showed marked increase in the incidence in older age groups both in 1996 and 1997. In both years, the incidence of hip fracture in females was approximately twice that of the male population.

The ethnic-specific hip fracture incidence rate is shown in Tables 4 and 5. In 1996, the ethnic-specific incidence rate was 166 per 100 000 for Indians, 155 per

**Table 1** The population above 50 years of age by race in Malaysia for years 1996 and 1997

Total population (> 50 years) × 1000	1996		1997	
	2442.3	100%	2526.6	100%
Malays	1309.7	53.6%	1352.6	53.5%
Chinese	872.7	35.7%	906	35.8%
Indians	177.5	7.3%	183.3	7.3%
Others	82.5	3.4%	84.9	3.4%

**Table 2** Incidence of hip fracture by age group (per 100 000) in 1996

Age group (years)	Male	Female	Overall
50–54	10	10	10
55–59	20	20	20
60–64	40	50	50
65–69	50	100	80
70–74	90	240	180
≥ 75	300	620	480

**Table 3** Incidence of hip fracture by age group (per 100 000) in 1997

Age group (years)	Male	Female	Overall
50-54	10	10	10
55-59	20	30	20
60-64	40	50	40
65-69	60	100	80
70-74	100	230	170
=> 75	320	640	510

**Table 4** Race-specific hip fracture incidence rate in 1996

RACE	Total cases 1996 (A)	Total population × 1000 (B)	A/B	Incidence rate
Malays	424	1309.7	424/1309.7	0.32
Chinese	1353	872.7	1353/872.7	1.55
Indians	294	177.5	294/177.5	1.66
Others	95	82.5	95/82.5	1.15

Mantel-Haenszel summary Chi Square = 5.97, P = 0.01 between Malay, Chinese and Indians

**Table 5** Race-specific hip fracture incidence rate in 1997

RACE	Total cases 1997 (A)	Total population × 1000 (B)	A/B	Incidence rate
Malays	478	1352.6	478/1352.6	0.35
Chinese	1442	906	1442/906	1.59
Indians	280	183.3	280/183.3	1.53
Others	94	84.9	94/84.9	1.11

Mantel-Haenszel summary Chi Square = 5.13, P = 0.02 between Malay, Chinese and Indians

100 000 for Chinese and 32 per 100 000 for Malays (Table 4). In 1997, the ethnic-specific incidence rate for Chinese was 159 per 100 000; 153 per 100 000 for Indians and 35 per 100 000 for Malays (Table 5). In both years, Malays had a significantly lower fracture rate compared to Chinese and Indians.

The overall sex-specific hip fracture incidence rate for 1996 was 65 per 100 000 and 138 per 100 000 for males and females, respectively. In 1997, the corresponding rates were 65 per 100 000 for males and 141 per 100 000 for females.

Ethnicity and sex hip fracture incidence rates are shown in Tables 6 and 7 for 1996 and 1997, respectively.

**Table 6** Race and sex-specific hip fracture incidence rate in 1996

Race	Male	Female
<b>Malays*</b>		
Total no. of cases (A)	156	268
Total population × 1000 (B)	634.8	674.9
A/B	156/634.8	268/674.9
<b>Incidence rate/1000</b>	<b>0.25</b>	<b>0.40</b>
<b>Chinese*</b>		
Total no. of cases (A)	380	973
Total population × 1000 (B)	423.4	449.3
A/B	380/423.4	973/449.3
<b>Incidence rate/1000</b>	<b>0.90</b>	<b>2.17</b>
<b>Indians**</b>		
Total no. of cases (A)	115	179
Total Population × 1000 (B)	87.4	90.1
A/B	115/87.4	179/90.1
<b>Incidence rate</b>	<b>1.32</b>	<b>1.99</b>
<b>others***</b>		
Total no. of cases (A)	32	63
Total population × 1000 (B)	41.7	40.8
A/B	32/41.7	63/40.8
<b>Incidence rate</b>	<b>0.77</b>	<b>1.54</b>

\* $\chi^2$  P < 0.0001 between males and females.

\*\* $\chi^2$  P = 0.0005 between males and females.

\*\*\* $\chi^2$  P = 0.001 between males and females.

Mantel-Haenszel summary  $\chi^2$  = 3.71, P = 0.053 between Malay, Chinese and Indian females

Females in all ethnic groups had significantly more hip fractures than males. Malay females had a lower incidence rate of hip fractures in both years compared to Chinese and Indian females, which showed a trend towards significance.

## DISCUSSION

Hip fracture is a major public health problem worldwide. It has been shown that there are variations in the rate of hip fracture in the different regions of the world.<sup>7-9</sup> The incidence of hip fracture has been studied in various Asian population.<sup>10-14</sup> The ethnic group that has been studied most in Asia are the Chinese. However, there were very few studies performed comparing different ethnic groups residing in a single country in Asia. We know that ethnicity plays an important role in disease prevalence, even within races.<sup>6</sup> Ethnic-specific data would be more valuable than a broad, racial summarization because fracture rates vary among Asian ethnic groups.<sup>6</sup>

**Table 7** Race and sex-specific hip fracture incidence rate 1997

Race	Male	Female
<b>Malays*</b>		
Total no. of cases (A)	178	300
Total population × 1000 (B)	654.8	697.8
A/B	178/654.8	300/697.8
<b>Incidence rate/1000</b>	<b>0.27</b>	<b>0.43</b>
<b>Chinese*</b>		
Total no. of cases (A)	415	1027
Total population × 1000 (B)	440	466
A/B	415/440	1027/466
<b>Incidence rate/1000</b>	<b>0.94</b>	<b>2.20</b>
<b>Indians*</b>		
Total no. of cases (A)	88	192
Total population × 1000 (B)	89.4	93.9
A/B	88/89.4	192/93.9
<b>Incidence rate</b>	<b>0.98</b>	<b>2.04</b>
<b>others*</b>		
Total no. of cases (A)	26	68
Total population × 1000 (B)	42.9	42
A/B	26/42.9	68/42
<b>Incidence rate</b>	<b>0.61</b>	<b>1.62</b>

\* $\chi^2$   $P < 0.0001$  between males and females.

Mantel-Haenszel summary  $\chi^2 = 3.76$ ,  $P = 0.052$  between Malay, Chinese and Indian females.

We have previously reported the age and sex hip fracture rates from Malaysia.<sup>15</sup> This paper extends that work by detailing the hip fracture rates within each of the major ethnic groups in Malaysia, which has not been previously studied. Even within the same country, the different ethnic groups have diversity in terms of genes and genetics, culture, lifestyle and food intake. Studies conducted in racially mixed populations using the same methodology for ascertaining hip fractures in all groups are particularly valuable for making inferences about racial differences in hip fractures incidence.<sup>7-19</sup>

The Malay population was the majority ethnic group in Malaysia for the years 1996 and 1997, both for the general population and those above 50 years of age. Chinese was the second largest ethnic group, followed by Indians. There was an increase of about 34% in the population above 50 years between 1986 and 1997 in Malaysia (data not shown) with no difference between the sexes. Therefore, there were 2.4 million people in 1996 and 2.5 million people in 1997 at risk of developing osteoporotic fractures.

The incidence of hip fracture in individuals above 50 years was 90 per 100 000 for both 1996 and 1997. The results of our study were similar over the 2 years,

which serves to validate the accuracy of our findings. The hip fracture rate in Malaysia is similar to that found in Singapore of 95 per 100 000<sup>12</sup> and in Beijing of 87 per 100 000 in females.<sup>13</sup> However, it is much lower than hip fracture rates in Hong Kong which was 304 per 100 000 in 1990.<sup>11</sup> A higher rate of hip fractures was also found in the Taiwan Chinese population,<sup>14</sup> consistent with the suggestion of increasing rates with increasing urbanization.

Of interest is our finding that there was no difference in the hip fracture incidence rates between 1996 and 1997. This is in keeping with a Hong Kong study that showed no increase in age-specific incidence rates of hip fractures between 1985 and 1995.<sup>20</sup> We are in the process of collecting data for the year 2007, to see whether there has been an increase over the past 10 years.

The ethnic-specific hip fracture incidence rate showed that Chinese and Indians had the highest incidence rate both in 1996 and 1997, which was significant. This has not been previously reported. In 1996 and 1997, the ethnic-specific incidence rate was 166 per 100,000 and 153 per 100,000 for Indians, respectively, 155 and 159 per 100,000 for Chinese and 32 and 35 per 100 000 for Malays. There have only been two other studies on hip fracture in the Indian population.<sup>15-21</sup> One was from Singapore, showing a lower rate of hip fractures compared to Singaporean Chinese.<sup>15</sup> The other studied the population residing in the UK which showed a rate of hip fractures similar to the UK Caucasian population.<sup>21</sup> Further studies are required to clarify this issue.

Sex-specific fracture incidence rates revealed that it was as common in females compared to males both in 1996 and 1997. The incidence rate was about 140 per 100 000 for females and 65 per 100 000 for males. This is in keeping with other Asian studies.<sup>13,14,19,20</sup>

It is interesting to speculate why Malays have a lower rate of hip fractures compared to Chinese and Indians. Possible explanation of our findings may be due to Malays having a higher BMD compared to Chinese and Indians, or possibly because there are more Malays living in the rural areas compared to more Chinese and Indians in the urban towns. We are in the midst of establishing a normal range database for our population which would then give us further data on race-specific BMD.

In conclusion, we have shown that the incidence of hip fractures in individuals above 50 is 90 per 100 000 people in 1996 and 1997. There are ethnic variations in the fracture rates which is important when trying to target individuals and communities for primary and secondary prevention of osteoporosis and related fractures.

## ACKNOWLEDGMENTS

We would like to thank all hospitals (both private and government hospitals) throughout the country who participated in this study and allowed us to collect data from them. We would also like to thank all orthopaedic surgeon colleagues who gave us full support in data collection. We would like to express our appreciation to Merck, Sharp & Dohme (I.A.) Corp. Malaysia who funded this study.

## REFERENCES

- 1 Clayer MT, Bauze RJ (1989) Morbidity and mortality following fractures of the femoral neck and trochanteric region: analysis of risk factors. *J Trauma* 29, 1673–8.
- 2 Poor G, Jacobsen SJ, Melton LJ III (1994) Mortality following hip fracture. *Facts Res Gerontol* 7, 91–109.
- 3 Jensen JS, Bagger J (1982) Long term social prognosis after hip fractures. *Acta Orthop Scand* 53, 97–101.
- 4 Bonar SK, Tinetti ME, et al. (1990) Factors associated with short- versus long-term skilled nursing facility placement among community-living hip fracture patients. *J Am Geriatr Soc* 38, 1139–44.
- 5 Villa ML (1994) Cultural determinants of skeletal health: the need to consider both race and ethnicity in bone research. *J Bone Miner Res* 9, 1329–32.
- 6 Villa ML, Nelson L (1996) Race, ethnicity, and osteoporosis. *Osteoporosis* 18, 435–47. Academic Press.
- 7 Bacon WE, Maggi S, Looker A, et al. (1996) International comparison of hip fracture rates in 1988–89. *Osteoporos Int* 6, 69–75.
- 8 Schwatz AV, Kesley JL, Maggi S, et al. (1999) International variation in the incidence of hip fractures: cross-national project on osteoporosis for the World Health Organization Program for Research on Aging. *Osteoporos Int* 9, 242–53.
- 9 Baron JA, Barrett J, et al. (1994) Racial differences in fracture risk. *Epidemiology* 5, 42–7.
- 10 Silverman SL, Madison RE (1988) Decreased incidence of hip fracture in Hispanics, Asians, and blacks: California Hospital Discharge Data. *Am J Public Health* 78, 1482–3.
- 11 Lau EMC, Cooper C, et al. (1990) Hip fracture in Hong Kong and Britain. *Int J Epidemiol* 19, 1119–21.
- 12 Wong PCN (1966) Fracture epidemiology in a mixed Southeastern Asian community (Singapore). *Clin Orthop* 45, 55–61.
- 13 Xu L, Lu A, Zhao X, Chen X, Cummings SR (1996) Very low rates of hip fracture in Beijing, People's Republic of China the Beijing Osteoporosis Project. *Am J Epidemiol* 144, 901–7.
- 14 Chie WC, Yang RS, Liu JP, Tsai KS (2004) High incidence rate of hip fracture in Taiwan: estimated from a nationwide health insurance database. *Osteoporos Int* 15, 998–1002. Epub 2004 May 20.
- 15 Lau EMC, Lee JK, Suriwongpaisal P, et al. (2001) The incidence of hip fracture in four Asian countries: The Asian Osteoporosis Study (AOS). *Osteoporos Int* 12, 239–43.
- 16 Bauer RL, (1988) Ethnic differences in hip fracture: a reduced incidence in Mexican Americans. *Am J Epidemiol* 127, 145–9.
- 17 Stott S, Gray DH, Stevenson W (1980) The incidence of femoral neck fractures in New Zealand. *NZ Med J* 91, 6–9.
- 18 Fisher ES, Baron JA, et al. (1991) Hip fracture incidence and mortality in New England. *Epidemiology* 2, 116–22.
- 19 Hinton RY, Smith GS (1993) The association of age, race and sex with the location of proximal femoral fractures in the elderly. *J Bone J Surg Am* 75, 752–9.
- 20 Lau EM, Cooper C, Fung H, Lam D, Tsang KK (1999) Hip fracture in Hong Kong over the last decade—a comparison with the UK. *J Public Health Med* 21, 249–50.
- 21 Parker M, Anand JK, Myles JW, Lodwick R (1992) Proximal femoral fractures: prevalence in different racial groups. *Eur J Epidemiol* 8, 730–2.

**Appendix 1** 1996 and 1997 hip fracture study on the elderly in the Malaysian government hospital list**Central**

Hospital Besar Kuala Lumpur  
 HUKM  
 UMMC  
 Hospital Selayang  
 Hospital Tengku Ampuan Rahimah, Klang

**East coast**

Hospital Besar Kota Bahru  
 Hospital Besar Kuala Terengganu  
 Hospital Tengku Ampuan Afzan, Kuantan

**Northern**

Hospital Besar Kangar  
 Hospital Besar Alor Setar  
 Hospital Besar P.Pinang  
 Hospital Besar Ipoh

**Southern**

Hospital Besar Seremban  
 Hospital Besar Melaka  
 Hospital Sultanah Aminah, Johor  
*Hospital Batu Pahat*  
*Hospital Muar*

**East Malaysia**

Hospital Besar Kuching  
 Hospital Mount Elizabeth

**Appendix 2** 1996 and 1997 hip fracture study in elderly in the Malaysian-private hospital list**Central**

Pusat Pakar Tawakal SDN BHD  
 Ampang Puteri Specialist Hospital  
 Pantai Medical Centre  
 Sentosa Medical Centre SDN BHD  
 Cheras Medical Centre SDN BHD  
 Gleneagles Hospital (Kuala Lumpur) SDN BHD  
 Arunamari Specialist Medical Centre SDN BHD  
 Assunta Hospital  
 Pantai Klang Specialist Medical Centre  
 Subang Jaya Medical Centre  
 Selangor Medical Centre SDN BHD  
 Damansara Specialist Hospital  
 Sri Kota Medical Centre  
 Tung Shin Hospital

**Southern**

Pantai Ayer Keroh Hospital  
 The Southern Hospital SDN BHD  
 The Southern Hospital Batu Pahat SDN BHD  
 Johor Specialist Hospital  
 Puteri Specialist Hospital

**Northern**

Putra Medical Centre  
 Kedah Medical Centre  
 Ipoh Specialist Centre  
 Fatimah Hospital  
 Pantai Puteri Hospital  
 Penang Adventist Hospital  
 Gleneagles Medical Centre  
 Loh Guan Lye Specialists Centre  
 Lam Wah Ee Hospital  
 Island Hospital SDN BHD (323705 A)  
 Mount Miriam Hospital

**East Malaysia**

Hospital Sarawak Medical Centre SDN BHD  
 Miri City Medical Center  
 Truepeace SDN BHD  
 Sabah Medical Centre BHD  
 Damai Specialist SDN BHD  
 Rafflesia Medical Centre SDN BHD  
 Kuching Specialist Hospital