

# Pre-Injury Demographic Patterns of Patients Sustaining Hip Fractures in Malaysia

**I Isnoni**, MS Orth, **Mohamad Adam B\***, Bsc Statistics, **M Murallitharam\*\*\*\*\***, MBBS, **A Tajuddin**, MS Orth, **SP Jaya Purany\*\*\*\*\***, MS Pub Health, **Manmohan S\*\*\*\*\***, MS Orth, **Phang HF\*\*\***, MBBS, **Pan CH\*\*\***, MS Orth, **Kamil MK\*\*\*\***, MS Orth, **M Anwar Hau\*\***, MMed

Department of Orthopaedic Surgery, Hospital Sultanah Nur Zahirah (HSNZ), Kuala Terengganu, Malaysia  
\*Biostatistics unit, Clinical Research Center, Kuala Lumpur, Malaysia

\*\*Department of Orthopaedic Surgery Hospital Raja Perempuan Zainab II (HPRZII), Kota Bharu, Malaysia

\*\*\*Department of Orthopaedic Surgery, Hospital Sultanah Bahiyah (HSB), Alor Setar, Malaysia

\*\*\*\*Department of Orthopaedic Surgery, Hospital Tengku Ampuan Rahimah (HTAR), Klang, Malaysia

\*\*\*\*\*Patient Registry Unit, Clinical Research Center, Kuala Lumpur, Malaysia

\*\*\*\*\*Department of Orthopaedic Surgery, Hospital Ampang, Selangor, Malaysia

## ABSTRACT

**Introduction:** Hip fractures entail a growing economic burden on the health care system. Study is warranted to further our understanding of its patterns and to create increased awareness in health care providers and the public.

**Materials and methods:** Data was extracted from the ongoing National Orthopaedic Registry of Malaysia (NORM), for the period June 2008 till December 2009. Patients aged 50 years and above without previous pathological fracture hip fractures were included in the study. **Results:** Most hip fracture patients were 70 years and above (69.5%) with a mean (SD) age of 73.8 (10.3) years. Females represented the majority of the patients in this study (68.4%). Low energy trauma (i.e. trivial fall) was to the main mechanism of hip fractures in this study (81.3%).

**Conclusions:** Aging adults should be made aware of timely preventive strategies (including osteoporosis prevention) fall prevention measures, and encouraged to maintain physically active lifestyles.

## Key Words:

*Hip fracture, pre-fracture status*

## INTRODUCTION

Hip fractures are relatively common injuries in aging adults, especially in postmenopausal women and often lead to serious consequences such as disability, severe persistent pain and impaired future mobility. Much attention has consequently been placed on comprehensive efforts to reduce the incidence and severity of this injury.

Incidence of hip fractures is on the rise as the general life expectancy of the population has increased significantly over the past few decades<sup>1</sup>. There are more than 280,000 hip fractures in the United States every year and incidence is expected to double by 2050. Most hip fractures in the elderly

individuals are a result of low energy trauma whereas younger patients typically sustain these fractures from high-energy trauma; hip fractures are generally associated with substantial morbidity and mortality.

A high percentage of hip fractures occur in patients with osteoporosis, resulting in continued high mortality and morbidity rates despite the increasing availability of effective preventive agents. The costs of care for this debilitating injury are immense because they are not limited solely to the costs of functional disability and increased death rates but are also linked to several other factors including: a loss of the ability of the injured adult to function independently; related costs of nursing care; rehabilitation care; and the need for one or more surgeries<sup>2</sup>. Thus, the implementation of widespread cost-effective preventive strategies against hip fractures as stressed by Wilson and Wallace<sup>3</sup> and Haleem *et al.*<sup>4</sup> are strongly indicated. The goal of treating hip fractures is to return patients to pre-fracture levels of function without long-term disability and to avoid medical complications.

The aims of this study were to look into incidence and patterns of hip fractures in this country to help clinicians identify target groups for implementation of preventive measures.

## MATERIALS AND METHODS

Patients for this cross sectional study were drawn from the Hip Fracture Disease Database, an ongoing patient registry that is part of the National Orthopaedic Registry of Malaysia (NORM). Participating centres in the registry are Ministry of Health hospitals (16 hospitals from West Malaysia and 2 hospitals from East Malaysia) that provide orthopaedic specialist services; dedicated personnel in these centres enter information online into an electronic Case Report Form (CRF) which was used as the assessment tool. The CRF

includes demographical data and other information such as fracture details, treatment modalities, length of hospitalisation, and patient disposition.

All patients, aged 50 years and above, admitted for in-hospital treatment at one of the 18 participating centres between June 2008 and December 2009 with a diagnosis of hip fracture were included in this study. The criteria for age were agreed upon due to the documented exponential increase in the incidence of hip fractures observed in this age group<sup>3,5,6</sup>. Research has shown that, after the age of 50y, increasing breakdown rate of bones by osteoclasts as well as severe disruption of bone micro architecture (osteoporosis) leads to age-related bone loss<sup>7</sup>. Hip fractures secondary to pathological caused other than osteoporosis was excluded in the study.

Descriptive summary for age is presented as mean (SD), minimum and maximum. All categorical variables are presented as frequency, percentage or both. Cross tabulation was performed between age groups and mechanisms of injury to analyse the association between these two variables. All analyses were carried out using SPSS (IBM SPSS version 20.0 for Windows).

## RESULTS

A total of 694 patients were recruited into the Hip Fracture Disease database between June 2008 and December 2009, 475 females (68.4%) and 219 males (31.6%). Their ages ranged from 50 to 101-years, with a mean (SD) age of 73.8 (10.3) years. The most commonly injured age group was from 70 to 79 year old (Table I). Hip fractures above the age of 60 years occur predominantly in female (Figure 1). The mean (SD) age of onset of menopause for women in the study was 49.8 (6.6) years and 392 (82.5%) of these individuals were post-menopausal at the time of the fracture. Pre-morbidly, 69.2% of the patients were able to ambulate independently and lived at home. Only 27.5% of the patients lived with their caretakers and only a very small number of patients (2.7%) were in a nursing home (Table II).

The predominant cause of injury resulting in these fractures was a low energy injury fall (83.1%) of the hip fractures while 7.8% was due to spontaneous fracture (Table II). Of those fractures caused by a fall, 72.5% were aged 70 years and above (Figure 2). There were 481 (70.1%) patients who had one or more pre-morbid illnesses at the time of fracture with the majority suffering from diabetes mellitus (45.7%) or hypertension alone (74.4%) (Figure 2).

## DISCUSSION

Studies have shown that the percentage of hip fractures has been increasing as the population ages in Malaysia; this

translates into a substantial burden on the health care system. Two previously published papers<sup>5,6</sup> highlighted hip fracture incidence among Malaysian ethnic groups. According to the National Population Census<sup>8</sup>, the population above 50 years old in Malaysia in year 2009 was 4.6 million people, with an almost equal distribution between females and males. Of this, Malays made up about 43.7% of the population with Chinese 32.7%, Indians 7.3% and other races consisting of 16.3%.

The predominant age group for hip fracture in this study was 70-79 years (69.5%) with a mean (SD) age of 73.8 (10.3) years, which similar to other studies<sup>5,6,9</sup>. The average life expectancy in Malaysia has increased from 72.4 years in year 2000 to 73.3 years in year 2009<sup>8</sup>. Therefore, it was not surprising to note that the increasing incidence of hip fracture was observed in this age group as hip fracture incidence is related to life expectancy. A study based on Germany's national hospital discharged registry data for 1995-2004 reported a statistically significant increase hip fracture incidence of about 0.6% per year for subjects 50 years or older<sup>10</sup>. In this study the largest percentage of fall was observed in those patients aged 70 years old and above (72.8%), and an epidemiology study of hip fracture in Belgrade, reported similarly that 70.3% of hip fractures occurred in older patients<sup>11</sup>. As the population is living longer, older adults (above 80 years old) are 10-15 times more likely to fracture a hip than those younger<sup>12</sup>.

The majority of hip fracture patients in this study (68.4%) were female, a female: male ratio similar with other studies<sup>5</sup>. Most of the female patients (82.5%) had already attained menopause at the time of injury, similar to results from other studies where female typically represent 66-78% of hip fracture patients<sup>13-15</sup>. The fact that decreased bone density occurs secondary to osteoporosis in post-menopausal females helps to explain why females experience hip fracture after the age of 60 most frequently.

Indians had the highest incidence of hip fracture (15.0%) compared to other ethnic groups especially considering that Indians only made up 6.8% of the Malaysian population in the year 2008-2009<sup>8</sup>. This was in line with previous studies<sup>5,6</sup>, which reported that Malays had a lower rate of hip fracture. Low energy trauma (i.e. trivial fall) was the main causative mechanism of hip fractures in this study (81.3%), with a small fraction due to road traffic accidents (7.2%) and spontaneous fractures (7.8%). An epidemiology study of hip fractures in Belgrade, reported incidence of hip fracture following fall up at a rate of 65.6%<sup>11</sup>. In the early 1990's, a research by Hayes and colleagues demonstrated that over 90% of hip fractures were associated with falls<sup>16</sup>. Since that time, an additional body of evidence has revealed a strong association between several diverse fall-related mediators and hip fracture injuries that might serve as useful intervention points in efforts to reduce hip fracture incidence

**Table I:** Demographic profile characteristic of hip fracture patients, July 2008 till Dec 2009

Profile	Descriptive summary	n	%
Age,			
Mean (SD); Min, max	73.8 (10.3); 50, 101		
Age group			
• 50-59		75	10.8
• 60-69		138	19.9
• 70-79		278	40.1
• 80-89		165	23.8
• ≥90		38	5.5
Gender			
• Male		219	31.6
• Female		475	68.4
Ethnicity			
• Malay		303	43.7
• Chinese		277	39.9
• Indian		104	15.0
• Others Malaysian		8	1.1
• Non Malaysian		2	0.3
Pre morbidity			
• Yes		481	70.1
• No		205	29.9

**Table II:** Ambulation status prior to hip fracture of hip fracture patients, July 2008 till Dec 2009

Profile	n	%
Residency		
• Home	661	95.2
• Sheltered housing	3	0.4
• Residential care	0	0.0
• Nursing home	19	2.7
• Permanent hospital	2	0.3
• Acute hospital	2	0.3
• Others	7	1.0
Dependency (NA = 15)		
• Independent	470	69.2
• Has career but not daily	14	2.1
• Has career once daily	7	1.0
• Live with carer(s)	187	27.5
• Patient in main carer	1	0.2
• Short term acute care	0	0.0
Walking ability		
Indoor (NA = 7)		
• Without aids	496	72.2
• With aids	157	22.9
• Unable to walk	34	4.9
Outdoor (NA = 45)		
• Without aids	466	71.8
• With aids	149	23.0
• Unable to walk	34	5.2
Accompanied to walk		
• Indoor	89	58.2
• Outdoor	26	17.0
• Both	38	28.8
Cause of hip fracture		
• Fall	590	83.1
• Accident	50	7.2
• Spontaneous	54	7.8

NA : not available (missing)

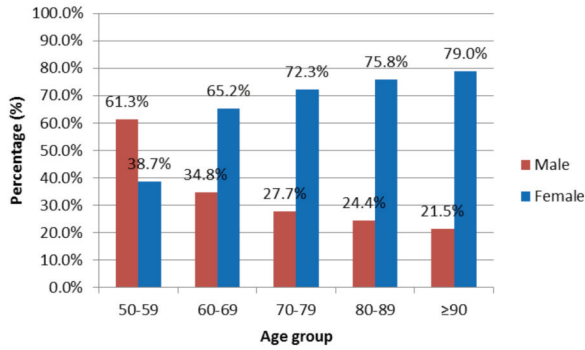


Fig. 1: Distribution of gender among age group of hip fracture patients, July 2008 till Dec 2009.

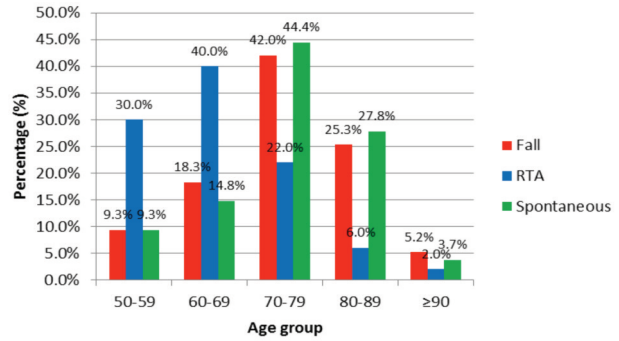


Fig. 2: Distribution of mechanism of injury among age group of hip fracture patients, July 2008 till Dec 2009 (RTA refers to road traffic accident).

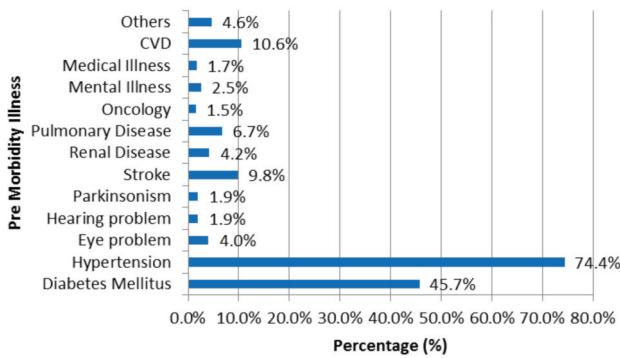


Fig. 3: Distribution of co morbidity of hip fracture patients, July 2008 till Dec 2009.

rates. These include: balance impairments<sup>17,18</sup>, neuromuscular and musculoskeletal impairments, type of fall, fall severity, and fall speed<sup>6</sup>. Declines in visual perception, proprioception, and/or transient circulatory insufficiencies<sup>19,20</sup>, as well as impaired sensory-motor integration functioning and unexpected perturbations are additional fall-related conditions.

Many chronic illnesses associated with aging, arthritis and Parkinson’s disease in particular, substantially increases the risk of falling, and hence the likelihood of incurring a hip fracture. In addition, arrhythmias, postural hypertension, peripheral neuropathies and other neurological conditions such as stroke may increase the risk of falls and associated hip fractures<sup>21</sup>. Diabetes mellitus<sup>22</sup>, hyperthyroidism<sup>21</sup> and other medical conditions associated with osteoporosis were associated with the risk of falling<sup>2</sup>. The use of walking aids as well as prolonged immobilisation may also increase the risk of sustaining a hip fracture, as the patients already have impairment in balance and mobility<sup>23</sup>. In the present study, 70.1% of patients had one or more pre-morbid illnesses at the time of injury, of which hypertension and diabetes mellitus were most frequent (Table I).

In the future, perhaps regular bone mineral density testing can be instituted to screen for osteoporosis, especially among post-menopausal older women who are at high risk for hip fracture. Limitations of this study include the lack of other source data providers from both the public and private sectors, making the generalisation of findings to the general population somewhat limited.

**CONCLUSIONS**

In conclusion, this study indicates that the occurrence of hip fracture is associated with older age and is likely to remain an important public health problem since the Malaysian is aging. Indeed, high numbers of aging adults will continue to bear the impact globally by this injury. Most patients had various degrees of fragility in addition to osteoporosis, and the main cause of injury was low energy trauma. Aging adults should be exposed to timely preventive strategies, including osteoporosis prevention, encouragement to maintain physically active lifestyles and education regarding fall prevention measures.

**ACKNOWLEDGMENTS**

The authors would like to acknowledge the Director General of the Ministry of Health for his support in our registry analysis efforts. They would also like to thank Naren Kumar A/L Surendra, NORM committee members throughout Malaysia for their help and support in collecting the data.

## REFERENCES

1. David G. La Vallae. Fracture and dislocation of the hip. 11th ed. In Campbell's Operative Orthopaedics; 2008, p. 3237-3239.
2. Poor G, Atkinson EJ, O Fallen WM, Melton LJ III. Predictors of hip fracture in men. *J Bone Min Res* 1995; 10: 1900-07.
3. Wilson RT, Wallace RB. Trends in hip fracture incidence in young and older adults. *Am J Public Health* 2007; 97: 1734-5.
4. Haleem S, Lutchman L, Mayahi R, Grice JE, Parker MJ. Mortality following hip fracture: trends and geographical variations over the last 40 years. *Injury* 2008; 39: 1157-63.
5. Joon-Kiong LEE and Amir S. M. KHIR .The incidence of hip fracture in Malaysians above 50 years of age: variation in different ethnic groups. *J Rheumatol* 2007; 10: 300-5.
6. Chong M Lee', Jagjit S Sidhu' and Kok L Pan .Hip fracture incidence in Malaysia 1981-1989. *Acta Orthop Scand* 1993; 64: 178-80.
7. Compston JE. Sex steroids and bone. *Physiol Res* 2001; 81: 419-47.
8. Malaysian population statistics 2009. *Department of Statistic, Malaysia*
9. Ray Marks. Hip fracture epidemiological trends, outcomes, and risk factors, 1970–2009. *Int J Gen Med* 2010; 3: 1-17.
10. Icks A, Haastert B, Wilder M, Becker C, Meyer G. Trend of hip fracture incidence in German 1995-2004: a population based study. *Osteoporos Int* 2008; 19(8): 1139-45.
11. A.Lešić,M.Jarebinski,T.Pekmezović,M.Bumbaširević, D.Spasovski, Henry D.E.Atikson. Epidemiology of hip fractures in Balgrade,Serbia Montenegro 1990-2000. *Arch Orthop Trauma Surg* 2007; 127: 179-83.
12. Scott JC. Osteoporosis and hip fractures. *Rheum Dis Clin North Am* 1990; 16: 717-40.
13. Sibai AM, Nasser W, Ammar W, Khalife MJ, Harb H, Fuleihan GE. Hip fracture incidence in Lebanon: a national registry-based study with reference to standardized rates worldwide. *Osteoporos Int* 2010; 22: 2499-506.
14. Piscitelli P, Brandi ML, Tarantino U, Baggiani A, Distanto A, Muratore M et al. Incidence and socioeconomic burden of hip fractures in Italy: extension study 2003-2005. *Rheumatismo* 2010; 62: 113-8.
15. Lönnroos E, Kautiainen H, Karppi P, Huusko T, Hartikainen S, Kiviranta I et al. Increased incidence of hip fractures. A population based-study in Finland. *Bone* 2006; 39: 623-7.
16. Hayes WC, Myers ER, Robinovitch SN, Van Den Kroonenberg A. Etiology and prevention of age-related hip fractures. *Bone* 1996; 18: 77-86.
17. Kulmala J, Sihvonen S, Kallinen M, Alen M, Kivirant I, Sipilä S. Balance confidence and functional balance in relation to falls in older persons with hip fracture history. *J Geriatr Phys Ther* 2007; 30: 114-20.
18. Boonen S, Broos P, Dequeker J. Age-related factors in the pathogenesis of senile (Type II) femoral neck fractures. An integrated view. *Am J Orthop* 1996; 25: 198-204.
19. Grisso JA, Kelsey JL, Strom BL, et al. Risk factors for falls as a cause of hip fracture in women. The North East Study Group. *N Engl J Med* 1991; 324: 1326-31.
20. Slemenda C. Prevention of hip fractures: risk factor modification. *Am J Med* 1997; 103: 65-73.
21. Boonen S, Broos P, Haentjens P. Factors associated with hip fracture occurrence in old age. Implications in the postsurgical management. *Acta Chir Belg* 1999; 99: 185-9.
22. Schwartz AV, Sellmeyer DE, Ensrud KE, et al. Older women with diabetes has an increased risk of fracture: a prospective study. *J Clin Endocrinol Metab* 2001; 86: 32-8.
23. Lau EM, Lee Jk, Suriwongpaisal P, et al. The incidence of hip fracture in four Asian countries; the Asian Osteoporosis Study (AOS). *Osteoporos Int* 2001; 12: 239-43.