

Original article

Epidemiology of fragility hip fractures in Nan, Thailand

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ABSTRACT

Objectives: Hip fracture is the most serious consequence of falling in elderly with osteoporosis. Patients with hip fractures suffer functional deterioration and increased morbidity especially during the first year after fracture. Rapid increase in the proportion of the elderly increases the prevalence of hip fractures in Thailand, leading to major problem for public health. There is substantial variation in the incidence of hip fracture in different regions of Thailand. Demographic data are required to improve management and prevention. This study was aimed to describe the demographic data and to determine the incidence of fragility hip fractures in Nan, Thailand.

Methods: A retrospective, cohort study had been conducted in Nan and Pua hospital. Patients with hip fractures were sorted by International Classification of Diseases 10th Revision (S72.0–S72.2) from September 1, 2014 to December 31, 2017. Statistical analyses were conducted using descriptive analysis and 95% confidence interval.

Results: The incidence of hip fractures in Nan province in 2015–2017 were 211.6, 214.9 and 238.5 per 100,000 person-years, respectively. There were 876 patients in this study. Higher incidence was found in female (ratio, 2.5:1). About 87.2% of the fracture occurred inside the house. There were 5.9% who had refracture. The median for refracture time was 143 weeks.

Conclusions: The incidence of hip fractures in Nan province was classified as moderate severity and was increasing between 2015 and 2017. A coordinated, multidisciplinary approach in homecare management especially in fall prevention are important factors to reduce incidence of fragility hip fracture.

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1. Introduction

The classic osteoporotic fractures are hip, vertebral, and wrist fractures. Hip fracture is the most serious consequence of falling in older people with osteoporosis: 87%–96% of hip fracture patients are 65 years of age or older [1]. Patients with hip fractures suffered functional deterioration, limited mobility and increased morbidity, especially during first year after fracture [2,3]. Furthermore, among the survivors of the first hip fracture, the age-standardized risk of a second hip fracture is higher than risk of a first hip fracture [4]. Previous studies have demonstrated that there is substantial variation in the incidence of hip fractures in different regions of Thailand. In 1990, a multicenter study on hip fractures was conducted in Thailand demonstrating that the age-adjusted incidence

of hip fractures was 7.45 per 100,000 person-years [5]. The highest incidence of 14.41 per 100,000 person-years was found in Saraburi province. Study in Ubonrachathane, Thailand in 1995 showed the incidence of 10.3 per 100,000 person-years [6]. From 1997 to 1998, the incidence of hip fracture in Chiang Mai was 151.2 and 185.2 per 100,000 person-years from hospital survey and community survey respectively [7]. There was limited report on incidence of hip fracture in Nan province. The population aged 60 years and older in Thailand is predicted to be doubled by 2050, increasing from 11 million (16.9% of population) today to 22 million (35.1% of population) [8]. Thus, Thailand will develop into fully aging society in the next decade. The rapid increase in the proportion of the elderly will increase the prevalence of hip fractures in Thailand in the future, leading to major problem for public health. The objectives of this study were to describe data on demography and to determine the incidence of fragility hip fractures in Nan province, Thailand that in order to improve planning of management and prevention.

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2. Methods

A retrospective, cohort study had been conducted at Nan and Pua hospital. Patients who were admitted to hospital with hip fracture were sorted by International Classification of Diseases 10th Revision (S72.0–S72.2) from September 1, 2014 to December 31, 2017. Medical records and radiographic images of patients were reviewed. Radiographic images were used for validation of hip fracture types. This study was approved by the Research Ethics Committee of the Nan Hospital (Nan Hos. REC No. 004/2019).

The proportion of the population of Nan, Thailand in 2015–2017 and numbers of mid-year population over 50 years old were derived from URL (http://stat.dopa.go.th/stat/statnew/upstat_age.php) used for calculation of the incidence of hip fractures from January 1, 2015 to December 31, 2017 in Nan province.

Inclusion criteria for this study were Thai peoples aged 50 years and older who lived in Nan who had fracture at hip (including neck of femur, intertrochanteric of femur and subtrochanteric of femur) from low energy trauma.

Exclusion criteria were as follows: (1) patients younger than 50 years, (2) foreigner, (3) high energy trauma, (4) traffic accident, (5) pathologic fracture, (6) periprosthetic fracture, and (7) previous ipsilateral hip fracture caused by the same injury.

Demographic data such as sex, age, weight, height, body mass index (BMI), ambulatory status before fracture, place of injury, type of hip fracture, history of refracture, type of treatment, type of surgical operation, timing of injury, timing to hospital, timing of surgery, cost of treatment and length of stay were collected from their medical records.

Information about mortality was obtained by telephone interviews and home visit by nurse and other medical personnels. All patients were followed for at least 1 year.

Statistical analyses were conducted using SPSS ver. 14.0 (SPSS Inc., Chicago, IL, USA). Descriptive results were expressed as mean, standard deviation, percent and medians. Incidence was expressed as per 100,000 person-years. Estimated relative risk with 95% confidence interval (95% CI) and P-value were calculated.

3. Results

3.1. Demographic data

This study was a retrospective study of hip fracture in patients older than 50 years old that occurred from falling and were admitted at Nan Hospital from September 1, 2014 to December 31, 2017. The duration of the study was 40 months. There were 876 patients. Most patients were female (male:female ratio, 1:2.5), BMI < 20 kg/m² and mean age was 78.8 years. Most hip fractures occurred inside the house. The demographic data including the ambulatory status before fracture was shown in Table 1.

Total of 644 patients (73.5%) had intertrochanteric fracture. Type of hip fractures and method of treatment were shown in Table 2. Approximately 82.4% of patients received surgical intervention. The cost in surgical cases was 3 times higher than nonsurgical cases.

3.2. Incidence of hip fracture

On average, the proportion of population in Nan was 0.74% of Thai population. Nan province has no private hospital. There are only 2 hospitals (Nan Hospital and Pua hospital) that have orthopedic surgeons who can treat and operate on patients with hip fractures. The patients with hip fractures were admitted to either hospital and the incidence rates of hip fractures had increased from 2015 to 2017 as shown in Table 3. In 2017, incidence rate of hip fracture in Nan was as high as 238.5 per 100,000 person-years. The

Table 1

Demographic data of patients with hip fractures in Nan hospital from September 1, 2014 to December 31, 2017 (n = 876).

Characteristic	Value
Sex	
Male	248 (28.3)
Female	628 (71.7)
Age, yr	78.8 ± 8.9
Body mass index, kg/m ²	19.5 ± 3.7
<20	505 (57.6)
20–25	303 (34.6)
>25–30	61 (7.0)
>30	7 (0.8)
Place of falling	
Inside the house	764 (87.2)
Bedroom	94 (10.7)
Bathroom	79 (9.0)
Other	591 (67.5)
Outside the house	112 (12.8)
Ambulatory status before fracture	
Community walk, no gait aid	465 (53.1)
Community walk, with gait aid	83 (9.5)
House walk, no gait aid	152 (17.4)
House walk, with gait aid	160 (18.3)
Wheelchairs	8 (0.9)
Bedridden	8 (0.9)
Type of fracture	
Neck	213 (24.3)
Intertrochanter	644 (73.5)
Subtrochanter	19 (2.2)
Duration from falling to seeing orthopedist,	57.5 ± 195.5
Within 24 h	611 (69.7)
>24–72 h	127 (14.5)
>72 h	138 (15.8)
Treatment	
Surgical	722 (82.4)
Nonsurgical	154 (17.6)
Time to surgery,	62.8 ± 203.5
Within 24 h	351/722 (48.6)
>24–48 h	116/722 (16.1)
>48–72 h	61/722 (8.4)
>72 h–1 wk	136/722 (18.9)
>1 wk	58/722 (8.0)
Length of hospital stay, d	7.01 ± 5.9
Surgical case	6.6 ± 8.2
Nonsurgical case	7.1 ± 6.3
Cost of treatment, Baht	43,594.5 ± 26,672.7
Surgical case	49,469.5 ± 23,587.9
Nonsurgical case	16,050.8 ± 22,756.4

Values are presented as number (%) or mean ± standard deviation.

incidence and relative risk classified by age groups were illustrated in Table 4.

With increasing age, it is more likely to sustain a hip fracture. At the reference aged 66–70 years, incidence of hip fracture had significantly changed from nearby sequence age group. Those aged 90 years and above were 17.8 times more likely to suffer from hip fracture than the reference group (95% CI, 10.19–30.98; $P < 0.001$). However, those aged 66–70 years, reference group were 3.1 times more hip fracture than those aged 61–65 (relative risk, 0.319; 95% CI, 0.16–0.62; $P < 0.001$) as shown in Table 4 and Fig. 1. There were total of 378 cases (43.2%) of female patients age > 65 years old and BMI < 20 kg/m².

3.3. Refracture hip

Forty-one patients had first hip fracture before the study period, whilst 11 patients had second hip fracture during the study period. Thus, refracture (second fracture) was found in a total of 52 cases (5.9%). The median time between the first and second hip fractures was 143 weeks. The first quartile (25%) was 308 weeks and the third quartile (75%) was 87 weeks. Refracture within 6 months were

Table 2

Types of fracture and methods of treatment.

Type of treatment	Intertrochanteric (n = 644)	Neck (n = 213)	Subtrochanteric (n = 19)
Nonsurgical treatment	112 (17.4)	36 (16.9)	6 (31.6)
Internal fixation method	527 (81.8)	16 (7.5)	13 (68.4)
Prosthesis method	5 (0.8)	161 (75.6)	0 (0)

Values are presented as number (%).

Table 3

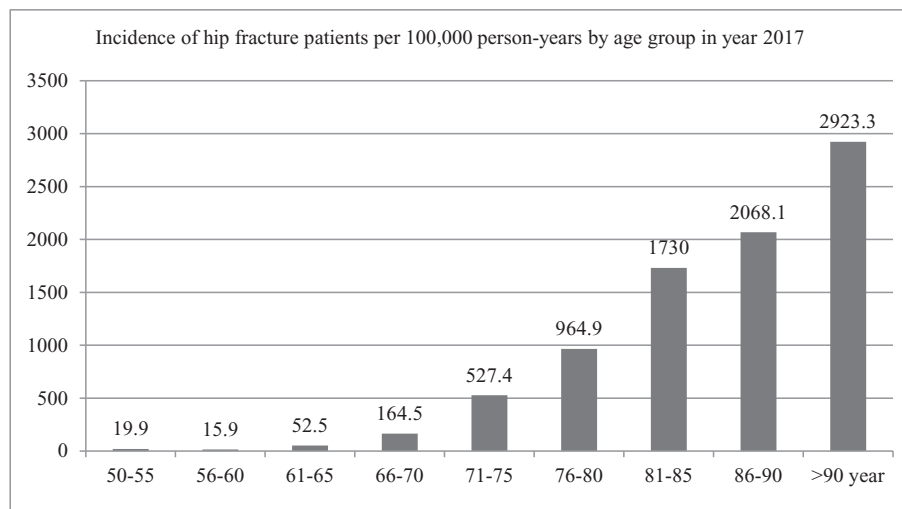
Incidence rates of hip fracture per 100,000 person-years in Nan, 2015–2017.

Year	No. of patient in Nan hospital (case)	No. of patient in Pua hospital (case)	Total (case)	No. of mid-year population over 50 years old (case)	Incidence of hip fracture in Nan province (/100,000 person-years)
2015					
All	260	21	281	132,804	211.6
Male	69	3	72	65,481	110.0
Female	191	18	209	67,323	310.4
2016					
All	250	47	297	138,176	214.9
Male	74	13	87	67,966	128.0
Female	176	34	210	70,210	299.1
2017					
All	282	59	341	142,967	238.5
Male	80	15	95	70,232	135.3
Female	202	44	246	72,735	388.2

Table 4

Incidences and relative risk of hip fractures in the year 2017 classified by age group.

Age group, yr	No. of patients	No. of mid-year population over 50 years old	Incidence of hip fracture in Nan province (/100,000 person-years)	Relative risk for hip fracture (95% CI)
50–55	9	45,141	19.9	0.120 (0.06–0.26) ^a
56–60	5	31,492	15.9	0.091 (0.04–0.25) ^a
61–65	13	24,785	52.5	0.319 (0.16–0.62) ^a
66–70	25	15,197	164.5	1.000 (0.05–1.74)
71–75	55	10,428	527.4	3.210 (1.99–5.14) ^a
76–80	75	7773	964.9	5.865 (3.73–9.22) ^a
81–85	87	5029	1730.0	10.516 (6.75–16.39) ^a
86–90	48	2321	2068.1	12.571 (7.77–20.35) ^a
>90	24	821	2923.3	17.77 (10.19–30.98) ^a

**Fig. 1.** Incidence of hip fracture per 100,000 person-years by age group in year 2017.

11.5%, within 1 year 19.2%, within 3 years 50.0%, within 5 years 67.3% and more than 5 years 32.7%.

Thirty-two patients (3.7%) died in the hospital. One-year mortality rate was 17.2% (151 cases).

4. Discussion

Previous studies examined hip fracture rates in different regions of the world. There was a marked heterogeneity in hip fracture risk between countries [9]. More than half of worldwide incidences occur in Asia [10]. The severity of hip fracture incidence was classified as high (>250/100,000), medium (150–250/100,000) or low (<150/100,000) [9]. The incidence of hip fractures in this study was moderate severity which was similar to many Asian countries such as Hong Kong, Japan, South Korea and Malaysia [9]. Incidence of hip fracture has a tendency to increase since we are approaching the elderly society in the next decades and it would be a major public health problem. In Thailand, The Ministry of Public Health has seen the importance of hip fracture problems and has pushed for national policy since 2017. The incidence rate of hip fractures in Nan, Thailand increased from 2015 to 2017. Incidence of hip fractures in this study was 238.5 per 100,000 person-years in 2017 that higher than 185.2 per 100,000 person-years in Chiang Mai in 1998 [7].

For this study, we found 378 cases (43.2%) who were female patients with age > 65 years and BMI < 20 kg/m². Most hip fracture occurred inside the house and in patients who can walk without gait aid. Some previous study demonstrated that each area has the same tendency to increase incidence by age and being multiply, starting from the age of 65 years especially in females with small BMI < 20 kg/m² [11–15].

The incidence of repeated hip fracture was variable in many studies [16–20]. Almost 80% occurred within three years after the first hip fracture [20–23]. In the present study, patients who had second hip fracture was 5.9% and the medians duration from first hip fracture to second hip fracture was approximately 3 years (143 weeks). This data indicated that the implementation of the prevention program for patient's follow up should be monitored for at least 3 years to reduce the recurrence rate of repeated hip fracture.

The interesting data and suggestion are: (1) Female over 65 year, BMI less than 20 kg/m² are the high-risk groups for hip fracture. Therefore, the annual screening of elderly in the primary health care system is well worth the cost of primary prevention. (2) The median duration of refracture is 3 years. Therefore, the follow-up period or the prevention of recurrence should be followed for at least 3 years.

5. Conclusion

The incidence of hip fractures in Nan province was classified as moderate severity. In addition, the incidence tends to increase due to the increasing proportion of the elderly population. A coordinated, multidisciplinary approach in homecare management especially good food to promote bone health, encourage patients to exercise regularly and preventing of fall are important factors to reduce incidence of first and second hip fracture.

Conflicts of interest

No potential conflict of interest relevant to this article was reported.

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