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## Analysis of the hip fracture records of a central training and research hospital by selected characteristics

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## Analysis of the hip fracture records of a central training and research hospital by selected characteristics

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**Background/aim:** Despite the importance of hip fractures, very few studies have assessed their epidemiological characteristics in Turkey. The aim of this study was to evaluate the frequency and demography of hip fractures from the recent data of a central training and research hospital.

**Materials and methods:** In this descriptive study, we identified hip fracture cases between 2009 and 2013. The age, sex, region, injury pattern, and calendar year for all patients were evaluated.

**Results:** Among the 687 patients (488 women, 199 men) described in our clinic's records, 122, 131, 144, 138, and 154 patients applied with hip fractures from the years 2009 to 2013, respectively. The mean ages of the women and men were 74.8 and 68.5 years, respectively. There were 220 patients who had femoral neck fracture (32%), 419 who had intertrochanteric fracture (61%), and 48 who had subtrochanteric fracture (7%).

**Conclusion:** The female geriatric population may have an increasing and distinct hip fracture risk, mainly in the trochanteric region. Furthermore, recent studies that show variations in the frequency and demography of hip fractures highlight the importance of meticulous recording of patients' information. A nationwide survey of different categories of hospitals and various geographic regions of Turkey is also needed to inform effective prevention strategies.

**Key words:** Hip fracture, epidemiology, osteoporosis

### 1. Introduction

Hip fracture is one of the most common causes of admission to an orthopedic ward and is associated with high rates of mortality and morbidity. For this reason, estimates of fracture risk are increasingly important for defining treatment thresholds; treatment of these fractures should, of necessity, begin with prevention, and that underlines the importance of gathering meaningful and accurate data (1–3). Many national and institutional studies have been published, and these studies have assessed the epidemiology and frequency of these fractures, which have a considerable socioeconomic burden worldwide (4–10).

Despite their importance, very few studies have assessed the epidemiology, socioeconomic costs, and frequency of hip fractures in Turkey. The frequency of hip fractures in a regional university hospital (11), the cost of hip fractures from patient records of 35 hospitals (12), and an estimation of the prevalence of hip fracture from a population-based sample (13) have been reported in previous studies; they all underlined the need for further research to identify the

underlying factors and burden of these fractures, and to improve fracture prevention strategies (11–13).

To the best of our knowledge, only two studies have assessed the frequency of hip fractures in the recent Turkish literature (11,14). However, the results of these studies are not consistent with the well-accepted literature and suggest errors in data collection. The aim of the present study was to evaluate the recent frequency and demography of hip fractures from the data of a central training and research hospital in the capital city of Turkey, and to assess the estimation of population changes for forthcoming years.

### 2. Materials and methods

This observational study was conducted at a tertiary central referral hospital in the capital city of Turkey. We identified 687 hip fracture cases between January 2009 and December 2013. They were classified as femoral neck fracture, intertrochanteric femur fracture, and subtrochanteric femur fracture, according to the fracture site. Periprosthetic and pathologic fractures were excluded.

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The age, sex, region, injury pattern, American Society of Anesthesiologists (ASA) score, and calendar year of fracture for each patient were evaluated in the present study. Regarding the treatment, joint-preserving surgeries (dynamic hip screw, proximal femur nailing, and proximal femur plate) were performed for relatively younger patients with good bone quality and hip arthroplasties (hemiarthroplasty and total hip arthroplasty) were performed for older patients with poor bone quality.

As our hospital is one of the main, centrally located hospitals in Ankara, and the capital is a metropolis where people from every part of the Turkey live, our data may be valuable for the demographic evaluation of hip fractures throughout Turkey. We used both the hospital's and our own clinical archives to obtain more accurate results. First, the numbers of patients admitted to our clinic were recorded by calendar year. Age and sex of the patients were recorded, and the region of the hip fracture was identified from the hospital archive and then confirmed by our clinic's X-ray archive. Injury patterns were also identified as low and high energy traumas.

The study was approved by the ethics committee of Ankara Numune Training and Research Hospital (ID number E-760-2014). All data were calculated as frequencies, means, standard deviations, and ranges. Statistical calculations were performed with SPSS 17.0 (SPSS Inc., Chicago, IL, USA.).

### 3. Results

A total of 687 patients with hip fractures that occurred between 2009 and 2013 were included in this study. According to calendar year, in 2009, 122 patients with hip fractures were admitted to our clinic; in 2010, 131; in 2011, 144; in 2012, 138; and in 2013, 154 patients were admitted with hip fractures. Among the 687 patients, 488 patients were female (71%) and 190 were male (29%). Patients' sex, fracture site, and injury pattern distributions over these 5 years are shown in Table 1. The number of female patients tended to increase across the calendar years, while the number of male patients held steady (Figure 1).

The mean age of all patients was  $72.9 \pm 12.4$  years. The mean ages of women and men were  $74.8 \pm 11.6$  and  $68.5 \pm 13.1$ , respectively. Of the total hip fracture population, 517 (76%) patients were over the age of 65. The number of female and male patients and their age distributions by calendar year are shown in Table 2. The mean ages of female patients tended to be higher than the mean ages of male patients. The ASA scores of the patients are shown in Table 3. All patients who were older than 65 years old had ASA scores higher than ASA II.

There were 220 patients that had femoral neck fracture (32%), 419 that had intertrochanteric fracture (61%), and 48 that had subtrochanteric fracture (7%). Of these, 483 fractures were due to low energy trauma (70%) and 204 were due to high energy trauma (30%) (Table 1). There was a positive trend in intertrochanteric femur fractures (Figure 2) and low energy traumas (Figure 3) by calendar year. With respect to age groups and fracture sites, most of the patients with femoral neck fracture and intertrochanteric femur fracture were between 65 and 80 years old, while most of those with subtrochanteric femur fracture were younger than 65 (Figure 4). Anteroposterior radiographs of all 3 types of hips fractures (femur neck fracture, intertrochanteric femur fracture, subtrochanteric femur fracture) are shown in Figure 5.

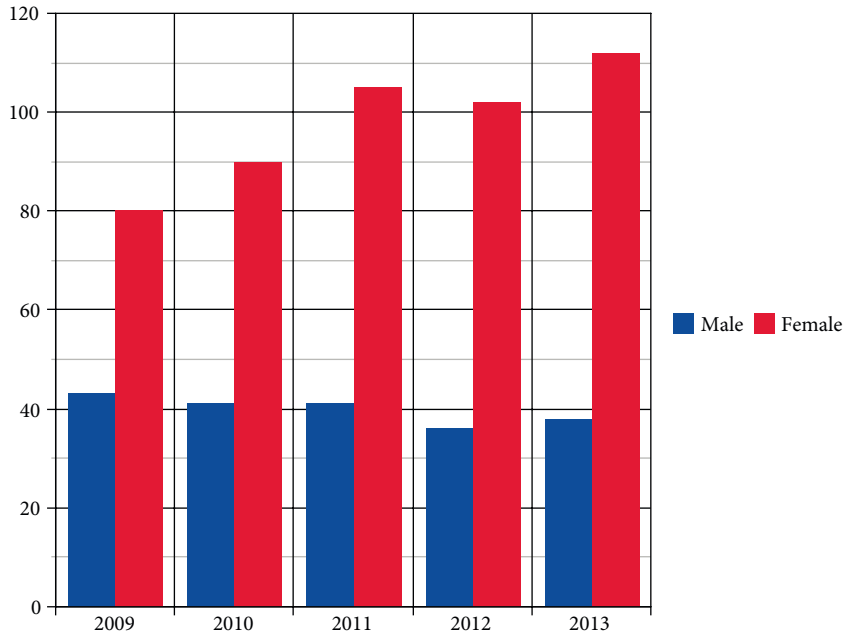
### 4. Discussion

Hip fractures are a common source of morbidity and mortality among elderly people worldwide. Globally, the mean age of the population is increasing with better medical care, so the number of hip fractures is expected to triple in the next 50 years (15). The necessity for a comprehensive preventive policy and planning for future treatment increases the importance of gathering data on the incidence and trends of hip fractures (1,3,6). Regional, sample-sized, and institutional studies have tried to identify frequency, demographic structure, and fracture site, aiming to contribute to preventive policies and treatment planning (1,4–11,13,14,16). However, in explaining their own limitations, all of these studies emphasize the need for

**Table 1.** Demographic and clinical data of the patients.

	Number	Percentage (%)
Sex (female/male)	488/199	71/29
Region (Neck/ITF/STF)	220/419/48	31/61/7
Energy (low/high)	483/204	70/30

The values are given as the number of patients with the percentage.  
ITF: Intertrochanteric femur fracture, STF: Subtrochanteric femur fracture.



**Figure 1.** Sex distributions of fractures according to calendar years.

**Table 2.** Number of the female and male patients and their mean age distributions according to the calendar years.

Calendar year	Sex	Number of patients	Mean and standard deviation
2009	Male	42	68.0 ± 12.1
	Female	80	74.1 ± 11.2
2010	Male	41	68.4 ± 13.6
	Female	90	74.6 ± 12.1
2011	Male	41	68.8 ± 12.6
	Female	103	74.6 ± 11.6
2012	Male	36	68.3 ± 13.8
	Female	102	75.3 ± 11.8
2013	Male	39	69.0 ± 13.9
	Female	113	75.1 ± 11.6

**Table 3.** ASA distributions of the patients according to their ages and fracture types.

Age	Femur neck fracture (220)		Femur intertrochanteric fracture (419)		Femur subtrochanteric fracture (48)	
	ASA 1-2	ASA 3-4	ASA 1-2	ASA 3-4	ASA 1-2	ASA 3-4
<65	36	22	40	42	24	6
66-80	0	100	0	194	0	13
>80	0	62	0	143	0	5

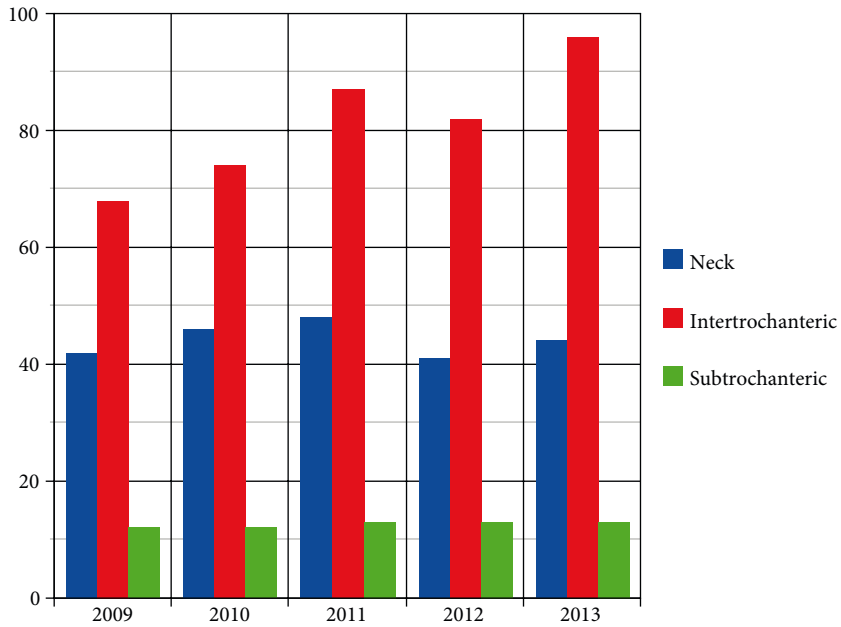


Figure 2. Fracture site distributions according to calendar years.

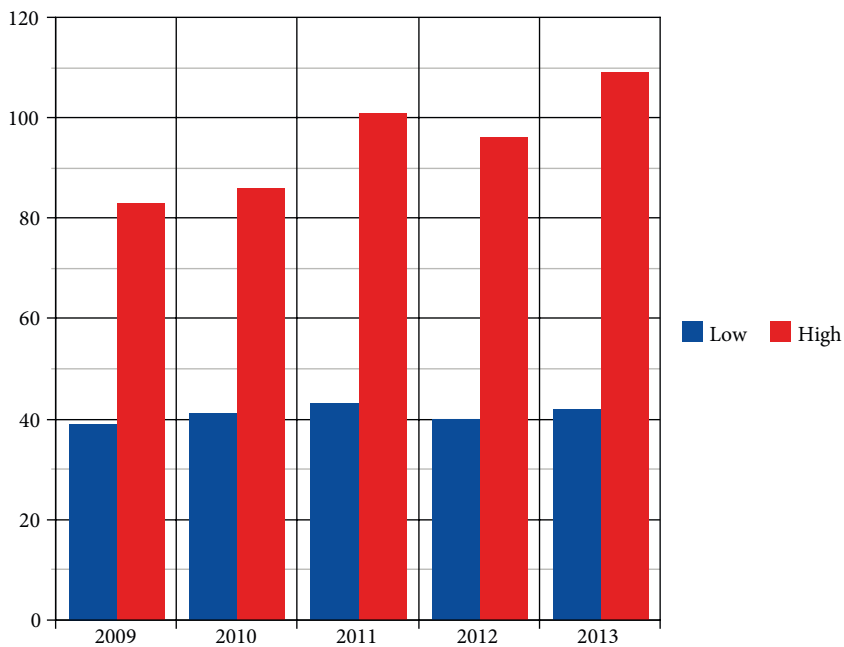
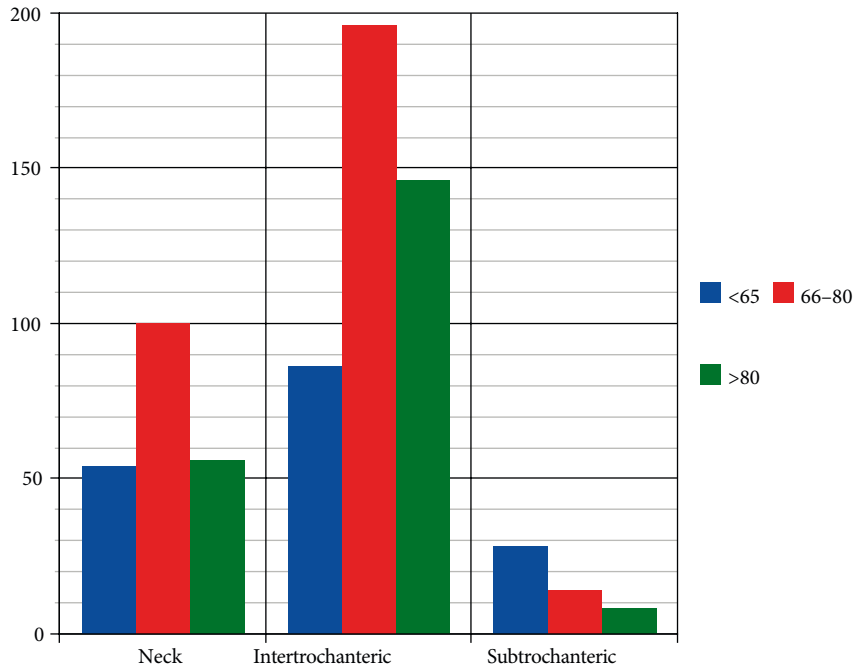


Figure 3. Injury patterns of fractures according to calendar years.

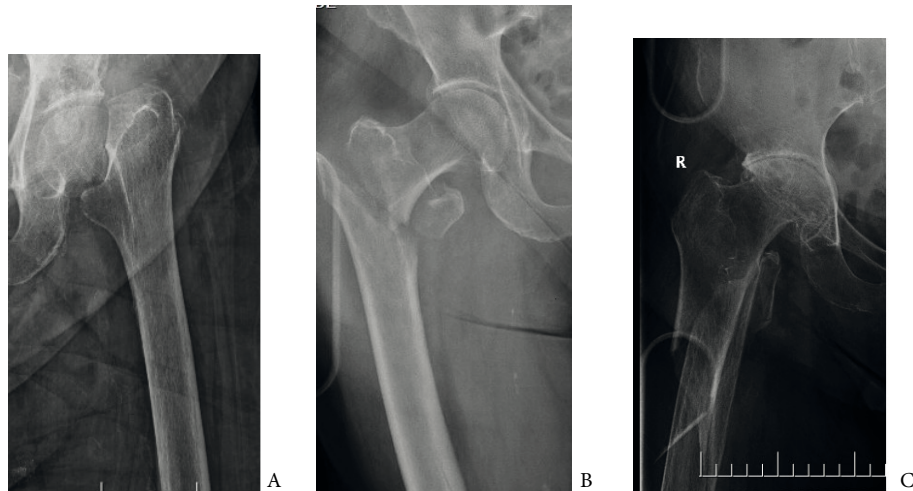
further studies. Because a greater than 10-fold variation in hip fracture risk and fracture probability has been reported between countries (17), studies with reliable data about hip fractures from Turkey are very important in creating national prevention strategies. However, only two recent studies in the Turkish literature reported on the frequency and demography of hip fractures before 2010, and there are no studies reporting this data for the 2010s. The aim

of the present study was to evaluate the recent frequency and demography of hip fractures from the meticulously collected data of a central training and research hospital in the capital city of Turkey, to allow for the estimation of any population changes in the forthcoming years.

Hip fractures constitute a major cause of mortality and morbidity among the elderly, with a considerable and increasing economic burden (3,12,18,19). In the



**Figure 4.** Presentation of patients according to age groups and fracture types.



**Figure 5.** Anteroposterior radiograph of an 82-year-old female patient with femoral neck fracture (A), anteroposterior radiograph of a 71-year-old female patient with intertrochanteric femur fracture (B), and anteroposterior radiograph of a 46-year-old male patient with subtrochanteric femur fracture (C).

present study, 76% of hip fracture patients were over age 65, supporting the suggestion that hip fractures are a major health problem among elderly patients. In light of this, factors such as inappropriate drug prescriptions (2), relationships with drug use (20), and regional and age-related variations (1,16,17) affecting morbidity and mortality have been widely investigated. All of these studies emphasize the great difficulty in treating hip fractures

and draw attention to prevention strategies as the best treatment modality. Undoubtedly, the creation of effective prevention strategies will be informed by determining the properties of the population at the greatest risk.

With respect to sex, two recent studies from Turkey reported surprisingly different results. One study, covering the 4 years before 2010, reported that 48% of hip fracture patients were female (14), while the other study, covering

the 10 years before 2009, reported that 58% of patients were female (11); however, percentages of females were similar to males at the beginning of the 2000s and steadily increased after 2005. According to a population-based study of fractures, there were approximately 24,000 hip fractures in Turkey, 73% in women (13). The present study, with a 71% female rate, is dramatically different from more recent frequency studies but supports the results of the two high quality incidence studies mentioned above. We observed that the female ratio tended to increase with age (Figure 1). This may be a result of Turkey's aging society and the increasing number of women with osteoporosis. It is estimated that life expectancy in Turkey will increase from 74.6 in 2010 to 78.5 in 2050, and current life expectancy is reported as 74.7 in men and 79.2 in woman by the Turkish Statistical Institute ([www.tuik.gov.tr](http://www.tuik.gov.tr)). In the present study, the mean ages of men and women with hip fractures were 68.5 and 74.8, respectively. Therefore, the mean age of hip fractures is about 6 years lower than life expectancy, which suggests a potentially catastrophic increase in hip fractures in an aging Turkish society in the coming years. The frequency study from the 2000s reported a mean hip fracture age of 70.5, an earlier mean age than that reported in the present study, which predicts an even greater increase in the number of hip fractures.

Regarding fracture sites, two recent frequency studies from Turkey reported similar results with data from the 2000s; in both of these studies, 55% of fractures were intertrochanteric femur fractures (11,14). The present study, with a 61% rate of female patients, is different from the frequency studies of the 2000s and suggests that the ratio of intertrochanteric femur fractures tends to increase with patient age (Figure 2). For patients below the age of 65, the ratio of subtrochanteric femur fractures increased, while the ratio of intertrochanteric femur fracture increased for those over the age of 80 (Figure 4). Interestingly, a recent frequency study from a teaching hospital reported an increased rate of collum femoris fractures for patients over the age of 85; the results of that study showed an absolutely reverse population trend from the present study and that of a recent study from a regional university hospital (11,14). An increase in low energy fractures across years is reported in the present study and supports the increase in intertrochanteric femur fractures, which are typically secondary to osteoporosis in the elderly population.

The present study raises a concern about the reliability of data collection in recent frequency studies due to the contradictory results within and between the studies. There are only two frequency studies in the Turkish literature from the 2000s. One is from a regional university in Turkey, reporting about a 2-fold increase in the number

of fractures between 2004 and 2005. This study also found that for the 5 years before 2005, the rates of men and women were about equal; however, for the 5 years after 2005, the rate of females with hip fracture was suddenly significantly higher than that for males (11). There were no attempts in this study to explain these contradictory results. Another frequency study from a teaching hospital reported a higher rate of men than women and a decrease in intertrochanteric femur fractures after the age of 85; these results were not compatible with any frequency studies from Turkey or any other country. We wonder whether there had been mistakes or negligence in the International Classification of Diseases-coding due to the intense work pressure in emergency services. Another concern about the reliability of data collection is the frequent changes in database systems in hospitals due to the present state bidding law. The database systems of many hospitals have changed every 3 years during the last decade in Turkey. Radical changes in database systems inevitably cause data losses and misvaluation. In the present study, in order to avoid data collection mistakes resulting in contradictory results, we confirmed data with three different databases. First, the age and sex of the patients were recorded and the regions of hip fractures were identified from the hospital archive. Second, these data were confirmed from our clinic's own records, which are independent from the hospital database system. Third, all of the patients were reassessed using our clinic's X-ray archive.

There are some limitations to this study. First, social descriptors of patients such as the quality of their care, whether they live alone, and whether they live in a house or in a nursing home were not reported in this study. Second, although our tertiary training and research hospital is situated in the central part of the capital city, data from different parts of Turkey and from different hospitals such as university, state, and private hospitals may provide better information for making decisions about population changes in hip fractures. Third, the 5 most recent years were reported in this study; analysis over a longer time period may give a more accurate picture of trends in hip fractures.

In summary, an increase in the incidence of trochanteric fractures suggests that osteoporosis needs to be investigated as the one of the major public health problems related to hip fractures. Furthermore, differences in the results of recent studies on the frequency and demography of hip fractures highlights the importance of meticulous recording of patients' information and suggests that a nationwide survey covering different categories of hospitals and various geographic regions of Turkey would provide a better basis for developing effective prevention strategies.



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