

Epidemiology of hip fracture in Tucuman, Argentina

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Abstract

Summary The incidence of osteoporotic hip fracture was studied previously in a central area of Argentina. Studying Tucuman (north area) was very useful to compare results of the different areas and detect a similar incidence in women and a slightly higher incidence in men compared with previous data for the central region.

Introduction/Methods Epidemiology of hip fracture was studied over a 1-year period in the city of San Miguel de Tucumán (SMT) and in the whole province of Tucumán, located in the northeast of Argentina (latitudes 26° and 28° south). The results were compared with previous studies performed in the central region of Argentina.

Results Two hundred and eighty-three patients (208 women and 75 men) aged 50 years or over in SMT suffered a hip fracture. The incidence in females and males was 334.9 and 163.8 hip fractures per 100,000 inhabitants per year, respectively (female/male ratio 2.0). A total of 498 hip fractures were recorded in Tucuman province (367 in women and 131 in men). The results in females and males were 276.5 and 114.7 hip fractures per 100,000 inhabitants per year, respectively. Average age of the female and male population was 78±9 and 77±9 years, respectively.

Conclusions These results showed that the incidence of hip fracture in female and male populations in SMT was

similar to previous studies performed in the central area of the country. Further studies on the south area of Argentina should be conducted to complete the information on a large country extending from latitudes 22° to 55°S.

Keywords Epidemiology · Hip fracture · Osteoporosis

Introduction

Osteoporosis is the most extensively studied skeletal disease of the last years [1–3]. Due to the increase in life expectancy, a large part of the population presents osteoporosis and is consequently at risk of suffering hip fracture, the most severe complication of the disease [4–6]. Hip fracture is associated with high morbidity and mortality rates, decreased quality of life, and high healthcare costs [7–10]. Accurate epidemiological data are essential to determine the magnitude of this problem in our country. The incidence rate of proximal femur fracture is the most frequently used parameter to determine the incidence of osteoporosis in a given geographic region. Epidemiological data from Latin America are scant and even non-existent in some countries [6, 11–16]. As regards Argentina, three prospective studies were performed in the central region of the country (La Plata, Mar del Plata, and Rosario) [13–15]. Although these data are of vital importance, further data on other regions of the country must be obtained in view of the extent of the country (3,700 km north-south, between latitudes 22° and 55°S), and the variation in geographic and population characteristics.

The aim of the present study was to assess the incidence of hip fracture in the city of San Miguel de Tucumán (SMT) and in the whole province of Tucumán, located in the northwest of

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Table 1 Tucuman province population data

Location	Latitudes 26° and 28° South Meridians 64°30' and 66°30'
Area	22,524 km ²
Climate	Subtropical with dry season
Total population	1,338,523 inhabitants
Population aged ≥50 years	246,927 inhabitants
Women aged ≥50 years	132,728 women
Men aged ≥50 years	114,199 men

Argentina, and compare the data with those obtained in studies performed in the central region of Argentina.

Materials and methods

Population

The population data used in the study was provided by the National Institute of Statistics and Census and was based on the census performed in 2001. Tucumán province is located in the north of Argentina (26° and 28° south latitude, meridians 64°30' and 66°30'). It covers a surface area of 22,524 km², has a subtropical climate with a dry season, and a total population of 1,338,523 inhabitants, 246,927 of whom are over the age of 50 years (132,728 women and 114,199 men; Table 1).

Most people who suffer hip fracture in the province are seen in SMT city, where there are a total of 15 healthcare centers with an orthopedics service equipped to treat these patients; two of these facilities are public (Hospital Ángel C. Padilla y Centro de Salud Zenón de Santillán) and 13 are private (Sanatorio 9 de Julio, Sanatorio Rivadavia, Sanatorio Central, Sanatorio CIMSA, Sanatorio del Sur, Sanatorio Galeno, Sanatorio Norte, Sanatorio Parque, Sanatorio Pasquín, Sanatorio Regional, Sanatorio Sarmiento, Sanatorio Modelo, Clínica Mayo).

The public health system and healthcare facility infrastructure in Tucumán are better than those in the neighboring

provinces, so that even people living far from the city and close to the state border would still seek healthcare in SMT and hip-fracture patients would not go to another province for treatment. Therefore, the incidence of hip fracture obtained in this study is reliable. The patients' address was confirmed prior to including them in the study; no non-residents were included. However, it is true that the likelihood of a resident suffering a hip fracture outside the province cannot be ruled out, in which event we would have "missed" a case. If this were the case, results might reflect an underestimation, not overestimation, of incidence. Hip fractures require medical attention and, in most cases, a surgical procedure. It is therefore highly unlikely that some rural inhabitant suffering a hip fracture might not get hospital attention.

The population is predominantly white, of European descent. All the hip fractures in subjects aged over 50 years in SMT city and Tucumán province were studied prospectively for 1 year, between 1 May 2001 and 30 April 2002. The Traumatology and Orthopedics Services of all the aforementioned healthcare centers were reached. Each patient was interviewed by one of the team researchers on the day of admission to the center. The operating and admission files of the institutions were also reviewed.

All the patients admitted to the hospital were interviewed to establish the patient's age, personal data and history (including address to corroborate that they lived in SMT or in Tucumán province), and type of fracture.

Using radiographic studies, the fractures were typed as cervical or trochanteric hip fractures according to their localization (17). Patients presenting traumatic fracture, pathologic fracture due to bone metastases or other metabolic bone diseases, and those who were not Tucumán residents were excluded from the study.

To further analyze the data, the patients were divided according to gender and age (decade of life). The incidence rate of fracture in each age-group and gender was calculated based on the total number of hip fractures and the corresponding population data of the city of SMT and the province of Tucumán.

The study protocol was approved by the Ethics Committee of the Hospital Centro de Salud of SMT city.

Table 2 Annual incidence of hip fracture in San Miguel de Tucumán city

Age (years)	Population		No. of fractures		Incidence 100,000 inhabitants per year		Female to male ratio
	Women	Men	Women	Men	Women	Men	
50–59	24,504	20,880	6	4	24.5	19.2	1.3
60–69	18,125	13,517	32	12	176.5	88.7	1.6
70–79	13,530	8,751	75	30	554.3	342.8	1.6
≥80	5,942	2,647	95	29	1,598.8	1,095.6	1.5
≥50	62,101	45,795	208	75	334.9	163.8	2.0

Table 3 Incidence of hip fracture in the province of Tucuman

Age (years)	Population		No. of fractures		Incidence 100,000 inhabitants per year		Female to male ratio
	Women	Men	Women	Men	Women	Men	
50–59	55,256	53,494	13	5	23.5	9.3	2.7
60–69	38,542	33,112	55	20	142.7	60.4	2.3
70–79	27,323	20,830	134	53	490.4	254.4	1.9
≥80	11,607	6,763	165	53	1,421.5	783.7	1.8
≥50	132,728	114,199	367	131	276.5	114.7	2.4

All the patients gave their informed consent to participate in the study.

Results

To allow for a better understanding of the results, the incidence of hip fracture in (1) SMT city and (2) Tucuman province, was analyzed separately.

1. Incidence rate of hip fracture in SMT city: Table 2 shows the distribution of the SMT city population according to age, the number of fractures in men and women, and the incidence of hip fracture per 100,000 inhabitants aged over 50 years, according to gender and decade of life. The total number of hip fractures in women and men aged over 50 years within the studied period was 208 and 75, respectively. The incidence of hip fracture was 334.9/100,000 inhabitants in the female population and 163.8/100,000 inhabitants in the male population. The female to male ratio was 2:0. The incidence of fracture was found to increase exponentially with age in both sexes (Table 2). The number of trochanteric fractures was higher than the number of cervical fractures (155 versus 128, respectively).
2. Incidence of hip fracture in Tucuman province: A total 498 fractures were recorded in the studied period (367 in women and 131 in men). Average age of the female and male population was 78±9 years (age range, 50 to

100 years) and 77±9 years (age range, 51 to 97 years), respectively.

Table 3 shows population data: total number of hip fractures and incidence of hip fracture per 100,000 inhabitants per year in the whole province of Tucuman (urban and rural population). The incidence of hip fracture in the female population was 276.5 per 100,000 inhabitants per year, and that of the male population was 114.7 per 100,000 inhabitants per year. The female to male ratio was 2:4. As observed in the SMT city population, the incidence of hip fracture increased exponentially with age in both men and women. The percentage of trochanteric fractures was higher than that of cervical fractures both in women (60% versus 40%, respectively) and in men (53% versus 47%, respectively). A total 270 fractures were recorded in fall and winter (54%) and 228 fractures were recorded in summer and spring (46%).

Discussion

Argentina is a large country, extending from latitudes 22° to 55°S, and has different climates: a subtropical climate in the north, and a cold climate in the south. Previous studies have shown that the prevalence of osteoporosis varies among the different geographic areas due to ethnic and environmental factors [13–27]. Having an estimate of the incidence of osteoporosis, based on the number of hip fracture in

Table 4 Hip fractures incidence standardized by age and sex in women of each Argentine city studied (100,000 inhabitants per year)

Age (years)	La Plata	Rosario	Mar del Plata	Tucuman
50–59	11.3	15.1	18.5	24.5
60–69	102.6	97.0	94.0	176.5
70–79	621.1	527.0	>70 years 946.2	554.3
≥80	2,807.3	2,954.0		1,598.8
≥50	379.4	405.0	259.6	334.9

Table 5 Hip fractures incidence standardized by age and sex in men of each Argentine city studied (100,000 inhabitants per year)

Age (years)	La Plata	Rosario	Mar del Plata	Tucuman
50–59	28.3	15.4		3.4
60–69	40.8	62.1		70.5
70–79	207.6	285.6	>70 years 326.6	342.8
≥80	796.2	807.0		1,095.6
≥50	101.0	137.0		92.1
				163.8

subjects aged over 50 years is therefore essential to estimate the risk of osteoporosis of the population and the economic impact of the disease.

Three previous prospective studies using the same methodology were performed to identify hip fractures within a 1-year period in populations living in the central region of the country (La Plata, Rosario, and Mar del Plata); this is the first study to be carried out in northern Argentina.

A strength of this study is that it is a prospective study seeking to identify all hip fractures occurring within a 1-year period and then compare results with those obtained in previous studies using the same methodology conducted in other areas of the country. The data reported here show the incidence of hip fracture in SMT city. The incidence of hip fracture in the female population was similar in SMT, La Plata, and Rosario, but was lower in Mar del Plata. Tables 4 (women) and 5 (men) show comparison of the results obtained in SMT and previously published results obtained in cities in the central region of the country.

The incidence of hip fracture in SMT was found to be 334.9 per 100,000 inhabitants per year in women. These results are similar to those obtained in La Plata (379 per 100,000 inhabitants per year) and somewhat higher than results corresponding to Mar del Plata (252 per 100,000 inhabitants per year). The city of Rosario had the highest incidence (405 per 100,000 inhabitants per year). Despite the differences observed among the three studies, all results were consistent.

The difference in hip fracture incidence between the female population of La Plata and Rosario and the female population of Tucumán could be attributed to their particular population characteristics. There are also climate differences between the regions where these cities are located, which may in turn result in differences in the levels of vitamin D of their populations. A study performed to establish vitamin D levels of populations living in different regions of Argentina showed the population in Tucumán to have higher levels than that living in central and south Argentina [28]. In agreement with reports showing hypovitaminosis in sunny countries, as is the case of Italy, Spain, and Greece [29, 30] the prevalence of vitamin D insufficiency or deficiency in Tucumán was high (52%), but was still lower than that observed in central Argentina (64%).

The results of the urban area of SMT and the predominantly rural area of the province of Tucumán were compared and showed a lower hip fracture incidence in the rural population. A possible reason for the lower incidence of hip fracture in rural communities is that their more physically active life-style may protect against osteoporosis and fractures. Similar results have been observed in other countries [31–34].

It is essential to perform similar epidemiological studies throughout the different regions of Argentina, mainly in the south of the country.

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Conflicts of interest None.

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