

# Incidence of lower limb bone fractures in female individuals of Aracaju (Sergipe), Brazil

Incidência de fraturas ósseas dos membros inferiores em indivíduos do sexo feminino de Aracaju (Sergipe), Brasil

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Studies indicate that the number of hip bone fractures caused by osteoporosis may rise from 1.66 to 6.26 million until 2050, worldwide. For this reason, implementation of preventive measures becomes a necessity. Female individuals are usually more affected due to a variety of factors including old age, early menopause, chronic disease in the family history, calcium deficit, as well as the lack of physical exercise (sedentary individual). The aim of this study was to estimate the incidence of hip and lower limb fracture in female individuals' resident in Aracaju city. From the period of January 2008-2009, around of 300 fracture cases were of lower limb analyzed from females. The incidence of femur fractures in women increased according to age group, 66.17 individuals per 10,000 inhabitants (over 60 years-old). These findings allow us to conclude that the incidence of hip and lower limb bone fractures among women over 60 years were more significant in the femur.

Keywords: fractures; lower limbs; bones

Estudos indicam que o número de fraturas osteoporóticas do quadril, no mundo irá aumentar de 1,66 para 6,26 milhões até o ano de 2050, fazendo-se necessária e urgente implantação de medidas preventivas. Os indivíduos do sexo feminino são os mais afetados, devido a fatores diversos como menopausa precoce, histórico familiar de doença, deficiência na ingestão de cálcio, bem como também, para ambos os sexos, a diminuição e/ou ausência de atividade física. O objetivo deste estudo foi estimar a incidência de fratura de quadril e osso do membro inferior em indivíduos do sexo feminino residentes em Aracaju/SE. No período de 2008-2009, foram analisados 300 casos de fraturas de membros inferiores do sexo feminino. A incidência de fraturas de fêmur em mulheres aumentava de acordo com a faixa etária, apresentando 66,17 indivíduos para cada 10 mil habitantes acima de 60 anos. Conclui-se que a incidência de fratura em membro inferior mais preponderante entre as mulheres acima de 60 anos concentra-se no fêmur.

Palavras-chave: fraturas; membros inferiores; ossos

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## 1. INTRODUCTION

Osteoporosis can be characterized as a disease that causes loss of bone mass, structural deterioration of bone tissue and reduction of bone mineral density, leading to major risks of bone fractures in adults [1]. According to the World Health Organization (WHO) [2], a patient that presents bone density is within  $\pm 1$  standard deviation (SD) is considered normal. However, those presenting more than 1 SD are known to be indicative of pathology like osteopenia and/or osteoporosis. The treatment is recommended to women with mineral bone density lower than -2 in order to reduce the risk of fractures, if there is no other risk factor.

With increasing life expectancy, the incidence of hip fractures will rise exponentially with age, unless preventive efforts are undertaken. Studies indicate that this bone affection could

increase from 1.66 to 6.26 million until 2050, worldwide [3]. This data underlines the real necessity of preventive measures. However, female individuals are usually more affected by osteoporosis due to a variety of factors associated with a decrease of bone density, including old age, early menopause, chronic disease in the family history, Calcium deficit, lack of physical exercise (sedentary individual), ethnic origin, as well as the continuous usage of corticoid [4].

Osteoporosis is a common pathology found among the elderly population which lately has been reported to be increasing due to the aging process. The estimated lifetime risk of osteoporotic fracture is as high as 50 percent, especially in white and Asian women. According to the Brazilian Geography and Statistical Institute (IBGE) [5], there were approximately 204 million older adults in 1950 around the world and it is estimated that in 2050 these numbers will rise to 32% of the total population. In Brazil, the data is also disadvantageous once that, in 2002, 9.3% of its population was considered elderly. Therefore, statistically it is expected to reach higher numbers in 2050, around 35% of Brazilian population.

When a patient presents an osteoporotic fracture, it represents serious implications to mobility. Usually, the most frequent fracture is of the femur, the longest bone in the human body. This sort of fracture has a huge impact in the Brazilian Government financial budget. Besides, there are reports from the Single Health System presenting expenditure around R\$2,000 for women over 50's [4]. This data suggests high financial cost due to continual use of medicaments, medical care and need of assistance through the recovery period of this age group.

The aim of this study was to estimate the incidence of hip and lower limb fracture in female individuals' resident in Aracaju city.

## 2. MATERIALS E METHODS

### *Study design*

A retrospective and descriptive epidemiological study was carried out at a Public Hospital called Fundação de Beneficência Hospital Cirurgia (FBHC), located in Aracaju-Sergipe/Brazil. This hospital is considered a reference in hospital care in Sergipe, attending around 4,800 fracture cases per year.

### *Data collection*

A total of 1,200 cases of fracture which occurred during the 2008-2009 period were evaluated, but only those of female individuals were analyzed. The data was then classified according to age group and type, if hip or lower limb bone fracture. All patients presenting pathological fractures deriving from bone cancer or any other chronic disease, such as kidney insufficiency or continuous use of corticoids, were disqualified as part of the exclusion criteria.

### *Statistical analysis*

Data statistical criteria was used systematically according to the average mistake pattern, Standard Error of Mean, ( $\pm$ S.E.M.) using 't' Student's t-distribution and Qui-Square for two different conditions, indicated at the bottom of every figure. Statistical software Graph Pad Prism (version 4) was used to systematize all data (GraphPad Software, San Diego, CA. USA).

### *Ethical aspects*

This present study was approved and registered by the Human Ethical Committee from the University Hospital of the Federal University of Sergipe (number: 0082.0.107.000-10).

### 3. RESULTS

One thousand and two hundred cases of lower limb and hip bone fractures, however we evaluated around 300 from female patients, namely 28.6% of initial population. All cases were taken from the Fundação de Beneficência Hospital Cirurgia.

Figure 1 shows the incidence of fracture per 10 thousand people. This one presents an increase of fracture according to age group among female patients. The obtained data reveals a crescent number, 0.48 individuals (0-10 years old), 5.75 individuals (11-20 years old), 8.59 individuals (21-29 years old), 11.20 individuals (30-60 years old) and 66.17 individuals for every 10 thousand residents over 60 years old.

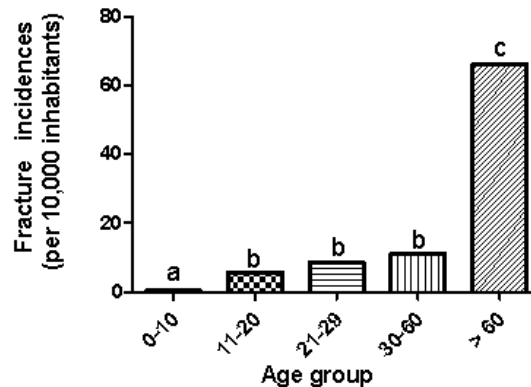


Figure 1: The data represent the rates of fractures grouped that were observed in female patients treated in the FBHC. Qui-square was used to evaluate the data ( $p < 0.05$ ). The different letters represent statistical difference in one or more groups.

Figure 2 details the clinical case by fracture location, showing a significant statistical growth ( $p < 0.05$ ) in the incidence of femur fracture following the age group in female patients (Figure 2A) from 11 years old, 4.47 individuals (11-20 years old), 5.42 individuals (21-29 years old), 4.82 individuals (30-60 years old) and 45.94 individuals for every 10 thousand residents over 60 years old. The number of patients presenting tibia fractures is shown on figure 2B. It was verified that it also increases according to age (0.64 individuals (11-20 years old), 0.90 individuals (21-29 years old) and 1.22 for every 10 thousand population (30-60 years old)). For women over 60's the incidence was even higher, 2.11 of patients with tibia fractures. Similar results also were observed in between 21-29 years of age (2,03) and over 60 years of age (5,06), based on every 10 thousand inhabitants.

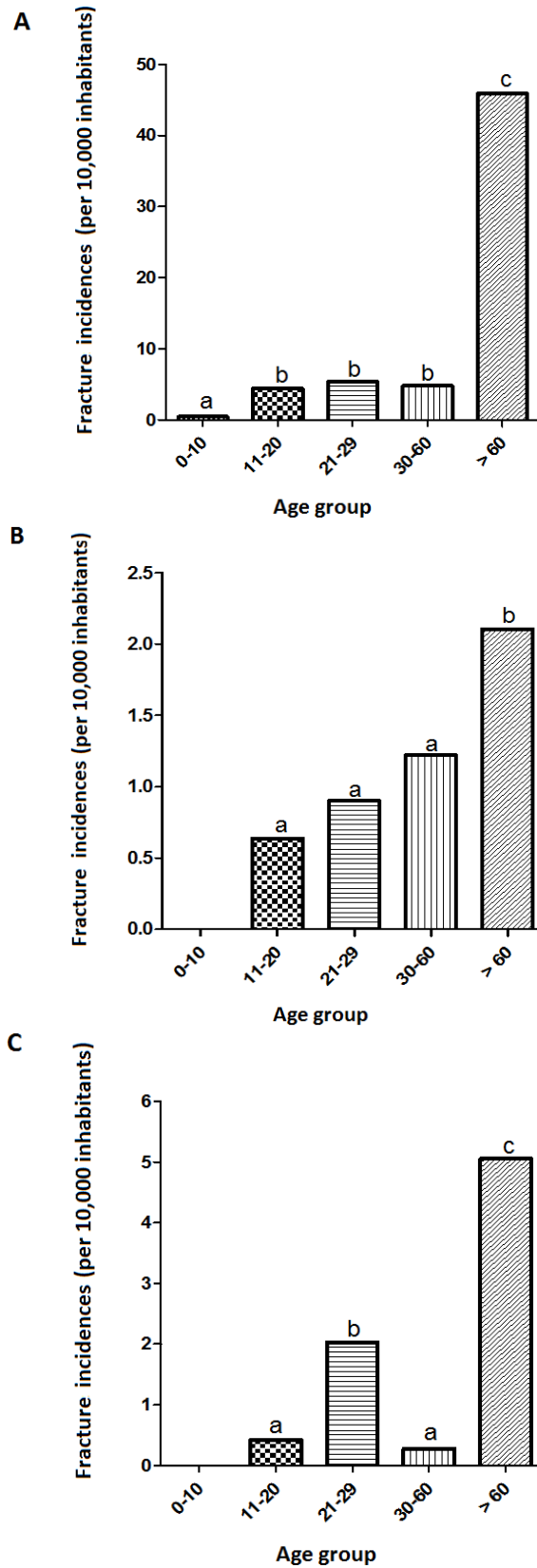


Figure 2: The data represent the rates of fractures grouped by type that were observed in female patients treated in the FBHC (A – Femur, B – Tibia, and C - Tibia/Fibula). Qui-square was used to evaluate the data ( $p < 0.05$ ). The different letters represent statistical difference in one or more groups.

#### 4. DISCUSSION

Despite all other bones structures from the lower limbs, the femoral fracture is one of the most traumatic injuries which cause deleterious effects in elderly women. Anatomically, fracture in the femur neck is most commonly observed due to its articulation with the hip, an impaired structure of high regional instability. The primary concern with femoral neck fractures is that the damaged blood supply to the bone will lead to non-healing or bone death of the femoral head. In these cases, patients may require a hip replacement surgery. In addition, periosteum covering the femur head is a very thick tissue layer with low osteogenic activity, characteristic that limits its reconstitution and bone synthesis in individuals over 60 years of age when committed by fracture [6].

The femur head is extremely vascularized by retinacular arteries which are branches from the medial circumflex femoral artery that extend to the head of the femur within the retinacular folds of synovial membrane surrounding the neck of the femur. Therefore, any rupture in the bone integrity can cause vascular discontinuity, followed by necrosis of the femur head and hemorrhage of hip articulation [6]. Damage in different parts of the femur were also reported, such as intertrochanteric region (in between lesser and greater trochanters) and pertrochanteric (fracture through the great trochanter and neck) [6, 7].

The femur is one of the largest and strongest bones in the body. It is known as the thigh bone and extends from the hip joint down to the knee joint. Although it has a high bone density, this bone structure is more likely to be damaged, either from car accidents or falls from heights. A spiral type of fracture is frequently observed in femur shaft [5]. In general, if the patient is medicated correctly, has a good medical assistance and hospital care, the recovery and bone reintegration can vary from a period of 20 weeks to 12 months [8, 9].

This study brings new information relating to tibia and fibula results. According to the Brazilian literature, there is a lack of data about the incidence on these types of fractures. The numbers are very significant once they show an increase following the age group. Lower limb and hip bone fractures instantly reduce patient's mobility causing lower quality of life, until full bone reintegration and re-establishment of its osteoarticular functions. Depending on the level and extension of fracture, it could lead to total movement loss and lower limb amputation. This scenario is even worse on elderly people who frequently present other inherent pathologies associated to the aging process such as less muscle strength and body balance, slow healing process, cardiovascular and metabolic diseases, like diabetes [10]. The limiting factor on this study is the absence of further fracture information on every case. However, the main cause of fracture in women over 60's are believed to be by osteoporosis and women in between 60-70 years of age have 8 times more frequency of osteoporosis when compared to male individuals of same age. In addition to this study, elderly women showed loss of bone mass around 3% per year in the first 5 years after menopause, once the decrease of estrogens leads to 50% loss of trabecular bone mass and 35% of cortex bone, meanwhile in male individuals these values did not overlap 30% [3].

Some authors suggested that the climatic factor may influence on incidence fracture, for example, at Ceará has been related a diminished incidence fracture on elderly people [11], this same authors suggested that solar exposition contribute to a pronounced vitamin D, which in turn, diminished fracture induced by aging. However, others factors as type of diet and genetic determinants contribute to maintenance of bone integrity [12, 13].

According to the 2000 census [5], there is an estimate of 14.5 million elderly individuals in Brazil, overloading the countries' Public and Private Health Sector. In fact, this populational increase of older people has a straight connection with the number of patient with chronic diseases which require medical assistance and hospital care for a longer period of time. It is necessary to incentive elderly people, men and women, to adopt healthy habits such as regular practice of exercise and food choice oriented by nutritionists, respecting each individuals need. Regular visits to the doctors are also recommended in order to evaluate personal health during the aging process.

## 5. CONCLUSION

The final conclusion of this present study reveals that in hip and lower limb bones, the major incidence of fracture among women over 60's were in the femur. However, the loss of bone integrity of tibia and tibia/fibula were also verified. This data urges the necessity of a permanent action from the Public Health Sector to present incentive measures that contribute to the development of educational work focused in the promotion of life quality and prevention of fractures in the elderly women.

## 6. ACKNOWLEDGMENT

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