

# *Densitometric analysis of femoral region in men older than 50 years old from an ambulatory of urology*

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## ABSTRACT

**Introduction:** Men osteoporosis remains poorly diagnosed. The objective of this study was to measure bone mineral density (BMD) and the prevalence of osteoporosis in a group of men. **Patients and methods:** 151 men (ages 50-93 years) in good health, from an outpatient clinic for routine urologic evaluation performed the measurement of bone density of lumbar spine and femoral regions. **Results:** Age had a negative influence on femoral neck BMD and T-Score ( $r_s = 0.49$  and  $0.73$ , respectively,  $P \leq 0.0001$ ) using the Spearman's rank correlation coefficient. Femoral neck osteoporosis was detected in 25.16% ( $n = 38$ ). Most of the osteoporotic patients (81.56%) were over 70 years old, and 47.37% of them were very old (aged 80 years or more). Beside age, hypogonadism induced by GnRH analogues and cyproterone acetate for treatment of prostate cancer, anticoagulants, coronary revascularization history and alcohol were risk factors identified in about 18% of the osteoporotic group. **Conclusion:** All men over 70 years old and younger men with risk factors for osteoporosis should be submitted to a bone densitometry.

**Keywords:** men, hypogonadism, osteoporosis, fractures, bone density.

## INTRODUCTION

The increase in life expectancy in Brazil has generated an increase in the incidence of chronic degenerative pathologies, such as senile osteoporosis in women and also in men. Everyone recognizes the high morbidity of osteoporotic fractures in elderly patients,<sup>1,2</sup> but health policy for prevention and treatment of osteoporosis are usually restricted to women after menopause. Although one third of the total femur fractures occur in men, and they have a worse prognosis after fracture than women,<sup>3,4</sup> the study of osteoporosis in men is worldwide neglected. This

disease is rarely diagnosed before the fracture, and even after this event rarely an anti-osteoporosis treatment is instituted.

This study measured bone mineral density (BMD) and the prevalence of osteoporosis in a sample of Brazilian men, regularly monitored in the urology clinic.

## PATIENTS AND METHODS

For this study, 200 men from the outpatient clinic for routine urologic evaluation in the Department of Urology, *Hospital*

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Central da Aeronáutica (Air Force Central Hospital), of age 50 or older and in good clinical conditions were pre-selected. The invitation to participate in the survey was by telephone contact expecting at least forty men by age group. All 163 who agreed to participate in the study were followed in the Geriatrics and Gerontology Unit, where history was collected and directed to diseases and medications that promote osteoporosis, and clinical examination performed. Subsequently, they were referred to a radiographic study of the thoracolumbar spine and pelvis, in addition to the measurement of BMD in lumbar spine and proximal femur on Norland apparatus.

Criteria for the diagnosis of osteoporosis, low bone mass, and normal BMD followed the standard of the World Health Organization (WHO). The international reference of the WHO for the diagnosis of osteoporosis is a T-score of -2.5 standard deviation (SD) or lower at lumbar spine or proximal femur, although the distal radius (peripheral site) can be used for this purpose.

The report of bone densitometry examination (DXA initial report) was based on the official positions of the Brazilian Society of Clinical Densitometry, according to minimum requirements.<sup>5</sup>

Statistical analysis was performed using the Stata program, software version 8.0, 2003. The differences between the median values of bone density by age group were determined by the non-parametric Mann-Whitney U test. The correlations between age and densitometry parameters were evaluated by the correlation coefficient Spearman. P-value less than 0.05 was considered significant.

The study was approved by the Research Ethics Committee of the Air Force Central Hospital, without conflict of interest. All patients participating in the study signed a free and informed consent.

**RESULTS**

From the 163 men initially evaluated, ten did not have bone densitometry and were excluded from the study. Of the remaining 153 men, who completed the form for evaluating the risk of osteoporosis and have done the image testing, 2 were excluded due to polyostotic Paget’s disease.

Thus, 151 men were the object of our densitometric analysis study. The age distribution (mean age and SD) was 37 men at 80 years old or older (83.7 ± 3.7 years), 38 men 70 to 79 years old (75 ± 4.1 years), 37 men 60 to 69 years old (65.4 ± 2.8 years), and 39 men 50 to 59 years old (55.3 ± 2.9 years).

There was a strong correlation between age and BMD in the femur neck (r = -0.49, P = 0.0000), and between age and

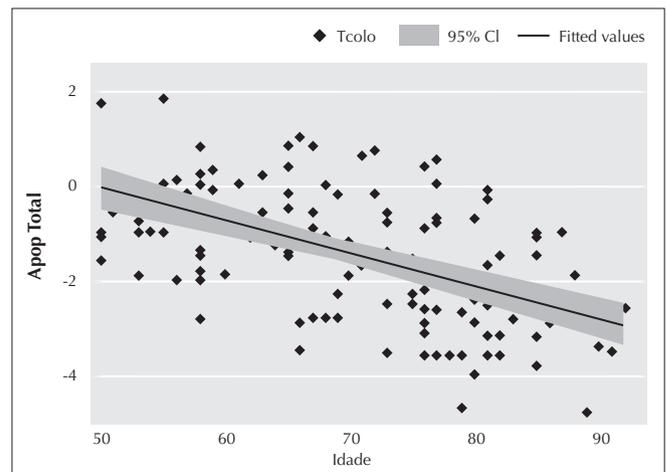
T-Score in the same region (r = -0.73, P = 0.0000), as seen in Figure 1.

From 151 men tested, 38 (25.16%) had osteoporosis in the femoral region. The most affected by osteoporosis (81.46%) were men over 70 years old (up to 93 years old) and a significant portion (47.37%) was of much older men, i.e., 80 years old or more.

Low BMD in the femoral region, considered osteopenia on densitometry (T-score of <-1.0 to > -2.5 SD compared with young men), was detected in other 47 men, 25 of them were 70 years old or older.

The BMD, median and interquartiles, and the prevalence of osteoporosis and osteopenia in the femoral region by age group are showed in Tables 1 and 2.

Z-Score (that compares the patient’s BMD with the values of men at the same age, body mass index, and ethnicity) was measured only in patients under 80 years old; there was only one case, a 79 years old patient, with Z -Score in the femoral neck much lower than expected: -2.2 SD.



**Figure 1.** Correlation between age and T-Score in the femur neck in men from 50 to 93 years old (r = 0.73 and P < 0.0001).

**Table 1**

Bone mineral density in the femur neck (median and interquartiles) by age, in men from 50 from 93 years old

50 to 59 years (n = 39)	0.956 g/cm <sup>2</sup> (0.889 to 1.025)
60 to 69 years (n = 37)	0.887g/cm <sup>2</sup> (0.830 to 0.988)
70 to 79 years (n = 38)	0.815g/cm <sup>2</sup> (0.703 to 0.921)
≥ 80 years (n = 37)	0.717g/cm <sup>2</sup> (0.627 to 0.831)
P-valor	<0.0001

**Table 2**

Prevalence of osteoporosis and osteopenia by densitometric criteria in Brazilian men from 50 to 93 years old

	50 to 59 years (n = 39)	60 to 69 years (n = 37)	70 to 79 years (n = 38)	≥ 80 years (n = 37)
Femur osteoporosis	2.56%	16.21%	34.21%	48.65%
Femur osteopenia	21.51%	37.84%	34.21%	32.43%
Normal femur BMD	76.93%	45.95%	31.58%	18.92%

The osteoporosis group, 18.42% (n = 7) were using drugs that potentially cause bone loss: goserelin (n = 4), cyproterone acetate (n = 2) and warfarin sodium (n = 1). The first two drugs mentioned were used as an antiandrogenic therapy in the treatment of prostate cancer (under control and no evidence of metastases), and anticoagulants in patients with atrial fibrillation. The use of alcohol was observed in two patients with osteoporosis under 70 years old. One 67-year-old patient with a history of myocardial revascularization not receiving anticoagulant presented T-score of -2.8 on femoral neck.

The group with low BMD (osteopenia on densitometry), 10.64% (n = 5) used or were using drugs potentially known to cause bone loss. Two osteopenic patients over 70 years old were using gonadotropin-releasing hormone analog GnRH (goserelin) to treat prostate cancer. A third patient, a 75-year-old former athlete, had a history of chronic use of corticosteroids in the past and T-score of -1.9 on femoral neck. From the osteopenic patients under 70 years old, 2 were chronic users of anticoagulants for atrial fibrillation. Use of alcohol was observed in one patient aged 53 years with T-score of -1.9 on femoral neck. A 66 years old patient with newly diagnosed Parkinson's disease had T-score of -1.3, and another patient with 58 years, with history of right nephrectomy in youth and serum creatinine of 1.5, showed T-score of -1.4.

Radiographs of thoracolumbar spine and pelvis, revealed no fractures or lytic and/or blastic lesions. As expected, the elderly more often presented spinal osteoarthritis, which hindered the densitometric analysis of the site. Only in 2 patients (68 and 81 years old with no recognized risk factors for osteoporosis), T-score on lumbar spine was -2.5 SD below the mean, these men also had densitometric patterns for osteoporosis in femoral region. Except for an 80 years old patient with T-score of -2.4 on analysis of femoral region (femoral osteopenia), all other elderly patients classified as osteopenic at the lumbar spine presented osteoporosis in the femoral region.

It was clear the discrepancy between the values found in the femoral region and the lumbar spine, especially in the elderly. From the 109 densitometry with T-score of lumbar spine within normal limits, the analysis of the femoral region showed osteoporosis in 14, and all these patients were over 60 years old. Furthermore, all bone densitometries classified as within the normal range, based on the femoral region, were also considered normal in the spine. Therefore, we exclude the lumbar spine site (L2-L4) from the results interpretation and from the discussion below.

## DISCUSSION

The prevalence of osteoporosis in the studied male population (25.3%) approximates that of the study performed at the National Institute of Trauma-Orthopedics (INTO) in Rio de Janeiro, which was 19.5%.<sup>6</sup> Data are more than twice the prevalence of the disease in the United States, Canada and Europe (approximately 10%).<sup>6</sup> When we analyzed the prevalence of the disease in very elderly men, there were even higher values compared to the INTO study (48.7% versus 36.4 %).<sup>6</sup>

In 2000, Zerbini *et al.* published the densitometric analysis of 288 Brazilian men aged 50 years or older (mean age 62.5 years), concluding that hip BMD was similar in the population studied, compared to the North American and European, but this study did not include very elderly men (80 years old or more), or presented a percentage of men with osteoporosis, allowing the comparison of prevalences.<sup>7</sup>

The lack of studies on the prevalence of osteoporosis in men in Brazil and the results found in this study reinforce the importance of health care policies aimed to the male population to prevent and treat osteoporosis, in order to reduce the risk of fractures. Most data from literature comes from foreign populations, and the treatment of male osteoporosis was done with bisphosphonates and teriparatide.<sup>8,9</sup>

The risk factors related to the appearance of osteoporosis are similar in men and women. Although there is gender difference in bone geometry, the incidence of fractures appears to be similar for the same areal BMD.<sup>10</sup> Because men have higher peak bone mass, they usually have fractures of hip, vertebral body or distal radius ten years after women. Hip fractures in men, however, result in a mortality rate, one year after the fracture, of 31% versus 17% in women. About 30% of hip fractures occur in men, and one in eight men over 50 will have an osteoporotic fracture.<sup>11</sup>

In our study, it could be seen that the age factor contributed to the onset of osteoporosis, evidenced by the strong correlation

between age and BMD. Virtually the entire group with osteoporosis consisted of men over 70 years old.

Certainly, the increase in life expectancy has contributed to the increased incidence of osteoporosis in the male populations already studied in the last decades. It became more evident that the senile osteoporosis in men aroused public health measures to combat osteoporosis, and researches in the field of bone metabolism towards the male population.

Tanaka *et al.* evaluated the risk factors related to osteoporosis in 325 Brazilian men aged 50 years or more, and confirmed that age was a risk factor for osteoporosis. Other risk factors were low BMI, physical inactivity (in the last 12 months), smoking, lack of routine use of thiazide, white ethnicity, and maternal history of osteoporosis after 50 years.<sup>12</sup>

In a recently published study, which excluded men receiving antiandrogenic therapy, we demonstrated that low BMI and decline of sex steroids explain much of the association between aging, increased bone turnover and osteoporosis.<sup>13</sup> The relationship between body composition and BMD was previously described by Zerbini *et al.*<sup>14</sup>

The senile osteoporosis tends to be multifactorial, related to age, inactivity, hypogonadism, low intake and/or calcium absorption and hyperparathyroidism secondary to vitamin D deficiency.<sup>15,16</sup> Although we are in a tropical country, vitamin D deficiency is expected due to the process of aging in the male population;<sup>17</sup> however, the decline in concentrations of 25 OH vitamin D in men takes longer than in women,<sup>18</sup> justifying the lower prevalence of osteoporosis in men. Senescence is characterized by the decline of physiological functions and, physiologically, there is a decrease in muscle mass, lentification and damage in the process of digestion, and reduction of renal and hepatic functions, favoring osteoporosis in both sexes.

The prevention of senile osteoporosis is based on scheduled physical activity, in addition to calcium and vitamin D supplementation.

Florindo *et al.*, studying 326 Brazilian men have shown that physical activity in the last 10 to 20 years, and even in the last 12 months, can contribute to preserve bone mineral density in men aged 50 years or older. The positive correlation between physical activity and bone mineral density in Florindo's group proved to be independent of age and BMI.<sup>19</sup>

Saraiva *et al.*, studying 177 institutionalized elderly (52 men) and 243 outpatients (75 men) from São Paulo, found high prevalence of disability and insufficiency of vitamin D in the elderly population studied, more pronounced in the institutionalized group. In this assessment, 71.2% of the institutionalized group and 43.8% of the outpatients have

shown values of 25 OHD lower than the minimum level recommended (50 nmol/L).<sup>20</sup>

In our study of vitamin D in Brazilian men, outpatients aged 50 years or older in Rio de Janeiro (n = 152), we observed high prevalence of hypovitaminosis D (49.4%) and deficiency of vitamin D (31.9%). In the group with osteoporosis, 82.7% had hypovitaminosis D or deficiency of vitamin D. Bone mineral density at femoral neck was associated with levels of 25 OHD ( $r = 0.317$ ,  $P = 0.002$ ).<sup>21</sup>

These works carried out in Brazil demonstrate the importance of vitamin D supplementation during the aging process to prevent and treat male osteoporosis in our country.

The studies on the treatment of osteoporosis in men with bisphosphonates and teriparatide include men of all ages, with younger men suffering from the so called "idiopathic osteoporosis" or secondary osteoporosis.<sup>9,22-25</sup> The use of testosterone and/or growth hormone replacement (GH) remains only in cases of deficiency (hypogonadism and GH deficiency).<sup>26,27</sup>

In our study, the men came from an urology outpatient clinic and were older. Probably it was the reason for a higher frequency of osteoporosis secondary to drugs for treatment of prostate cancer and other chronic diseases.

It is of outmost importance to give attention to medication in the investigation of osteoporosis in men. In the group examined, 20% of osteoporosis cases were considered induced by drugs. Treatment of prostate cancer with antiandrogenic therapy, cyproterone acetate or GnRH analogues, such as goserelin, deserves consideration. All patients who were using or had used these drugs had low bone mass or osteoporosis. Several authors have demonstrated bone loss related to the use of these medications, due to induced hypogonadism.<sup>28-30</sup> Sex steroids are crucial not only for the acquisition and peak of bone mass, but also for its maintenance.<sup>31</sup> It is recommend the concomitant use of bisphosphonates in cases of prostate cancer with bone metastases.<sup>32,33</sup> In the present study, all patients with prostate cancer had bone scintigraphy of the whole body without metastases. In such cases, the administration of bisphosphonates is also necessary, but there are few studies in these circumstances.<sup>34</sup> Chronic anticoagulant therapy is also associated in our study with patients with osteoporosis or low BMD. Currently, the use of anticoagulants for long periods increased, in part due to the high incidence of morbidity and mortality from cardiovascular and cerebrovascular diseases, but little attention has been given to the effect of these drugs on the bone in the long-run. We need more studies on this subject.

We observed cases of osteoporosis and low BMD in men below 70 years old. The chronic consumption of alcohol promotes bone loss, even in young people. It is common with excessive intake, malnutrition and increased risk of falls and fractures, but it seems that alcohol has a direct effect on the bone, inhibiting its formation, reducing the number of osteoblasts, the amount of osteoid matrix and the secretion of osteocalcin.<sup>35</sup>The real effect of alcohol on BMD of these studied population is difficult to measure due to the small number of drinkers. Attention should be paid to this habit or addiction, so common in our environment, since the amount and frequency of alcohol intake tended to be minimized by men.

In our study, the low incidence of osteoporosis in men below 60 years old suggests that we should not ask for routine bone densitometry in this age group, according to the national and international guidelines for the investigation of osteoporosis in men. The age group between 60 to 70 years old has shown considerable increase in the prevalence of osteoporosis, and in the future they might be routinely assessed. Remains, therefore, the request for routine bone densitometry in men with aged 70 years or older, and in an individualized way in the younger, taking into account the potential risk factors related, especially the family history and the use of drugs potentially deleterious to bone mass.

## CONCLUSIONS

Our findings are in accordance with the global data, which show an exponential increase of osteoporosis in the aging male: about 25% of the studied men over 50 years old had femoral neck osteoporosis. Of these, most were over 70 years old. Drugs for prostate cancer, anticoagulant, history of coronary artery bypass surgery, and alcohol use were risk factors found in 18% of the osteoporotic population. These findings lead us to recommend bone densitometry for all men over 70 years old, and for younger men with risk factors.

In Brazil, prevention and treatment of male osteoporosis have become necessary: the attention given to women's bone health must be shared with men.

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