

ORIGINAL ARTICLE

Prevalence of Osteoporosis in adults aged 40 years and above at the University Teaching Hospital in Lusaka, Zambia

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ABSTRACT

Background: Osteoporosis is a global problem with a high prevalence in developed countries and an increasing trend in developing countries. Studies on the incidence of osteoporosis in Zambia are not documented. However, some recent data in other countries have shown an increase in this disease but awareness of this condition is sorely lacking among the population as well as health authorities, making it difficult to determine the extent of the concern in Zambia. Since the prevalence of this disease has not yet been established at the study site, this study aimed to determine the prevalence of osteoporosis among adult patients aged 40 years and above at the University Teaching Hospital (UTH).

Methods: This retrospective study involved the retrieving of document data from 76 patients, aged 40 years and above, who had bone mineral density reports.

Results: The study results showed that 32.9% of the patients had osteoporosis, 43.4% had osteopenia, while 23.7% had normal bone mass. Among the male patients, 47.6% had osteoporosis while 27.3% had osteoporosis among the females. However, the chi-square results at 5% level of significance showed that both men and women have an equal chance of acquiring osteoporosis ($p=0.091$). This study also showed a direct association between osteoporosis and age. The study established that the likelihood of being diagnosed with osteoporosis increased with age ($p=0.015$).

Conclusion: These findings show that the prevalence of osteoporosis and its associated factors is quite high among adults above the age of 45 years.

INTRODUCTION

Osteoporosis is the most common bone disease that causes physical limitations, fractures and the associated complications of fractures. This disease

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poses health challenges in mostly the geriatric and it remains neglected in countries like Zambia. It is an important public health concern that results in substantial morbidity and mortality.¹ This illness is identified by low bone mass and micro-architectural worsening of bone tissue, leading to bone fragility and a consequent increase in risk of fracture. Worldwide, about 200 million people have osteoporosis and among them, around 8.9 million fractures are as a result of this condition and these fractures are mostly at the hip, vertebrae and distal forearm. These fractures are related with notable morbidity, mortality and reduced quality of life. This disease is assigned not only to fractures but also to the high incidences of co morbidities in these patients.²

The diagnosis of osteoporosis is done by measuring the bone quality and bone mass, mainly bone mineral density (BMD) of patients using Dual-Energy X-ray Absorptiometry (DEXA) as the benchmark method. Previous researchers agree that BMD is the best available means to assess bone strength and the only important tool in the early diagnosis of osteoporosis so that effective preventive and therapeutic measures can be initiated at the earliest stage³. Therefore, BMD is a measure of bone mineral content per unit area that considers the overall firmness and fragility of bone.⁴ Determination of BMD is mostly done on cancellous (spongy) bone such as the lumbar spine.⁵ This is because the rapid turnover of cancellous bone (versus cortical bone) makes it a more sensitive indicator of metabolic stimuli and other factors that may affect bone metabolism.⁴

The World Health Organization (WHO) advocates for the use of the DEXA method for assessing BMD because it is fast, safe and accurate. The BMD test determines bone density by assessing the quantity of minerals (calcium and phosphorus) that the bone has. A dual X-ray absorptiometry (DXA) of the hip and spine is a fast, without pain, low-dose X-ray that measures the density or thickness of the bones. Based on WHO diagnostic standards, osteopenia

(bone mass loss) occurs when BMD is 1 to 2.4 standard deviations below the mean BMD of healthy adults of the same gender and race; osteoporosis occurs when BMD is 2.5 standard deviations (or more) below the mean BMD of healthy adults of the same gender and race. When bone mass is lost osteopenia can manifest as bone pain and deformation of the spinal column. The continuous gradual loss of bone mass can progress to osteoporosis, which may increase the risk of fractures.^{5,6}

Osteoporosis carries a significant economic burden on countries in the world and the main cost drivers are fracture related. The direct costs include treating osteoporotic fractures and the indirect costs such as disability and loss of productivity.⁷ This study, therefore, aimed to investigate the prevalence of osteoporosis in patients (aged above 40 years) who underwent BMD testing at the University Teaching Hospital (UTH) in Lusaka, Zambia.

MATERIALS AND METHODS

Study design: A quantitative, retrospective, descriptive study was carried out at a single site. This research used the positivist paradigm, a theory which uses the scientific approach to study the scientific world. This philosophy believes that all genuine knowledge is true by either definition or facts acquired by reason and logic that are fully independent of our perceptions of the world as individuals.⁹ This was achieved by using empirical scientific evidence. Facts for this study were thus collected from scientific data that was precise and based on measurements and these were analysed using statistics. This study was also descriptive in nature, since the report involved figures, frequencies or the extent at which something happens.¹⁰

Research site: The study was conducted at the University Teaching Hospital in Lusaka, Zambia. UTH was chosen because it is the only hospital in Zambia with DEXA machines used for testing BMD.

Sample: The study population included 76 random purposefully selected files of both male and female patients who underwent BMD testing between January and December 2020 at UTH. The patients were aged 40 years and above.

Data Collection: Files with Bone Density Reports were randomly collected and the necessary data was got from these reports. The data collection sheet had the following sections: Patients demographic information, osteoporosis seen or not and any related condition seen

Data Analysis: The data was captured on a data spread sheet. The data was quality controlled; assured and analysed using SPSS version 23. Descriptive analysis (mean, median, mode, percentages and standard deviation) of all variables was performed. Bivariate analysis was performed using the Pearson's chi-square test. Chi-square tests were used to determine the association of osteoporosis with sex and age of patients. Throughout the analysis, a 2-sided p-value <0.05 was considered to decide statistical significance.

Ethical considerations: Ethical approval was got from ERES research ethics committee (IRB No 00005948) and permission to conduct the research on site was got from the Head of Clinical Care at UTH. The study complied with ethical requirements according to the Code of ethics of the World Medical Association (Declaration of Helsinki).

RESULTS

Age of respondents: Table 1 below shows the measures of central tendency and dispersion on the age of respondents. The results show that the minimum age in the sample was 40, while the maximum age was 87. The mean age was 61.9 years with a standard deviation of 12.2 years. Based on the descriptive statistics shown in Table 1, most of the respondents were 12.2 years below or above the mean age of 61.9 years in this sample. This shows us that the population was old

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
Age of respondent	76	47	40	87	61.9	12.2	149.8
Valid N	76						

Table 1. Measures of central tendency and dispersion

Demographics the respondents: From the collected data, females constituted the largest proportion (72.4%) of study participants, male were represented by 27.6%. The sex and age distribution of the participants is as shown in Table 2 below shows.

Demographic characteristics	Frequency	Percentage (%)
Sex		
Male	21	27.6
Female	55	72.4
Age		
40-49	17	22.4
50-59	12	15.8
60-69	24	31.6
70-79	20	26.3
85+	3	3.9
Total	76	100

Table 2. Sex and age of respondents

Prevalence of Osteoporosis

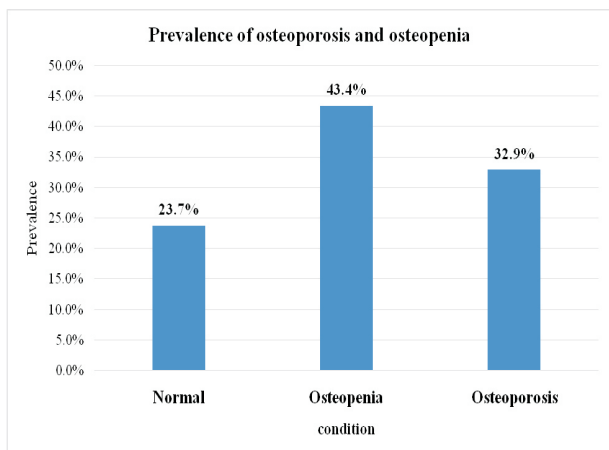


Figure 1: Prevalence of osteoporosis

The study results as depicted in figure 1 showed that 43.4% of the patients had osteopenia, 32.9% had osteoporosis, while 23.7% had normal bone mass. The study established that the prevalence of osteoporosis, in adults above 40 years, was at 32.9% at UTH.

Association of sex of patients with osteoporosis

Table 3. Percent distribution of the prevalence of osteoporosis according to sex.

Gender	Prevalence of osteoporosis		Total	Number of patients	P-value
	Osteoporosis present	No osteoporosis			
Male	47.6%	52.4%	100%	21	0.091
Female	27.3%	72.7%	100%	55	
Total			100%	76	

The study used the cross-tabulation technique and Pearson Chi-Square test to determine if sex was a determinant of osteoporosis. Table 3 shows that 32.9% had osteoporosis. Among the patients with osteoporosis, 47.6% were males while 27.3% were females.

The Chi-Square test was used to establish if sex was a significant determinant of osteoporosis. The results showed that there was no statistically significant relationship between sex of respondent and osteoporosis (p-value=0.091).

Association of age of patients with osteoporosis

Table 4. Percent distribution of the prevalence of osteoporosis according to age.

Background characteristics	Prevalence of osteoporosis		Total	Number of patients	Chi-Square P-value
	Osteoporosis present %	No osteoporosis			
Age					0.015
40-49 years	29.4	70.6	100	17	
50-59 years	33.3	66.7	100	12	
60-69 years	12.5	87.5	100	24	
70 years and above	56.5	43.5	100	23	
Total	32.9	67.1	100	76	

Table 4 shows information on the percent distribution of respondents by age. According to Table 4, the likelihood of being diagnosed with osteoporosis increased with age. The results showed that osteoporosis is more common in the older age group above 70 years, with more than half (56.5%) of the population in this age group suffering from the disease. The results also showed that 33.3% of the respondents in the age group 50-59 had osteoporosis, and 29.4% of those in the age group 40-49 had osteoporosis.

To establish if age was a determinant of osteoporosis, the study employed the Pearson Chi-Square test of association using SPSS version 23. The results showed that there was a statistically significant relationship between age of respondents and osteoporosis (p-value=0.015).

DISCUSSION

The main objective of this study was to establish the prevalence of osteoporosis in adults aged 40 years and above at UTH. Studies by different researchers have shown that osteoporosis is very prevalent around the world. For example, it is stated that osteoporosis is second only to cardiovascular disease as a global health care problem.⁴ In a study done on the global prevalence of osteoporosis, it was found that its frequency was at 39.5% in Africa.¹¹ Other researchers in the Eastern Mediterranean Region found that the prevalence of osteoporosis was at 24.4% in their region.¹² However, this study has found that the prevalence of osteoporosis, in adults above 40 years, at UTH is at 32.9%. These findings are evident that the prevalence is lower at UTH than the African average frequency. However, these findings are still higher than the prevalence reported in previous studies done outside Africa, like in the Eastern Mediterranean Region. The differences in the findings of the present study and the other studies cited above could be due to variations in the target population and the locations in which the studies were conducted.

Our study also demonstrated that 47.6% of the males had osteoporosis compared to 27.3% of the females. This study has shown that this difference in percentages is not statistically significant as the study showed that there is no significant relationship between sex of patient and osteoporosis (p-value=0.091). This is in contrast to other studies that reported that the prevalence of osteoporosis in a male population in the world was at 23.1% and 11.7% among the female population¹¹. Other studies in the Eastern Mediterranean Region showed the prevalence to be at 20.5% in males and 20.4% in female's respectively.¹²

Our study also showed that patients in the oldest age group (70 years and above) are more likely to be diagnosed with osteoporosis (56.5%) followed by the age group of 50-59 years (33.3%), compared to patients in the youngest age group of 40 to 49 years (29.4%). The study found that there was a statistically significant relationship between age of patients and osteoporosis (p-value=0.015). Thus, the findings indicate that the likelihood of being diagnosed with osteoporosis increases with age. Therefore, there is enough evidence to conclude that age is a determinant of osteoporosis.

This is in conformity to what other scholars found. For example, a study found that the prevalence of osteoporosis showed a linear increase with age in the four age percentiles of the population studied¹³. Furthermore, it was also observed that in terms of differentials in age groups, osteoporosis raised steeply after 50 years (p=0.0001).¹⁴

Limitations: Being a retrospective research study, challenges were encountered when retrieving data that could have been important to this study. This was due to the fact that the data used in this study could only be retrieved from patient's records as they appeared which in some cases could not be found or was incomplete. As such, some reports did not indicate the actual density or thickness of the bones so as to determine the severity of osteoporosis. In future it may be necessary to carry out a longitudinal prospective study that will take into consideration such issues of quantification of all results.

CONCLUSION

This study found that the prevalence of osteoporosis, in patients aged 40 years and above, is quite high at UTH (32.9%). This study also found that there was no statistically significant relationship between sex and osteoporosis (p =0.091). In addition, it was established that the likelihood of being diagnosed with osteoporosis increased with age. Older patients were more likely to be diagnosed with osteoporosis compared to younger patients (p =0.015). It can thus be concluded that osteoporosis is a critical health

problem at UTH, in Lusaka, Zambia as it causes massive medical, economic and social burdens to both the individuals affected and the whole country at large. Hence, highlighting its prevalence at UTH can help facilitate policies that can help implement prevention and control measures needed to be implemented by the ministry of health in Zambia. In addition, highlighting the prevalence of this disease can help accelerate the purchase of the necessary facilities for the treatment of patients with osteoporosis including the training of specialized manpower to handle these cases. Therefore, interventions for reducing and combating osteoporosis and its associated factors should be put in place and those at risk and managing the condition should be made aware of these measures, since, nowadays, there are notable developments in science that can be used to determine its cause, diagnosis and therapy.

What is already known on this topic: It is already known that this condition involves weakening of bone strength that makes it susceptible to fracture. It's already documented that it mostly involves the hips, wrists or spine and urgent medical attention is needed in severe cases.

What this study adds: This study highlights the high prevalence rate of osteoporosis at UTH as well as the burden that it causes. It also points out the need to increase awareness and funding towards causes that may help prevent and treat this disease.

Recommendations: The researcher would like to recommend that older people in society should engage in regular physical exercises and medical check-up. Awareness campaign programs on physical exercises and medical check-ups should be intensified at community level and the country at large, targeting both men and women. In addition, there is need to purchase more DEXA machines to be distributed countrywide, as well as train more health personnel to handle these machines. This will help increase accessibility to diagnostic tools that will help detect osteoporosis in the early stages as

people will have easy access to these health services.

Furthermore, since this was a hospital-based study, community-based studies may be needed to establish the countries prevalence of osteoporosis. It is also recommended that risk factors for osteoporosis in Zambia be researched on.

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Competing Interest: The authors of this research study hereby declare that have no competing interests

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