ORIGINAL ARTICLE

Frequency of Osteoporosis in Patients of Chronic Liver Disease

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ABSTRACT

Aim: To determine the frequency of osteoporosis in patients of chronic liver disease.
Settings: South Medical ward, Mayo Hospital, King Edward Medical University Lahore
Study Design: Cross sectional survey
Duration of Study: This study was conducted from 1st January to 30th June, 2014
Methods: Total 100 patients having chronic liver disease falling in the inclusion criteria were selected using 5% level of significance, 6.5% error margin and 11.5% of expected percentage for osteoporosis. Bone mineral density (BMD) (g/cm^2) of the lumbar spine and the left proximal femur (if not involved by disease, in other case the right proximal femur) was measured by dual energy x-ray absorptiometry (DEXA) with the use of a discovery W model by single technician. T score at these areas were also noted and interpreted for presence or absence of osteoporosis. The data was entered and analyzed into SPSS version 23.0
Results: Age range of the patients was 30-75 years with the mean age of 53.9±10.6 years. There were 42 (42%) male patients and 58(58%) female patients. Out of total 100 patients only 12(12%) patients were found to have osteoporosis and 88(88%) patients had no evidence of osteoporosis. There were 29 (29%) patients who were diagnosed to have osteopenia and 59(59%) patients had normal bone density (BMD)
Conclusion: We have concluded that Osteoporosis is common in patients having chronic liver disease. Osteoporosis becomes more evident and it has been frequently seen in patients with prolonged duration of liver disease.
Keywords: Chronic liver disease, osteoporosis, T-score, bone mineral density (BMD)

INTRODUCTION

Osteoporosis is one of the common metabolic bone disease in which bone strength is reduced which makes an individual vulnerable to fractures, most commonly encountered in hip joints, spine and other skeletal sites.[1] Osteoporosis is usually asymptomatic and most frequently encountered in clinical practice. Post menopausal women are affected more[2]. Major risk factors for developing osteoporosis are estrogen deficiency in women, low body mass index, cigarette smoking, consumption of alcohol, reduced dietary calcium intake, physical inactivity, certain drugs and illnesses.[3]Cirrhosis is a term used when there is irreversible chronic insult of the liver parenchyma that leads in extensive fibrosis along with the formation of regenerative nodule[4].

Metabolic bone disease is one of the important complications of patients having chronic liver disease; causes of metabolic bone disease are complex and multifactorial. Osteodystrophy can manifests as osteopenia and osteoporosis[5]. The prevalence of osteopenia and osteoporosis in patients having chronic liver disease is 34.6% and 11.5% respectively, seen higher in females than in males and there is no striking impact of menopausal status, hormone replacement therapy (HRT), and cause of cirrhosis on bone mineral density (BMD)[6].

The incidence of reduced BMD is also statistically higher in the group of patients with cirrhosis or chronic type C hepatitis compared to healthy subjects group[2]. Checking Bone mineral density is a noninvasive/quick and effective measurement tool for assessing bone mineral density, which ultimately predicts the fracture risk, and monitor changes in bone density over time[7]. The "gold standard" test for diagnosis and monitoring of BMD is dual energy x-ray absorptiometry (DEXA) scan of the spine, hip, or forearm[8]. Tests other than DEXA scan used for assessing bone mineral density are not so sensitive or have deficient data to reach to a conclusion.[9]Bone mineral density is commonly reported as a T-score, the standard deviation variance of the patient's bone mineral density compared to a normal young adult reference population.[9] World Health Organization (WHO) recommended that the diagnosis of osteoporosis be made when the T score is -2-5 or lower and osteopenia be made when T scores are from -1.0 to 2.5[10].

Cirrhosis is linked with higher morbidity and mortality as it can cause many complications. Osteoporosis is frequently observed in cirrhotic patients having Hepatitis B and C, more frequent in patients with longer duration of liver disease but there is no strong relationship between the etiology or severity of liver disease and osteoporosis[11].

In Pakistan, very few studies have been conducted on osteoporosis in association with chronic liver disease. Through this study, we tried to find out frequency of osteoporosis in chronic liver disease (CLD). So screening, early identification, and early introduction of treatment for bone disorders in these patients is pivotal to reduce fracture risk so as to improve clinical outcome and quality of life. Thus emphasizing the importance of early BMD measurements in cirrhotic patients and if needed prompt prophylactic measures to secure bone health.

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MATERIAL AND METHODS

A descriptive study started from 1st January to 30th June, 2014 having 100 patients with chronic liver disease falling in the inclusion criteria with Non-probability purposive sampling was conducted. Patients were labeled to have osteoporosis who had T score –2-5 or lower on BMD measurement by DEXA scan in either of lumbar spine or proximal femur.

Inclusion Criteria: Patients of both gender having chronic liver disease with the age of 30-75 years were selected. Patients were considered to have chronic liver disease (CLD) who had duration of the disease for ≥ 6 months and with a diagnosis confirmed by serological tests for Hepatitis B and C detection by ELISA (enzyme-linked immunosorbent assay) and by abnormal findings on ultrasonography.

Exclusion Criteria: All patients who had history of Cigarette smoking 1 pack per day for more than 6 months. Already diagnosed cases of chronic kidney disease (CKD), chronic obstructive pulmonary disease (COPD) and active coronary artery disease (on history and previous medical record), diagnosed cases of thyrotoxicosis, hyperparathyroidism and Cushing syndrome (on history and previous medical record).Liver, kidney, colon, lung and bone malignancies (on previous medical record) were excluded from the study. Pregnant participants were not considered as part of our study as well

RESULTS

Table 1: Gender and age distribution of respondents

Variable	n	%age
Gender		
Male	42	42.0
Female	58	58.0
Total	100	100.0
Age		
30-40	16	16.0
41-50	24	24.0
51-60	31	31.0
61-70	23	23.0
71-75	6	6.0
Mean±SD	53.9±10.6	

Table 2: Distribution of patients by T-score of lumbar spine

T Score	n	%age
-3.4 - -3.1	4	4.0
–3.0 – –2.1	12	12.0
–2.0 – –1.1	22	22.0
–1.0 - –0	4	4.0
0.1 - 1.0	10	10.0
1.1 – 2.0	27	27.0
2.1 – 3.0	21	21.0

Table 3: Distribution of patients by T-score of hip

T Score	n	%age
-3.4 - -3.1	3	3.0
–3.0 – –2.1	14	14.0
–2.0 – –1.1	22	22.0
–1.0 - –0	3	3.0
0.1 - 1.0	9	9.0
1.1 – 2.0	37	37.0
2.1 – 3.0	12	12.0
Total	100	100.0

Table 4: Distribution of patients by frequency of osteoporosis

Osteopenia	n	%age
Yes	12	12.0
No	88	88.0
Total	100	100.0

Table 5: Distribution of patients by frequency of osteopenia

Osteopenia	n	%age
Yes	29	29.0
No	71	71.0
Total	100	100.0

Table 6: Distribution of patients' frequency of normal BMD

Normal bone	n	%age
Yes	59	59.0
No	41	41.0
Total	100	100.0

A total of 100 patients having chronic liver disease participated in our study in which 42(42%) were males and 58(58%) were females with overall mean age of 53.9±10.6 years (Table 1). The distribution of patients by T-score of lumbar spine, hip joint can be seen in Table 2 and 3 respectively. In our study it was found that 29(29%) patients had Osteopenia and 12% had osteoporosis (Table 4). The distribution of patients by frequency of normal bone; there were 59(59%) patients had frequency of normal bone mineral density and 41(41%) patients had no frequency of normal bone bone mineral density (Table 5).

DISCUSSION

Liver is one of major organ of body having synthetic functions and also contribute to various metabolic and hormonal maintenance, disturbance in this can result into derangement of bone homeostasis resulting in osteopenia and osteoporosis[11]. Osteoporosis is common metabolic bone disease in which there is structural bone weakness along with reduced bone mass which ultimately makes individuals vulnerable to fractures, commonly in hip joints, spine and other skeletal sites[1]. patients having Osteoporosis have minimal symptoms usually but most frequently encountered in clinical practice after being diagnosed by DEXA scan, better way of assessing the bone mineral density.

Bone mineral density testing is a noninvasive, quick and easy way to assess bone mineral density and so the osteoporosis. It also predicts fracture risk, and monitor changes in bone density over time[7], the better method/test for diagnosis and monitoring of BMD is dual energy x-ray absorptiometry (DXA) of the spine, hip, or forearm.[8] Non-DEXA tests either are too insensitive or have insufficient data to reach conclusions[9].

Bone mineral density is usually reported as a T-score, the standard deviation variance of the patient's bone mineral density compared to a normal young adult reference population[9]. World Health Organization (WHO) recommended that the diagnosis of osteoporosis be made when the T score is -2-5 or lower and osteopenia be made when T scores are from -1.0 to 2.5[10].

In our study the mean age of the patients was 53.9±10.6 years. As compared with the study of Sakhi et al[6] the mean age of the patients was 54.4±12.9 years, which is comparable with our study. In our study, there

were 42% male patients and 58% female patients. As compared with the study of Sakhi et al[6] there were 52% male patients and 48% female patients, which is comparable with our study.

In our study there were 12% patients had frequency of osteoporosis. As compared with the study of Sakhi et al[6] there were 11.5% patients had frequency of osteoporosis, which is comparable with our study.

In another study conducted by Javed et al[12] the frequency of osteoporosis in cirrhotic patients was found in 26% patients, while in our study the frequency of osteoporosis was found in 12% patients. In our study, there were 29% patients had frequency of osteopenia. As compared with the study of Javed et al[12] the frequency of osteopenia was found in 42% patients. This difference of result can be attributed to that we selected all patients having cirrhosis regardless of the cause unlike the study conducted by Javed et al.[12] in which only those patients were selected who had cirrhosis due to Hepatitis B and Hepatitis C only along with duration of liver disease were taken into account in their study.

A study conducted by Handzlik-Orlik G et al[11] found out that 40% of patients who had chronic liver disease can have osteoporotic fracture.

Study conducted by Sakhi et al[6] the frequency of osteopenia was found in 34.6% patients, which is comparable with our study. In our study, there were 59% patients had normal BMD. As compared with the study of Javed et al[12] the frequency of normal BMD was found in 32% patients.On the above discussion, it is concluded that osteoporosis is a common finding in patients with chronic liver disease.

CONCLUSION

We have concluded that Osteoporosis is a commonly found in patients with chronic liver disease. There is strong need to identify and screen such patients at higher risk of osteoporosis so as to improve the clinical outcome and give them sense of better quality of life.

Limitations: This was a single centre study, with smaller sample size so results can't be generalized to whole population of Pakistan. In future we need to conduct more multicentre based studies with large sample size to find out the differences in different regions of our country.

RECOMMENDATIONS

We strongly recommend future multicentre based studies and gather a data to maintain registry of all such patients with chronic liver disease, all should be screened for BMD and if found in range of osteoporosis, need to be treated aggressively. Bisphosphonates have become the mainstay of therapy for osteoporosis prevention and treatment and is recommended for all patients with osteoporosis. Patients having chronic liver disease need to be advised to comply with good nutritious diet rich in calcium and vitamin D, need to have adequate sunlight exposure. In Pharmacological treatment newer drugs are available in armamentarium of treatment of osteoporosis so that we can reduce mortality and morbidity related with this complication and improve quality of life of these patients.

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