OSTEOPOROSIS IN CHRONIC LIVER DISEASE (CLD)

Adeel Ahmed, Sobia Mehreen, Muhammad Tahir*, Afeera Afsheen**

Combined Military Hospital Kohat Pakistan, *Combined Military Hospital/ National University of Medical Sciences (NUMS) Rawalpindi Pakistan, **Combined Military Hospital Peshawar Pakistan

ABSTRACT

Objective: To find the frequency of osteoporosis in male patients with cirrhosis secondary to hepatitis C and its relation with Child Pugh score of liver cirrhosis in outpatient department of CMH Kohat.

Study Design: Descriptive cross sectional study.

Place and Duration of Study: Combined Military Hospital Kohat, from Dec 2012 to Jun 2013.

Material and Method: A total of 94 patients (47 cases of Child Pugh B and 47 cases of Child Pugh Class C) were included in this study. DEXA scan was done for measuring bone density. Patients were grouped according to their T scores. Frequency of osteoporosis was calculated in both Child Pugh Class B patients and Class C patients and comparison was done using Chi Square test.

Results: Mean age of the patients was 52.23 ± 8.46 and 55.57 ± 7.43 in Child Pugh Class-B and C class, respectively. Mean BMI in Child Pugh Class-B was 20.69 ± 3.77 and in class C it was 20.50 ± 3.99. Bone metabolic changes were found in 20 cases of Child Pugh Class-B, out of these 20 cases, 12 (25.5%) had osteopenia and 8 (17.0%) had osteoporosis. Bone metabolic changes were found in 34 cases of Child Pugh Class-C. Out of these 34 cases 22 (46.8%) had osteopenia and 12 (25.5%) had Osteoporosis.

Conclusion: There is higher prevalence of osteoporosis in patients with cirrhosis. In these patients's osteoporosis must be diagnosed early and treated appropriately particularly when risk factors such as severe liver disease, low BMI and cholestasis are present.

Keywords: Hepatitis C, Liver cirrhosis, Osteoporosis.

INTRODUCTION

Osteoporosis ("porous bones", from Greek: osteon meaning "bone" and poros meaning "pore") is an underestimated complication of cirrhosis. Osteoporosis is considered as a "silent thief" because a patient with osteoporosis remain asymptomatic until a pathological fracture occurs. Osteoporosis can affect every part of the skeletal system. It is characterized by architectural deterioration of osteoid tissue and reduced bone density, making the bones fragile. Low intensity trauma can cause pathological fractures which are characteristic of osteoporosis[1]. Vertebral compression fractures increase the 5-year risk of mortality by 15%. Hip fractures increase the 1-year mortality by 19% and 20% of the patients ultimately need prolonged nursing care[2-4]. Studies have shown osteoporosis occurring in up to 14% to 45% of patients with liver cirrhosis[5,6]. Studies have shown conflicting results with some studies showing significant correlation between Child Pugh class and osteoporosis while others show no significant correlation[7,8]. The only study in Pakistan studying the frequency of osteoporosis in patients with cirrhosis due to hepatitis B and hepatitis C was conducted at Hayatabad Medical Complex Peshawar[8]. According to this study osteoporosis was found in 26% of patients and osteopenia in 42%, while 32% had normal bone mineral density (BMD). This study also did not find any significant correlation between osteoporosis and Child Pugh score of liver disease. However this study used ultrasound to measure BMD of calcaneum which is not gold standard for measuring BMD. Furthermore this study did not exclude bedbound (immobilized) patients from the study group which itself is a well-known cause of osteoporosis. Foreign studies have mostly calculated the risk of osteoporosis in

Correspondence: Dr Adeel Ahmed, Department of Medicine, Combined Military Hospital Kohat Pakistan
Email: adeel303@gmail.com
Received: 27 Aug 2015; revised received: 18 Aug 2017; accepted: 08 Sep 2017

alcoholic cirrhosis and primary biliray cirrhosis[9,10] but not specifically for cirrhosis secondary to chronic viral hepatitis which is the leading cause of hepatic cirrhosis in Pakistan. In normal clinical practice no osteoporosis prophylaxis is given routinely to patients with cirrhosis which can lead to spontaneous fractures, negatively affecting quality of life and survival. In patients with liver disease early screening and treatment of osteoporosis is necessary to reducethe risk of pathological fractures and to improve the quality of life and survival. This study was conducted to determine the frequency of abnormal bone density in male patients with liver cirrhosis secondary to Hepatitis C based on Child Pugh Class B and C. DEXA (dual energy X-ray absorptiometry) scan was used to measure BMD which is the gold standard test for measuring BMD. Based on the results of this study we may be able to suggest the need of osteoporosis prophylaxis in patients with cirrhosis.

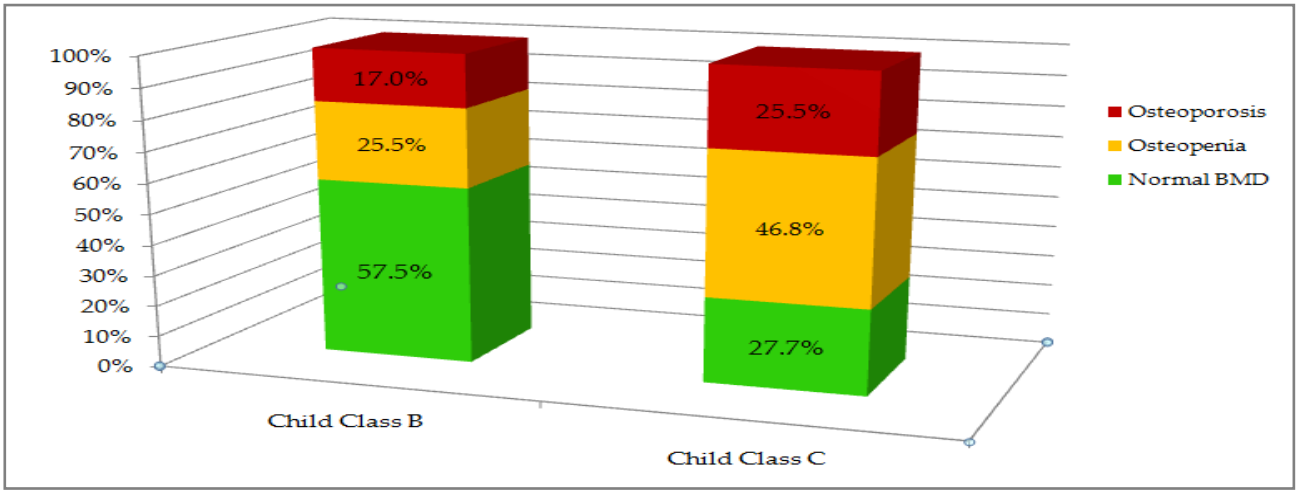

Figure-1: Distribution of cases by bone status.

MATERIAL AND METHODS

The descriptive study was carried out at outdoor patient department of Combined Military Hospital Kohat from December 2012 to June 2013. This study included diagnosed patients of cirrhosis liver secondary to hepatitis C. Patients aged 30 years to 65 years were included in the study. Bedridden patients, long term steroids users and patients with cirrhosis due to etiology other than hepatitis C, were excluded from the study. The study included 94 patients usingnon-probability purposive sampling. Sample size was calculated using WHO software for sample size determination in health studies. Fourty seven patients belonged to Child Pugh Class B and 47 belonged to Child Pugh Class C. A brief history was taken from each patient including history of complications of cirrhosis. A brief clinical exam was carried out with emphasis on signs of cirrhosis including leukonycia, clubbing, palmar erythema, gynaeco-mastia, encephalopathy, ascites and testicular atrophy. Serum albumin, prothrombin time and serum bilirubin were measured. Severity of the disease was assessed by Child Pugh score. DEXA scan was done for measuring bone density. Patients were grouped according to their T scores as follows:

- Normal bone mineral density (BMD)= T scores > -1 Standard Deviation (SD)
- Osteopenia= T score between -1 SD & -2.5 SD
- Osteoporosis= T score <-2.5 SD

Data analysis was done by SPSS 17 statistical software. Means and standard deviations were calculated for numerical variables i.e. age and BMI. Frequencies were calculated for categorical variables i.e.bone status (osteopenia, osteopo-rosis, normal BMD) and Child Pugh Class (i.e.

class B and C). A *p*-value <0.05 was considered as significance. Chi square test was used to compare the categorical data.

RESULTS

A total of 94 patients (47 cases of Child Pugh B and 47 cases of Child Pugh Class C) were included in this study. Mean age of the patients was 52.23 ± 8.46 and 55.57 ± 7.43 in Child Pugh class-B and C class, respectively. Mean BMI in Child Pugh class-B was 20.69 ± 3.77 and in class C it was 20.50 ± 3.99. Normal BMD was found in 27 (57.5%) of Child Pugh Class-B and in 13 (27.7%) of Child Pugh Class-C. Abnormal Bone mineral density (Osteoporosis plus osteopenia) was found in 20 cases of Child Pugh Class-B. Out of these 20 cases, 12 (25.5%) had Osteopenia and 8 (17.0%) had Osteoporosis. Abnormal Bone mineral density (Osteoporosis plus osteopenia) was found in 34 cases of Child Pugh class-C. Out of these 34 cases 22 (46.8%) had Osteopenia and 12 (25.5%) had Osteoporosis (fig-1). Difference of frequency of osteoporosis between Child Class B and Child Class C was non-significant (*p*=0.313) (table). However there was a significant difference between frequency of abnormal BMD (osteopenia and osteoporosis) between Child Class B and Class C (*p*=0.003) (fig-2).

Table: Distribution of cases by osteoporosis.

Bone status	Child Pugh Class-B		Child Pugh Class-C	
	No.	Percentage (%)	No.	Percentage (%)
No osteoporosis (Normal BMD + Osteopenia)	39	83.0	35	74.5
Osteoporosis	08	17.0	12	25.5
Total	47	100.0	47	100.0

Chi-square=1.01, *p*-value=0.313

DISCUSSION

Osteopenia means a reduction in bone density, while osteoporosis encompasses both a decrease in bone density along withchanges in micro-architecture of the bone leading to increased fragility of bones and higher chances of pathological fractures. Our study showed an increased frequency of abnormal bone mineral density in patients with liver cirrhosis. The frequency of osteoporosis determined by our study corresponds to the range reported by other documented studies (10-40%)[1,6]. In liver cirrhosis, osteoporosis risk factors are: alcoholism, malnutrition cholestasis, hypogonadism and treatment with corticsteroids.

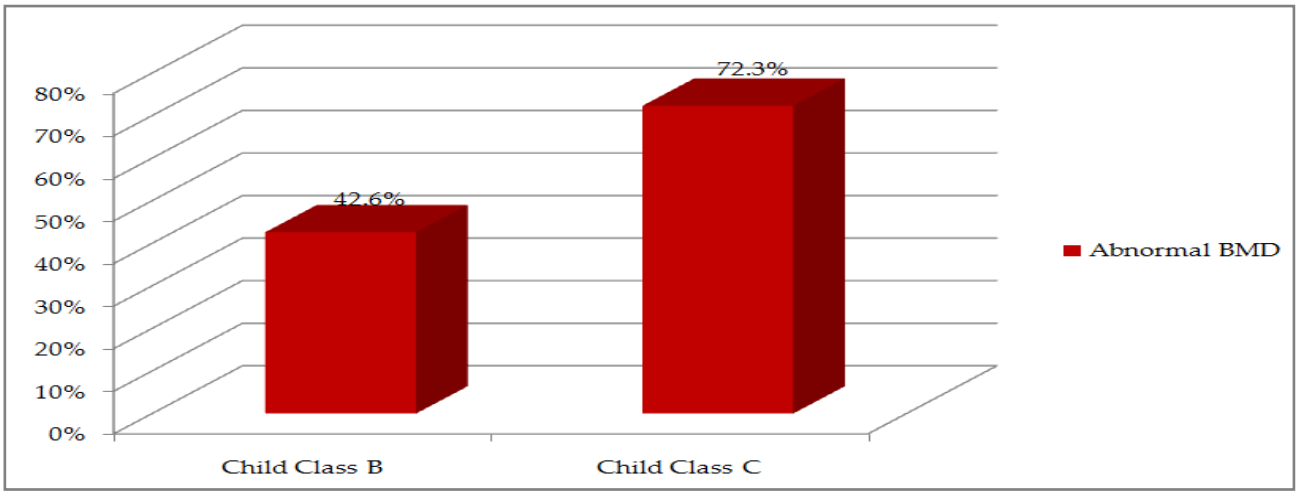

Figure-2: Comparison of Abnormal Bone Mineral Density (BMD) between Child Class B and Child Class C. (*p*=0.003).

Initially cholestasis was thought to occur as a complication of cholestasis (primary biliary cirrhosis has an osteoporosis prevalence of 15-50%), but later abnormal bone mineral density was reported in other liver diseases as well including: viral cirrhosis (20-53%),primary sclerosing cholangitis (50%), or alcoholic cirrhosis (30%)[11]. In our study abnormal bone mineral density was found in 20 (42.5%) of 47 Child Pugh class B cases and in 34 (72.3%) of 47 Child Pugh class C. There was a significant correlation between abnormal bone densities and Child Pugh Class (p=0.003). Currently the pathogenesis of reduction in bone density in cirrhosis is not fully known. There are two theories:, one suggesting a high bone turnover (normal rate of bone production but increased rate of bone resorption) while the other suggests a low bone turnover (reduced rate of bone production with normal rate of boneresorption[12,14]. DEXA is the gold-standard test to measure bone density. This procedure is cost effective, precise, quick and noninvasive. The bone density is measured at the lumbar vertbrae (L2-L4) or at the neck of femur. Result is given in T-scores (number of standard deviations in comparison to a normal youngd adult) or Z-scores (comparison with and an individual of the same gender and age). Treatment of osteoporosis in liver cirrhosisis not different from the treatment of osteoporosis from other causes. In addition to lifestyle modifi-cations, vitamin D supplementation (400-800 IU/day) and calcium supplementation (about 1g/day) are recommended for osteopenia[15]. Osteoporosis should be treated using oral or IV bisphosphonates.

CONCLUSIONS

Patients with liver cirrhosis have a higher risk of osteoporosis. In these patients osteo-porosis must be diagnosed early and treated appropriately, particularly when risk factors such as severe liver disease, low BMI and cholestasis are present.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

REFERENCES

1. Arif M, Inam M, Shabir M. Role of bone mineral density measurement by calcaneal ultrasound in hip fracture. J Postgrad med Inst 2009; 23(02): 174-8.
1. Vestergaard P, Rejnmark L, Mosekilde L. Increased mortality in patients with a hip fracture-effect of pre-morbid conditions and post-fracture complications Osteoporos Int 2007; 18(12): 1583-93.
2. Loria I, Albanese C, Giusto M, Galtieri PA, Giannelli V, Lucidi C, et al. Bone disorders in patients with chronic liver disease awaiting liver transplantation. Transplant Proc 2010; 42(4): 1191-3.
3. Topcheeva ON. Hepatic osteodystrophy in patients with liver cirrhosis. Eksp Klin Gastroenterol 2010; 6: 89-94.
4. Ahmed SF, Elmantaser M. Secondary osteoporosis. Endocr Dev 2009; 16: 170-90.
5. Wariaghli G, Mounach A, Achemlal L, Benbaghdadi I, Aouragh A, Bezza A, et al. Osteoporosis in chronic liver disease: a case-control study. Rheumatol Int 2010; 30(7): 893-9.
6. George J, Ganesh HK, Acharya S, Bandgar TR, Shivane V, Karvat A, et al. Bone mineral density and disorders of mineral metabolism in chronic liver disease. World J Gastroenterol 2009; 15(28): 3516-22.
7. Javed M, Saeed A, Khan IM, Hameed K, Rehman S, Khattak AK, et al. Frequency of osteoporosis in patients with cirrhosis due to hepatitis B and hepatitis C: A study of 100 cases. J Ayub Med Coll Abbottabad. 2009; 21(3): 51-3.
8. Mounach A, Ouzzif Z, Wariaghli G, Achemlal L, Benbaghdadi I, Aouragh A, et al. Primary biliary cirrhosis and osteoporosis: a case-control study. J Bone Miner Metab 2008; 26(4): 379-84.
9. Wariaghli G, Allali F, El Maghraoui A, Hajjaj-Hassouni N. Osteoporosis in patients with primary biliary cirrhosis. Eur J Gastroenterol Hepatol 2010; 22(12): 1397-401.
10. Corazza GR, Trevisani F, Di Stefano M, De Notariis S, Veneto G, Cecchetti L, et al. Early increase of bone resorption in patients with liver cirrhosis secondary to viral hepatitis. Dig Dis Sci 2000; 45(7): 1392-9.
11. Gallego-Rojo FJ, Gonzalez-Calvin JL, Munoz-Torres M, Mundi JL, Fernandez-Perez R, Rodrigo-Moreno D. Bone mineral density, serum insulin-like growth factor I, and bone turnover markers in viral cirrhosis. Hepatology 1998; 28(3): 695-9.
12. Carey E, Balan V. Metabolic bone disease in patients with liver disease. Curr Gastroenterol Rep 2003; 5(1): 71-7.
13. Guanabens N, Pares A, Marinoso L, Brancos MA, Piera C, Serrano S, et al. Factors influencing the development of metabolic bone disease in primary biliary cirrhosis. Am J Gastroenterol 1990; 85(10): 1356-62.
14. Bikle D. Osteoporosis in gastrointestinal, pancreatic, and hepatic diseases. In: Osteoporosis, Robert M,)Editor. Washington: Acad Press, 2001.