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THE PREVALENCE OF OSTEOPOROSIS IN PATIENTS WITH LIVER CIRRHOSIS

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Abstract:

Introduction: *Liver cirrhosis is a major health concern in developing and developed world, the prevalence of the disease is on the rise, there are various complications related to hepatic cirrhosis osteoporosis is one of them , it can increase the morbidity and mortality in such cases.*

Objective: *To assess the frequency of liver cirrhosis patients suffering from osteoporosis.*

Methods and place: *This cross sectional study was conducted at National Guard Hospital in KSA from the period of April 2017 to January 2018. The patients with age group 31-75 years suffering from liver cirrhosis for at least 1 year or more were enrolled. The detailed clinical and socio-demographic data was collected and analyzed by Spss 21. The patient was labeled positive for osteoporosis when the T score recorded was less than 2.5 on DEXA scans.*

Results: *In our study, A total of 250 cases were enrolled, out of them ,160 (64%) males and 90 (36%) were females with mean age of 45.37±7.13 years. Osteoporosis was recorded in 85 (34%) of patients. Osteoporosis affects females more, where it is seen in 38 (42.23%) out of 90 cases with p= 0.09. Osteoporosis has significantly high prevalence (p=0.002) in patients suffering from cirrhosis for more than 3 year affecting 56 (47.97%) cases in contrast to 12 (17%) cases in their same groups. And the percentage is not related to a specific type of hepatitis.*

Conclusion: *Osteoporosis is common in cases of liver cirrhosis significantly increasing the morbidity and mortality for the parent. Almost every 3rd person suffering from hepatic cirrhosis suffers from osteoporosis and the prevalence increases as the duration of disease increases.*

Key words: *Liver cirrhosis, osteoporosis, T score, DEXA scan.*

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INTRODUCTION:

According to an estimate more than 200 million world population suffered from osteoporosis and the disease burden is on 5th ranking for age related diseases.[1]

Osteoporosis is characterized by the progressive loss of bone mass and low bone mineral density eventually resulting in increased susceptibility for fractures.[2]

Many of the authors reported hepatic osteodystrophy that included osteoporosis and osteopenia and their association with chronic Liver diseases and liver cirrhosis.[7]

Liver cirrhosis can be described as the end stage of the progressive hepatic fibrosis. It starts with the chronic inflammation followed by the destruction and distortion of normal liver structure.[4] Liver cirrhosis is an irreversible condition and transplantation is said to be the treatment of choice for this end stage condition.[25]There are many causes that lead to Liver cirrhosis that include viral infections,autoimmune diseases,alcoholic hepatitis and genetic disorders. And there are a large number of complications that occur in cases with cirrhosis e.g gastrointestinal bleeding, hepatic encephalopathy , ascites and osteoporosis etc.[4] These complications increase the morbidity and mortality of the patient.

OBJECTIVE:

The objective of our study is to determine the prevalence of osteoporosis in patients suffering from hepatic cirrhosis.
In our study, it is recorded that the cases with chronic liver disease suffer from bone mass loss at quite a faster rate than the normal individuals. It has been recorded that age, gender, and the degree of liver cirrhosis were important risk factors for development of osteopenia and osteoporosis in patients suffering from primary sclerosing cholangitis.[8] The best strategy to manage the osteoporosis in patients with cirrhosis is the primary prevention, the focus of our study is to identify the important risk factors of osteoporosis in patients of liver cirrhosis so that the burden of fractures secondary to osteoporosis can be decreased.[33,34]

The decrease in bone mass density can result in complications like easy fractures.[33] The estimated prevalence for liver-related osteoporosis is between 20-420/100000 of the general population.[3] Other risk factors like decreased sun exposure, female gender, smoking history, steroid use, diabetes mellitus, alcoholism etc also predispose to osteoporosis.[4]

Furthermore different pathogenic mediators like fibronectin, insulin like growth factor-I, and various cytokines involved in progression of the disease have also been recognized.[29] Isolated liver disease to be the cause of osteoporosis in the absence of these co factors,osteoporosis due to liver cirrhosis is a neglected and highly under rated entity.[29]

However, despite the pathogenesis of osteopenia is high lighted by the advancement of bone biology,the treatment options for this disease remains unchanged i.e supplementation with calcium,vit D and use of bisphosphonates.[36]

Various studies have been conducted on this topic and different modalities of investigations have been used,In our study we used dual energy x-rays absorptiometry (DEXA) scan to assess the bone density.[31] The bone mass depends upon the harmony and the balance between two opposite processes: bone formation by the osteoblasts and bone resorption by osteoclasts. [32,33]Consequently ,if the resorption exceeds the bone formation level, this results in osteopenia and bone loss.[25,32,33]

The mechanisms of osteoporosis in liver diseases are not completely understood. Some studies suggest increased bone resorption while some indicate decreased bone formation due to impairment of the osteoblastic activity resulting in decreased bone wall thickness and and defective matrix.[30]

MATERIALS AND METHODS:

It is a cross sectional study conducted at the National Guard Hospital, Saudi Arabia, from the period of April 2017 to January 2018.

The 250 patients were enrolled in this study with age ranging 31-75 years, diagnosed cases of liver cirrhosis (diagnosed radiologically with shrunken liver, clinically with presence of jaundice, ascities or any other sign of chronic liver disease with increased prothrombin time and decreased albumin). INCLUSION CRITERIA: 1.patients in age group 31-75years. 2. Diagnosed as a case of liver cirrhosis due to hep B or hep C for more than 1 year.

EXCLUSION CRITERIA: patients who had co-morbidities like diabetes mellitus, heart diseases, end stage renal diseases and metabolic disorders.

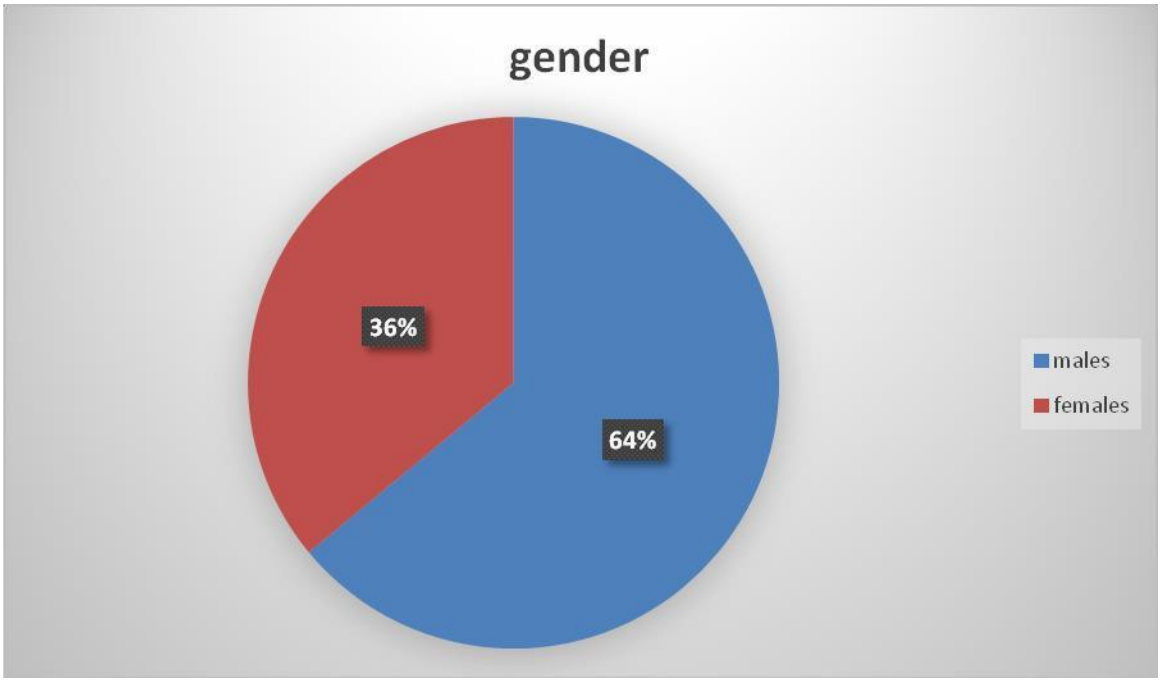
The social and demographic data is collected in detail with the help of preformed questionaires. The data is recorded and analyzed with spss21.

The age, duration of disease etc were recorded as mean and qualitative data like gender and presence of osteoporosis was recorded as median, stratification of the effect modifiers was done and post stratification chi square was applied. The patients whose had DEXA scan result was less than 2.5 were labelled as osteoporotic.

RESULTS:

In our study, there were total of 250 cases, out of which 160 (64%) males and 90 (36%) females. The mean age of patients was 45.37±7.13 years, while the mean duration of chronic liver disease was 5.91±2.76 years. Out of 250 patients enrolled, 170 (68%) patients were HCV positive while 80 (32%) were HBV positive. Osteoporosis was recorded in 85 (34%) of patients. The prevalence among the female patients was quite higher (43.69%). And the ratio is higher in age group 60-75 years i.e.(41.39%).

It is also noted that the prevalence of osteoporosis is higher in patients who had disease duration more than 3 years (46.66%) and in respective age group it is found to be 21.34%.



type	Osteoporosis (yes)	Osteoporosis (no)
Hepatitis B	18%	82%
Hepatitis C	35%	65%

DISCUSSION:

Liver cirrhosis is a major health concern across the world and it is a cause of great burden on heath providing institutions in the developing countries and countries of middle east.

Taking in the account of pathophysiology and functions of liver that involve various mechanisms,the patients of liver cirrhosis are more susceptible to develop osteoporosis due to decrease bone mineral density and impaired osteoblastic activity.[4,7,2]

The prevalence of osteoporosis CLD patients was recorded to be in 14% to 55% cases in western world.[15–17] In our study,the prevalence of osteoporosis in liver cirrhosis was reported to be 34% in patients with liver cirrhosis that was caused by viral infections of hep b and hep C. The results in comparison to other studies show wide variability of recorded prevalence of osteoporosis that maybe due to different age group, etiologies and disease duration of the patients.[6,18] In this study, the patients of liver cirrhosis due to autoimmue hepatitis were excluded as that may have developed osteoporosis due to glucocorticoid consumption. This is one of the reason that why the reported prevalence of the disease in our study is relatively lower. However,this value is not significant statistically.osteoporosis iss quite high in patients suffering from liver cirrhosis for more than 3 years. i.e (46.66%)

Liver plays vital role in regulation of bone metabolism.[19] Hypogonadism is an important risk factor for osteopenia and osteoporosis, thus, CLD would accelerate the development of hypogonadism in the patients due to imbalance between the gonadotrophic hormones as a result of poor metabolic functions of the liver [19] Furthermore, a reduced level of circulating estrogen in the body may be another mediator to produce osteopenia and osteoporosis..[20]

The prevalence of Osteoporosis was high in those cases who suffered from cirrhosis for more than 3 years affecting 116 (46.66%) patients in contrast to 52 (21%) of patients who suffered for less than 3 years duration. The results of our study is comparable to studies done in the past by Javed et al.13 and Sokhi et al. 7 , their results showed a positive correlation in between duration of hepatic cirrhosis and risk of osteoporosis.[7,13]

Vitamin D3 plays pivotal role in normal homeostasis of serum calcium and bone matrix.[22]The serum level of D3 is altered in patients of liver cirrhosis. Vitamin D is either absorbed through the gut or synthesized in the skin , tan is then hydroxylated in the liver by enzyme 25-alpha-hydroxylase and then in kidney by 1-alpha-hydroxylase, then active metabolite 1.25-alpha-hydroxylase is formed.[21] Patients who suffer from cirrhosis often have low vitamin D3 levels.[22]

The results of our study show that the females after menupause are more susceptible to develop osteoporosis due to change in hormonal balance. Low BMI is also associated with increased risk of osteoporosis in patients with PBC.[28]

Another study done shows that weight loss is related to general increased risk of fractures and weight gain has association with reduced hip fracture risks.[26,27]

Low BMI was another risk factor associated with osteoporosis ,Consistently, the results of our study implies that patients with noncholeastatic liver cirrhosis with lower BMI are more prone to develop osteoporosis.[33,34]

Although a lot of studies done report the relationship between the Child–Pugh score and decreased bone mass, conflicting findings still exist. As there are a number of accompanying conditions in decompensated liver cirrhosis patients, including elevated prothrombin time, bilirubin and ascites. [35]The symtoms like ascites may affect the assessment of patients weight and BMD, hence, in our study all the enrolled patients were child pugh score A. The symptoms such as ascites would affect the patients' weight and BMD assessment. Hence, in this study, all included patients are compensated cirrhosis patients with liver function being Child– Pugh A.

The results of our study may be different from the other studies done in the other parts of the world as it is highly heterogenous topic, the sample size,age group of the patients,disease duration of the patients and child-pugh scoring may differ,consequently, results are altered.

CONCLUSION:

Osteoporosis is closely associated with liver cirrhosis. Furthermore, in patient lower BMI, female gender and cirrhosis for more than 3 years, the prevalence is significantly high.

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