



# Osteoporosis in Liver Cirrhosis

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## ABSTRACT

**Introduction:** Liver cirrhosis is highly prevalent in developing countries like Pakistan and osteoporosis is well reported and can add to further morbidity in such cases. **Objective;** To determine the frequency of osteoporosis in cases of liver cirrhosis. **Methods;** This cross sectional study was done at Department of Medicine, Sheikh Zayed Hospital, Rahim Yar Khan from the period of January 2016 to December 2016. The patients with age 30-70 years having liver cirrhosis of at least 1 year or more were included. The detailed socio-demographic and clinical data was collected and osteoporosis was labeled as yes when the T score was less than 2.5 on DEXA scan. **Results;** In this study there were total 200 cases out of which 124 (62%) males and 76 (38%) females with mean age of  $44.35 \pm 8.32$  years. Osteoporosis was seen in 68 (34%) of cases. Osteoporosis affect more females where it was seen in 32 (42.10%) out of 76 cases with  $p = 0.09$ . Osteoporosis was significantly high ( $p=0.002$ ) in cases that had cirrhosis more than 3 year affecting 56 (46.67%) cases in contrast to 12 (15%) cases in their respective groups. There was no difference regarding type of hepatitis between both groups (table 2). **Conclusion;** Osteoporosis is common in cases of liver cirrhosis where every 3<sup>rd</sup> cases develops it and duration of cirrhosis more than 3 years is significantly associated with this.

**Key words;** Liver cirrhosis, osteoporosis, T score, DEXA scan

## INTRODUCTION

**L**iver cirrhosis is denoted as the end stage of progressive hepatic fibrosis. It is characterized by the chronic inflammation, destruction and distortion of normal hepatic architecture. This is an irreversible condition and liver transplantation is thought to be the treatment of choice for this.<sup>1</sup> Liver cirrhosis can occur due to various causes and hepatitis B and C infection are thought to be the most common ones. There are wide range of complications that are seen in cases with cirrhosis and include ascites, hepatic encephalopathy, gastrointestinal bleeding and osteoporosis etc. that can affect and result in increased likelihood of morbidity and mortality.<sup>2</sup>

Osteoporosis is the condition that is the result of decreased bone mineral density and it is reported that the cases with liver cirrhosis suffer from bone loss at much faster rate than the normal cases and it can result in complications like easy fractures. The

estimated prevalence for liver-related osteoporosis is between 20-420/100000 of the general population.<sup>3</sup> Other risk factors like decreased sun exposure, female gender, smoking history, steroid use, diabetes mellitus, alcoholism etc also predispose to osteoporosis.<sup>4</sup> Furthermore different pathogenic mediators like fibronectin, insulin like growth factor-I, and various cytokines have also been recognized. Isolated liver disease to be the cause of osteoporosis in the absence of these co factors is highly under rated and a neglected entity. However, despite the advances in bone biology that have highlighted the pathogenesis of this bone loss, treatment options remain the same as for osteoporosis due to other causes comprising calcium, bisphosphonate and vitamin D supplementation.<sup>5-6</sup> Different methods have been devised to score for bone mineral density, out of which dual energy x-ray absorptiometry (DEXA) scan is most commonly used.

According to a study by Javed M et al osteoporosis was seen in 26% of the cases with

chronic liver disease who had a T score of less than 2.5 on DEXA scan.<sup>7</sup> Another study conducted by Cijevski C et al in Romania also noted a higher percentage of osteopenia and osteoporosis both accounting for about 38% of patients with liver cirrhosis.<sup>8</sup> The objective of the study was to determine the frequency of osteoporosis in patients with liver cirrhosis due to hepatitis B and C.

## MATERIALS AND METHODS

This cross sectional study was done at Department of Medicine, Sheikh Zayed hospital, Rahim Yar Khan from the period of January 2016 to December 2016. The 200 patients in this study with age range of 30-70 years having liver cirrhosis (diagnosed clinically with presence of ascites, jaundice and shrunken liver on USG with increased PT and decreased albumin level) of at least 1 year or more due to either hepatitis B or C were included. The cases suffering from co morbid conditions like DM, metabolic disorders and end stage renal or heart disease were excluded. The detailed sociodemographic and clinical data was collected. Osteoporosis was labeled as yes when the T score was less than 2.5 on DEXA scan.

### Statistical Analysis

Data was analyzed with the help of SPSS version 17. Quantitative variables like age, duration of liver cirrhosis and value of T score were presented in terms of Mean $\pm$ SD (Standard Deviation). Effect modifiers will be controlled through stratification of age, gender, duration of liver cirrhosis and type of hepatitis to see the effect on outcome variable (osteoporosis). Post stratification Chi-Square test was applied taking P-value  $\leq 0.05$  as significant.

## RESULTS

In this study there were total 200 cases out of which 124 (62%) males and 76 (38%) females. The mean age was 44.35 $\pm$ 8.32 years while mean duration of CLD was 6.84 $\pm$ 2.95 years (Table 1). Out of 200, 140 (70%) cases had HCV positive while 60 (30%) had HBV. Osteoporosis was seen in 68 (34%) of cases. Osteoporosis affect more females

where it was seen in 32 (42.10%) out of 76 cases with  $p=0.09$  and it was also more common in age group over 60 years affecting 60 (38.71%) cases as compared to 8 (17.77%) cases with age less than this ( $p=0.06$ ). Osteoporosis was significantly high ( $p=0.002$ ) in cases that had cirrhosis more than 3 year affecting 56 (46.67%) cases in contrast to 12 (15%) cases in their respective groups. There was no difference regarding type of hepatitis between both groups (Table 2).

**Table 1: Study variables.**

	Mean	Range
Age	44.35 $\pm$ 8.32	30-70 years
Duration of cirrhosis	6.84 $\pm$ 2.95	2-15 Years
T score	1.05 $\pm$ 0.33	1-4

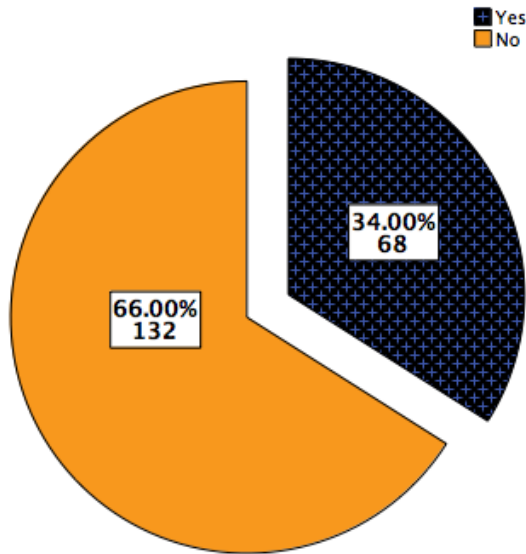
**Table 2: Osteoporosis with respect to different variables (n= 200)**

Variables		Osteoporosis		P-value
		Yes	No	
Gender	Male	36 (29.03%)	88 (70.97%)	$p=0.09$
	Female	32 (42.10%)	44 (57.90%)	
Age (Years)	30-50	8 (17.77%)	037 (82.22%)	$p=0.06$
	60-70	60 (38.71%)	95 (61.29%)	
Duration of cirrhosis	< 3 yrs	12 (15%)	68 (85%)	$p=0.002$
	> 3 yrs	56 (46.67%)	64 (53.33%)	
Type of hepatitis	Hep B	18 (30%)	42 (70%)	$p=0.87$
	Hep C	50 (35.71%)	90 (64.29%)	

## DISCUSSION

Liver cirrhosis poses a great burden in the developing countries like Pakistan. Considering the functions of liver and the pathophysiology involving various mechanisms, these patients are at increased risk of decreased bone mineral density and can end

up in osteopenia and osteoporosis that can further add to the overall morbidity and mortality.



**Fig. 1: Frequency of osteoporosis in cases of liver cirrhosis (n= 200).**

Osteoporosis was seen in 68 (34%) out of 200 cases of liver cirrhosis in the present study. In previous studies, the incidence of this has been seen from 20 to 50% of the cases.<sup>9-10</sup> The variation in different studies can be due to difference in operational definitions to label the osteoporosis and it can also be due to difference in site for labeling it ranging from femur to vertebral bone. While in a study by Javed M et al that used the same criteria as we did with T score of less than 2.5, they found osteoporosis in 26% of their cases.<sup>7</sup>

Osteoporosis affected more females where it was seen in 32 (42.10%) out of 76 cases with  $p=0.09$ . This was also observed by the studies in the past.<sup>11-12</sup> The higher number of this in females can also be due to endocrine factors along with cirrhosis. The estrogen and progesterone are deficient in females at especially at older age group (due to menopause), which was another factor having high osteoporosis rate in our study. However this difference was not statistically significant.

Osteoporosis was significantly high ( $p=0.002$ ) in cases that had cirrhosis more than 3 year affecting 56 (46.67%) cases in contrast to 12

(15%) cases with duration less than this in their respective groups. Similar has been observed in the past as well where the studies by Sokhi et al.<sup>7</sup> and Javed et al.<sup>13</sup> have found positive co relation between the duration of cirrhosis and the chances of osteoporosis. In the latter above mentioned study they found this as significantly correlated with  $p$  value of 0.005; however, they used the cut off value of 5 years to divide the groups in terms of duration of liver cirrhosis.

## CONCLUSION

Osteoporosis is common in cases of liver cirrhosis where every 3<sup>rd</sup> cases develops it and duration of cirrhosis more than 3 years is significantly associated with this.

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