Original Article

Prevalence of osteoporosis in patients with chronic liver disease (CLD) in a hospital; a cross-sectional study

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DOI: 10.47750/pnr.2022.13.S06.129

Abstract

Patients with chronic liver disease (CLD) are increasing aware of the consequence of osteoporosis. Low bone turnover, impaired osteoblast function, and low blood osteocalcin levels are the hallmarks of osteoporosis in CLD, which mostly affects trabecular bone. Osteoporosis is the public health issue of metabolic bone disease among the every age group throughout the globe especially in Pakistan. The current study was conducted in DHQ, KPK, Pakistan to determine the prevalence percentage of osteoporosis in patients during July 2020-2021. Out of 548 patients, the prevalence of osteoporosis was 22.9% at a 95% Confidence Interval (5.9-12.5%), which was higher among female (57.60%) than male (42.40%). The higher prevalence rate was recorded in old patients than young patients. The lower weight, height and cholestasis in sex are risk factors of osteoporosis in chronic liver disease. The early detection of disease can help in decreasing the socio-economic burden and fracture rates.

Keywords: Prevalence; Osteoporosis; Chronic liver disease; Risk factor; Pakistan

INTRODUCTION

The most prevalent metabolic disorder, public issue and one of the important reasons of death and morbidity in the old age population while musculoskeletal system in old age is osteoporosis. Osteoporosis is considered by a slow decline of bone mass and poor bone mineral density, which eventually rises the danger of fractures (Cauley, 2013; Sözen et al., 2017; Noh et al., 2018; Khan et al, 2018; Fassio et al., 2018; Choi et al., 2021). This number has an impact on the techniques used for diagnosis, prevention, rehabilitation, and treatment (Raška et al., 2017; Almulaify et al., 2018).

Numerous writers described hepatic osteodystrophy, including osteoporosis as well as its correlation with chronic liver disorders and liver cirrhosis. When liver cirrhosis is severe or persistent, the body goes through a number of changes. When there is a chronic liver condition present, the phrase "hepatic osteodystrophy" typically alludes to osteoporosis (Mo et al., 2021). Cirrhosis and osteomalacia have been linked less frequently than cirrhosis and osteoporosis. While cirrhosis patients seldom have osteomalacia, 12 to 55% of these individuals have osteoporosis according to several studies (Chen et al., 2017; Liu et al., 2018) 10% of hepatitis B virus patients, 50% of hepatitis C virus patients, and 30% of patients with alcoholic liver and autoimmune illness (Collie, 2007; Guañabens and Parés, 2010; García Botina et al., 2011).

In Pakistan, the normal life probability has climbed from 46.6 years in 1960 to 65.4 years in 2010 and is estimated to reach 72.4 years in 2023. Osteoporosis is becoming a significant public health issue in Pakistan as a result of the country's steadily growing geriatric population and inadequate diet. With an average hospital stay of 7–10 days, it is assessed that the cost of hip breakages in Pakistan ranges from 4000 to 10000 USD depending on the hospital environment. Osteoporosis is consequently placing a strain on the nation's healthcare system (Guañabens and Parés, 2018; Hayashi et al., 2018).

Frailty is linked to osteoporosis and bone fracture. The symptoms of frailty include self-reported weakness, tiredness, sluggish walking, and low levels of physical activity. The mortality of patients due to advanced disease is correlated with this condition (Gonçalves et al., 2013; Zeng et al., 2019). Patients with CLD require early detection and osteoporosis prophylaxis. Chronic liver illness frequently results in metabolic bone diseases (CLD). Bone fractures are more likely to occur in patients with CLD, with serious consequences for morbidity, quality of life, and even survival (Ward, 2013; Milte and Crotty, 2014; Ijayakumar and Busselberg, 2016). In many different types of liver illness, bone diseases such osteoporosis, are frequently seen. Numerous improvements have been made in current years regarding the understanding of the pathogenetic mechanisms of osteoporosis in this context as well as the identification of risk factors (Guarino et al., 2016; Hayashi et al., 2018; Sternberg et al., 2014; Liu et al., 2017). Despite all of this, there are still a lot of problems to be resolved before we fully understand this subject. In this study, we focused on the prevalence of osteoporosis, so current study was conducted to fill this gap.

Material and method

This cross-sectional study was conducted in District Headquarter hospital, Khyber Pakhtunkhwa, Pakistan from July 2020-July 2021 after gaining ethical permission from the Institutional Review Committee. The participants with orthopaedic issues between the ages of 20-40 years who willing to consent to the study were included. Total 548 patients including 221 male and 327 females were participated in this study. Convenient sampling was carried out, and the sample size was determined using the given formula of Shrestha et al. (2019). The aim, significance and procedure was discussed in detail and a written informed consent was received from all the patients. Demographic data of each patient was collected. Height (meter square) and weight (Kg) of patients were measured through a nurse using an electronic digital scale and a portable standiometer, respectively. Weight (Kg) was divided by height (m2) to calculate the body mass index (BMI). Patients were then classified as underweight (15-19.9), normal weight (20-24.9), overweight (25-29.9) and obese (30-40).

Results and discussion

One frequent skeletal consequence in those with chronic liver illness is osteoporosis which is asymptomatic, lead to fractures and a lower quality of life if left untreated. This study was conducted to check the prevalence percentage of osteoporosis in patients. Osteoporosis can cause brittle or insufficiency fractures, which are frequently observed in the hip, distal forearm, and vertebra, if it is not treated appropriately in a timely manner. The education level and occupation of examined patients is given in table 1. Among 221 male and 327 females, 42.40 and 57.60%, respectively had osteoporosis. It was recorded that old patients had higher rate of prevalence than young patients (Table 2).

Our study reported an osteoporosis prevalence of 22.9%, which was not comparable to other studies performed in different countries such as India (Vaishya et al., 2017). They reported 8.99% prevalence while Haris et al. (2014) had reported 30.7% prevalence in Pakistan while 10.3% prevalence has reported by Wright et al. (2014) in America.

For both sexes, osteoporosis is a problem. However, as women are extra expected than males to grow osteoporosis and resultant breakages, the maximum research on the condition has concentrated on women. Osteoporosis was found to be prevalent in 24.7% of 773 Indian men and women between the ages of 30 and 90. The prevalence in women was estimated to be 15%; 4.7% of premenopausal women and 10.3% of post-menopausal women were affected. 9.7% of men in this study were found to be predisposed (Modagan et al., 2018; Zou et al., 2020). The prevalence % was recorded maximum in female than male in the current study which is in line with the previous studies (Ormarsdottir et al., 1999; Cheraghi et al., 2018). They reported 8.08% prevalence in female while 7.99% prevalence of osteoporosis in the male of Hamadan province. It has been observed that risk factors were highly associated with osteoporosis as given in table 4.

Table 1. Education level and occupation of patients in the study area.

Variables	**Frequency (n)**	**Percentage**
Education level		
Elementary school	158	28.83%

Middle school	143	26.09%
High school	125	22.81%
University	120	21.89%
Occupations		
Business	45	8.21%
Farming	178	32.48%
Housewife	182	33.21%
Public officer	54	9.85%
Employee	89	16.24%

Table 2. Gender and age dispersal in osteoporosis.

Gender	**Frequency (%)**	**Total**
Male	53 (42.40)	221 (40.32)
Female	72 (57.60)	327 (59.67)
Total	**125 (100)**	**548 (100)**
Age		
20-25	21 (16.80)	165 (130.10)
26-30	28 (22.40)	116 (21.16)
31-35	36 (28.80)	126 (22.99)
36-40	40 (32.00)	141 (25.72)
Total	**125 (100)**	**548 (100)**

Table 3. Body Mass Index (BMI) distribution in osteoporosis

Body mass index	**Frequency (%)**	**Total**
Under weight (> 18.5)	31 (24.80)	134 (24.45)
Normal weight (≤ 18.5)	35 (28.00)	139 (25.36)
Over weight (≤ 255)	40 (32.00)	147 (26.82)
Obese (≥ 30)	19 (15.20)	128 (23.35)
Total	**125 (100)**	**548 (100)**

In the current study, among the osteoporotic patients, 31 (24.80%) were underweight, 35 (28.00%) normal weight, 40 (32.00%) overweight, and 19 (15.20%) obese (Table 3). The overweight and normal weight patients were recorded more osteoporotic than underweight and obese. Harris et al. (2014) had investigated the similar findings of osteoporosis.

Table 4. Risk factors associated with osteoporosis in patients

Serial number	**Risk factors**
1	Low density of bone minerals
2	Use of corticosteroids

3	Smoking
4	Advancing age
5	Dementia
6	Sarcopenia
7	Chronic illnesses
8	Hypertension

Conclusion

The current study shows the higher osteoporosis prevalence in the patients of the country. The prevalence is high due to various risk factors such as age, sex and various diseases. Rapid socioeconomic change is a result of economic progress. The main factor contributing to mortality and morbidity now is non-communicable diseases. The females and older patients are highly affected with osteoporosis than males and younger.

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