Inflammatory Bowel Disease Prevalence and Risk Factors for Low Bone Mineral Density a Single Center Study

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Abstract

Background and Aim : Osteoporosis and osteopenic fragility are frequent in people with inflammatory bowel disease**.** Clinically, several risk factors have been suggested for low bone mineral density (BMD) in inflammatory bowel disease (IBD) patients. Yet, limited data is available on evaluating the prevalence and risk factors for BMD. Therefore, The objective of this study was to identify the frequency of low BMD in IBD and the variables that increase its risk.

Methodology: This singe center study conducted in 130 ulcerative colitis adult patients at the department of Gastroenterology Hayat Abad Medical complex Peshawar. from August 2020 to July 2021. Patients' demographic details such as age, BMI, disease types, gender, disease duration, Both vitamin D levels and steroid usage histories were documented. Bone mineral density was measured in the femur and the lumbar spine by dual-energy X-ray absorptiometry (DEXA). Deoxypyridinoline, serum calcium, osteocalcin, and phosphorus levels, among others, were recorded as biochemical indicators of bone metabolism. Results were compared between those with low bone mineral density and those with other clinical characteristics including medication or steroid use, illness duration, age, and body mass index. Data analysis was performed using SPSS version 25.

Results: Out of 130 ulcerative colitis patients, there were 70 (53.8%) male and 60 (46.2%) females. The overall mean age was 38.6±3.54 years. The prevalence of abnormal bone mineral density was 68.9% (n=90). Of the 90 abnormal BMD patients, the incidence of osteoporosis and osteopenia was 46 (35.4%) and 44 (33.8%) respectively. Steroid use and duration of disease was significantly associated with low bone mineral density in univariate analysis. In multivariate analysis, low bone mineral density was significantly associated with disease duration only. There was an insignificant association between low BMD and different clinical parameters such as age, BMI, gender, vitamin D level, and steroid usage.

Conclusion: According to the results of the current investigation, people with inflammatory bowel illness are disproportionately affected by osteoporosis and osteopenic fragility. In addition, a strong correlation between poor bone mineral density and the progression of illness was found. The greatest risk factor for poor bone mineral density seems to be the illness itself. If patients with low MBD are identified in the early stages, an appropriate preventative approach may be devised.

Keywords: Risk factors, Inflammatory bowel disease, Ulcerative colitis, Low bone mineral density.

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INTRODUCTION

Inflammatory bowel disease patients usually have osteoporosis and Osteopenia with varying prevalence of osteoporosis from 2% to 42% [1, 2]. The increased risk factors for low bone mineral density in patients with inflammatory bowel disease have been described in a number of study.[2, 3]. Multiple risk factors such as age, gender, BMI, disease duration, smoking, steroid history, and reduced food intake were associated with a lower bone mineral density [4]. Osteoporosis is generally accepted to have multifactorial pathogenesis in inflammatory bowel disease. Genetic factors, lower BMI, small bowel resection, malabsorption, corticosteroid treatment, hypogonadism, and vitamin D deficiency were different potential risk factors for low bone mineral density [5-7]. Low BMD could be caused by Crohn's disease as an important risk factor. Crohn's disease initial diagnosis could be the time for low bone mineral density disease. Compared to ulcerative colitis patients, the average of low BMD patients had significant association with previous treatment for Crohn's disease patients [8]. Induction of azathioprine remission increases the BMD in Crohn's disease patients in turn osteopenia/osteoporosis could be developed by a significant role played by Crohn's disease. Steroids could not be an effective treatment for low BMD patients. Regardless of conflicting results, BMD could be reduced by Corticosteroids [9].

A conflicting result has been reported by several studies regarding risk factors for low BMD. Jahsen et al [10] investigated 120 IBD patients and reported that low BMD and vitamin D had no significant association. Similarly, another study by Maldonado et al [11] investigated premenopausal women with inflammatory bowel disease and reported insignificant association between BMD and vitamin D and calcium intake. In contrast, Khadgawat [12] found a positive association between low BMD and lower intake of calcium while studying inflammatory bowel disease patients from India. However, they found no association of BMD with steroid usage, age, and disease duration. Bishop et al [13] conducted his study on 166 IBD patients and found that risk for low BMD increased due to corticosteroid, male gender, and low vitamin D intake, whereas BMD has no association with age and location of disease. Compared to the general population, IBD patients are 40% more susceptible to bone fracture which might include hip and vertebral fractures. The osteoporosis development by various risk factors could assist in identification of those factors for fractures. ThereforeThe ongoing study aimed to determine the causes of low bone mineral density and develop better methods of monitoring and treating the disease.

METHODOLOGY

This Study department of Department of Gastroenterology Hayat Abad Medical complex Peshawar was carried out on 130 ulcerative colitis adult patients from August 2020 to July 2021. Patients' ages, BMIs, diagnoses, genders, disease durations, blood vitamin D levels, and steroid usage histories were recorded. DEXA measured femur and lumbar spine bone mineral density. Deoxypyridinoline, serum calcium, osteocalcin, and phosphorus were tested and reported. Drug/steroid history, illness duration, age, and BMI were compared to low bone mineral density. DEXA study excluded patients with isolated proctitis and no steroid history. Medical records

and questionnaires provided demographic and clinical data. Endoscopic, clinical, histological, and radiological tests diagnosed IBD. This research excluded individuals with chronic renal failure with blood creatinine >1.5 mg/dL, diabetes, chronic liver, recent pregnancy, vitamin D supplements, and cancer.

Standard DEXA measured femur and L2-4 BMD. BMD analysis yielded T or Z scores. Z scores represent the standard deviation from age-specific and normal sex mean values, whereas T-scores link peak bone mass age with gender-matched young people. The WHO defined osteoporosis and osteopenia using standard deviation values. According to WHO guidelines, osteoporosis was defined as T scores <-2.5 SD and osteopenia as T values <-1 SD [14]. Normal, insufficiency, and deficiency were defined as blood vitamin D 25-hydoxy levels over 30 ng/mL, 20–30 ng/mL, and <20 ng/mL, respectively.

Osteoporosis and osteopenia were compared to individuals' normal bone mineral density. SPSS 25 analysed data. Low BMD was linked to illness duration, age, BMI, steroid use, gender, and vitamin D. Chi-square and Student's tests analysed categorical and quantitative variables. Univariate analysis generated odd ratios with 95% confidence intervals.

RESULTS

Out of 130 ulcerative colitis patients, there were 70 (53.8%) male and 60 (46.2%) females. The overall mean age was 38.6±3.54 years. The prevalence of abnormal bone mineral density was 68.9% (n=90). Of the 90 abnormal BMD patients, the incidence of osteoporosis and osteopenia was 46 (35.4%) and 44 (33.8%) respectively. Steroid use and duration of disease was significantly associated with low bone mineral density in univariate analysis. In multivariate analysis, low bone mineral density was significantly associated with disease duration only. There was an insignificant association between low BMD and different clinical parameters such as age, BMI, gender, vitamin D level, and steroid usage. Figure-1 depicts the gender's distribution. Prevalence of abnormal BMD is illustrated in Figure-2. Table-I represents the baseline characteristics of DEXA assessed IBD patients. Mann-Whitney test was used for assessing the individual risk factor and T scores as shown in Table-II.

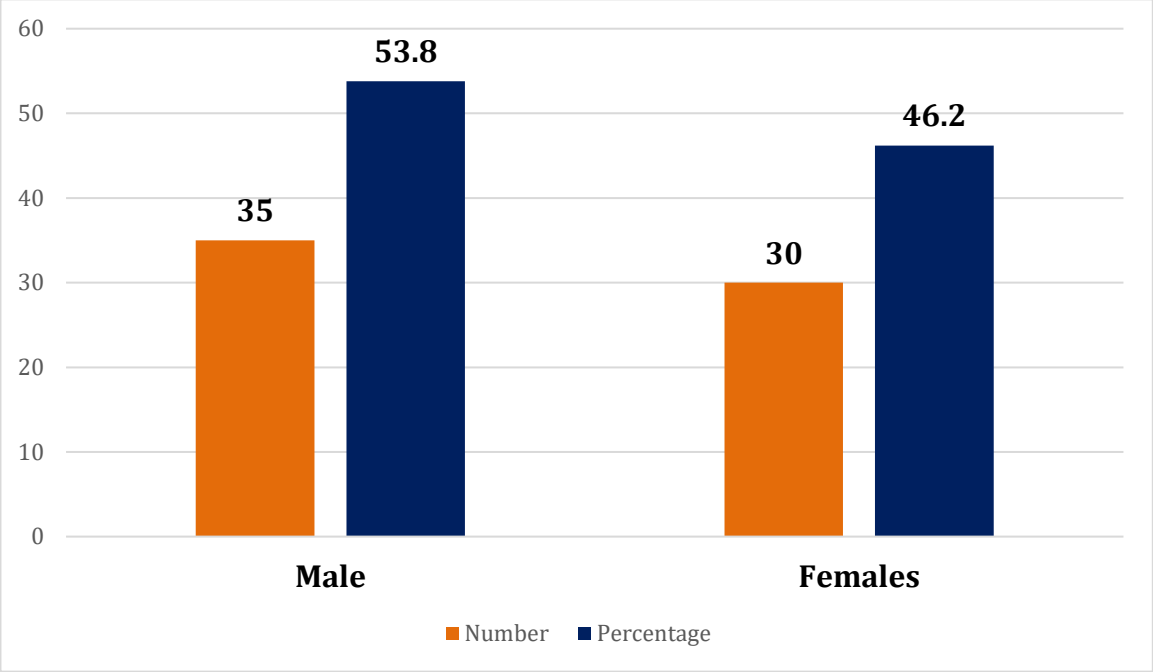

Figure-1 gender's distribution (n=130)

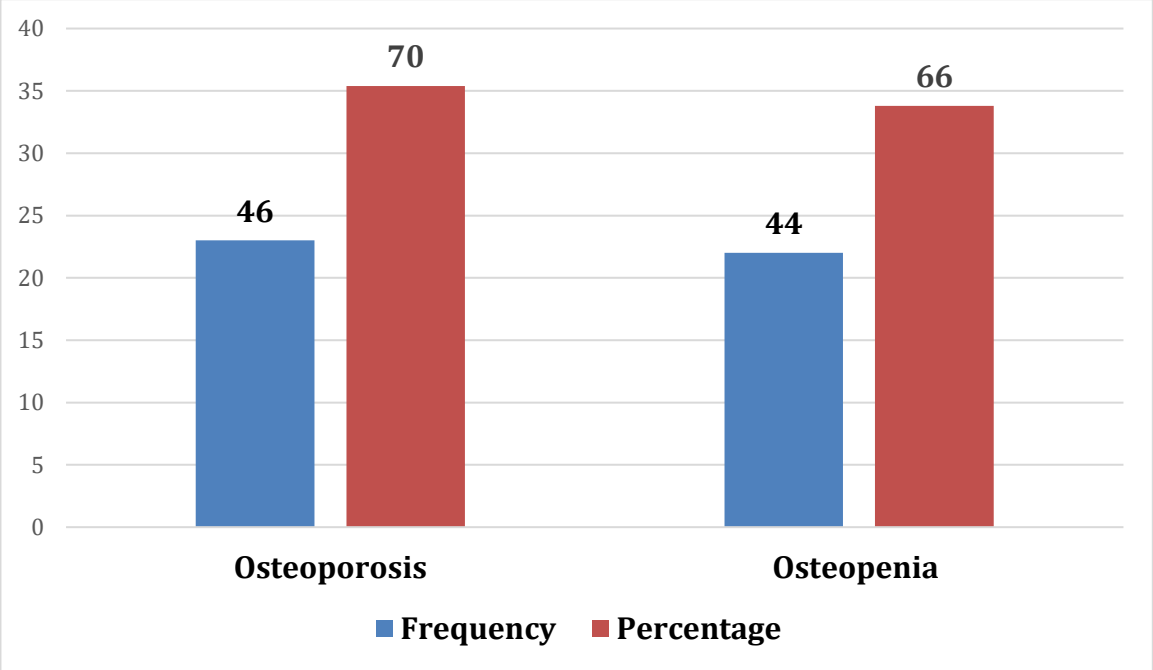

Figure-2 Prevalence of abnormal BMD (n=90)

Table-I Baseline characteristics of DEXA assessed IBD patients

Parameters	IBD n=65
1.Age in years (Mean ± SD)	38.6±3.54
2.BMI in Kg/m2 (Mean ± SD)	22.9±4.7
3.Duration of disease in years (Mean ± SD)	8.6±6.9

4.Patients with flares (Mean ± SD)	9.1±9.8
5.Small Bowel resection (%)	18 (27.7)
6.Small intestine involvement (%)	28 (43.1)
7.Steroids dosage in g (Mean ± SD)	25.9±42.7

Table-II individual risk factor and T scores assessed by Mann-Whitney test

Risk Factors	T-scores above -1 SD	T-scores below -1 SD	p-value
Femoral Neck			
BMI Kg/m2	23.8	21.2	0.005
Lumber Spine			
Age (years)	39.8	33.7	0.03
BMI (Kg/m2)	23.3	21.3	0.05
Steroid Dosage (g)	3.9	7.1	0.029

DISCUSSION

Inflammatory bowel disease patients had higher rates of osteoporosis and osteopenia. IBD patients were more at risk for osteopenia/osteoporosis after bowel resection and corticosteroid therapy. Disease risk variables were independent. This research found a greater frequency of osteopenia/osteoporosis, similar to a tertiary care referral study [15]. Inflammatory bowel disease patients had a 30% osteoporosis rate [16, 17]. Bisphosphonates, vitamin D, and calcium are effective baseline treatments for IBD patients with osteoporosis and osteopenia.

The femoral neck was less effective than the lumbar spine in IBD patients in a recent pathological BMD research. Most investigations found osteoporosis greater in the femoral neck [18, 19]. Corticosteroids cause trabecular bone loss. Bokemeyer et al. [20] examined Chinese IBD patients' low BMD rates. 26 ulcerative colitis patients out of 50 had 63% lower bone mineral density than age- and gender-matched young people. Low BMD predicted illness duration in this research. Azuma et al. [21] reported comparable results in 41 ulcerative colitis patients.Poor BMI is the usual risk factor for low BMD. In this research, poor BMD did not affect BMI. Asians' lower BMI and belly circumference may explain this. A cross-sectional research of 1250 postmenopausal women indicated that lower BMD and greater BMI were related with poorer socioeconomic status [22].Low BMD and vitamin D levels were not linked in this research. Possible cause: limited patient. Reduced nutrition, malabsorption, sun exposure, and vitamin D circulation may promote vitamin D deficiency in IBD patients [23]. Hilmi et al. [24] also observed no significant correlation between poor BMD and vitamin D in 74 IBD patients. Mouli et al. [25] found that vitamin D insufficiency was related with poor BMD in inflammatory bowel disease patients. Corticosteroids, another risk factor for low BMD in IBD patients, cause bone loss by lowering intestinal calcium absorption, affecting osteoblast function, increasing renal calcium excretion, and promoting osteoblast death [26]. This research found no link between steroids and poor BMD. A large cross-sectional investigation by Alireza et al. [27] identified a substantial positive correlation between poor BMD and

steroid use in 122 inflammatory bowel disease patients. Steroid usage is linked to osteopenia and osteoporosis, Abraham said. An argument that pathological BMD patients utilise more steroids confirmed the steroid's toxic impact on low BMD. This validated prior systematic findings that corticosteroids are a risk factor for osteoporosis in Crohn's disease patients. Steroids at 110 g may lower BMD [28].

CONCLUSION

According to the results of the current study, people with inflammatory bowel illness are disproportionately affected by osteoporosis and osteopenic fragility. In addition, a strong correlation between poor bone mineral density and the progression of illness was found. The greatest risk factor for poor bone mineral density seems to be the illness itself. If patients with low MBD are identified in the early stages, an appropriate preventative approach may be devised.

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