



International Journal of Orthopaedics Sciences

E-ISSN: 2395-1958
P-ISSN: 2706-6630
IJOS 2021; 7(3): 893-896
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www.orthopaper.com
Received: 04-05-2021
Accepted: 27-06-2021

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Primary osteoarthritis of the knee joint and osteoporosis in postmenopausal females in a tertiary care hospital

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DOI: <https://doi.org/10.22271/ortho.2021.v7.i3m.2853>

Abstract

Context: The relationship between osteoarthritis and osteoporosis in post-menopausal females is controversial. Western literature shows inverse relationship but Indian population is different.

Aims: To investigate the association of primary osteoporosis with osteoarthritis of knee joint amongst post-menopausal females.

Settings and Design: At tertiary care hospital A Cross sectional study for 75 post menopausal patients with osteoarthritis of knee joint visiting the orthopaedic OPD with chief complaints of pain and stiffness of knee joint were screened for grade of osteoarthritis on x-ray and BMD.

Methods and Material: A cross-sectional observational study was carried out on 75 postmenopausal females with primary osteoarthritis of the knee joint. Grading was done according to the Kellgren and Lawrence system based on x-ray. The comparison of mean values of BMD among early-stage group (K/L group 1,2) and advanced group (K/L group 3,4) was performed.

Statistical analysis used: The comparison of mean values of BMD among both groups were performed using one-way of analysis of variance (one way ANOVA). SPSS to 20.0 statistical software package was used.

Results: The difference in BMD T score value in both groups was not significant. There were 16/38 patients with osteoporosis in early arthritis group (42.1%) whereas 15/37 patients in late arthritis group (40.54%).

Conclusions: Osteoarthritis of knee joint is not protective against osteoporosis. There is no significant difference in bone mineral densitometry measurement between early and late osteoarthritis of knee joint.

Keywords: Densitometry, females, osteoporosis, osteoarthritis knee, joint

Introduction

Elderly population mainly females across the world is facing two common orthopaedic problems mainly osteoarthritis and osteoporosis [1]. Osteoarthritis is a degenerative disorder which mainly affects articular cartilage of major joints like knee, hip etc. Of this knee joint affection is commoner in India. Globally osteoarthritis ranks 10th in all non-fatal diseases and accounts for about 22-39% of the musculoskeletal problems [2].

Osteoporosis is a skeletal disorder characterized by low bone mass and microarchitectural deterioration of the skeleton leading to bone fragility and predisposition to fractures. Osteoporosis is a major cause of morbidity and mortality in postmenopausal women. It is called primary osteoporosis if it is due to age without any underlying disease. While secondary osteoporosis has some underlying disease or medication responsible for it [3]. The relationship between osteoarthritis and osteoporosis is controversial. Osteoarthritis is caused due to overactivity which however is protective mechanism against osteoporosis. However clinical experience shows that both conditions may coexist [5]. Many patients operated for hip osteoporotic fractures have primary hip osteoarthritis also. In many patients operated for primary hip osteoarthritis in western literature have femoral neck bone mineral densitometry value in good range [7].

In few other studies in women with large joint osteoarthritis though bone mass was above average, the risk of bone fractures did not decrease [8].

Studies in western literature shows inverse relationship between osteoarthritis and osteoporosis [9]. Indian population has many differences in lifestyle, cultural, social and societal norms with habits such as squatting, knee folding and occupational strains like agriculture and labouring. Also in Indians primary knee osteoarthritis is more common [10]. Hence we decided to study the relationship between primary osteoarthritis of the knee joint and osteoporosis in postmenopausal females in a tertiary Care hospital.

Aims and Objectives

1. To investigate the association of primary osteoporosis with osteoarthritis of the knee joint amongst post-menopausal females in tertiary care hospital
2. To determine the grade of osteoarthritis amongst post-menopausal females in a tertiary care hospital
3. To assess the bone density of femoral neck by Singh's Index amongst post-menopausal females with advanced osteoarthritis in a tertiary care hospital.
4. To establish the grade of osteoporosis from the bone density amongst post-menopausal females with advanced osteoarthritis in tertiary care hospital

Subjects and Methods

A cross-sectional observational study was carried out on 75 postmenopausal females with primary osteoarthritis of the knee joint who came to outpatient department of MIMER medical college, Talegaon (Dabhade) Pune. Ethics committee approval was taken and written informed consent was taken from patients for participation in the study. Patients who had secondary osteoarthritis of the knee joint or secondary osteoporosis were excluded from study. X-ray standing anteroposterior view of the knee joint was taken of the patients with osteoarthritis of the knee joint. Grading was done according to the Kellgren and Lawrence system [11].

Grade 1: Doubtful joint space narrowing (JSN) and possible osteophyte lipping

Grade 2: Possible joint space narrowing on antero-posterior weight-bearing radiograph and definite osteophytes

Grade 3: Definite joint space narrowing, multiple osteophytes, sclerosis and possible bone deformity

Grade 4: Marked joint space narrowing, large osteophyte, severe sclerosis and definite bony deformity.

We measured the bone density of calcaneus by quantitative ultrasound method. This device advantage of lesser cost, portability and not using ionizing radiation. Bone mineral densitometry (BMD) result was presented as mean (\pm SD). For statistical analysis the patients were divided into 2 groups early-stage group (K/L group 1,2) and advanced group (K/L group 3,4). The comparison of mean values of BMD among both groups were performed using one-way of analysis of variance (one way ANOVA) P less than 0.05 was considered significant. SPSS to 20.0 statistical software package was used for statistical analysis.

Results

75 patients were included in study. 38 in early arthritis age group and 37 in late arthritis group. Mean age of the patient was 51.5 ± 5.4 in early arthritis group and 50.2 ± 5.4 in late arthritis group (P value 0.4).

BMD T score value (mean \pm SD) was $-2.18 (\pm 1.23)$ in early arthritis and $-2.32 (\pm 1.23)$. Thus difference in BMD T score value was not significant (P value greater than 0.05).

Considering osteoporosis as T score below -2.5 number of osteoporosis patients in early arthritis group and late arthritis group according to K-L score was noted.

There were 16 patients with osteoporosis out of 38 in early arthritis (42.1%). There were 15 patients with osteoporosis out of 37 in late arthritis group (40.54%). Thus there was no significant relationship between osteoporosis and stage of arthritis (early or late group) as P value was greater than 0.05.

Discussion

The prevalence and severity of osteoarthritis and osteoporosis increase in postmenopausal women [13]. The literature from west has found an inverse relationship between osteoarthritis and osteoporosis [14]. Some data from west suggest that prevalence of osteoporosis in OA is same as in general population [15]. However Indians have different lifestyle, cultural and social differences than western population. There are only few Indian studies about relationship between osteoarthritis and osteoporosis. Study by Ghosh et al from eastern India showed that the prevalence of osteoporosis in osteoarthritis was same as prevalence of osteoporosis in general population. However this study did not exclude males and premenopausal females [16]. Another study from Pooja Dhaon et al done in north India did not show any difference in prevalence of osteoporosis in osteoarthritis and general population [17]. There was no study done in western India to study the relationship of osteoarthritis and osteoporosis. Hence we did the study.

In our study there was no statically significant difference in age group in early arthritis group (51.5 ± 5.4) and late arthritis group (50.2 ± 5.4).

In our study there was no significant difference in BMD in early arthritis group and late arthritis group. However our findings were comparable to study by Pooja Dhaon et al and Ghosh et al which also showed no significant difference in BMD in arthritis group according to severity [16, 17]. Our findings were also consistent with study by Bagis S et al, Julie Glowacki et al, Aigul Zholdoshova et al which showed that primary generalized osteoarthritis is not protective against osteoporosis [18, 19, 20].

Also study by Dequeker J et al and Soloman et al showed that both diseases can co-exist as in our study [21, 22]. There are other studies in literature by Avden NK et al, Sornay et al. which show that though high BMD in osteoarthritis patients may exist but risk of fracture is not low. However this study was not done by us and we cannot comment on this. There are many studies in literature which show inverse relationship between osteoarthritis and osteoporosis [23, 24, 25].

Incidence of osteoporosis in post menopausal females with advanced osteoarthritis of knee joint in

Study by Pooja Dhaon et al. from north india showed incidence of osteoporosis is 34.6% in patients of osteoarthritis of knee joints [17].

While in study by Elizabeth A Lingard et al. from UK incidence was 23% only [27].

In study by Chang Bum Chang et al. from Korea incidence of osteoporosis in advanced osteoarthritis of knee joint was 31%.28 A Finnish study by Makinen et al. reported this figure to be 28%. while another German study by Breijawi N et al. reported it to be 29% [29, 30].

Thus we came to know that incidence of osteoporosis in advanced osteoarthritis of knee joint varies from 17% to 36%

in various ethnic groups according to genetic, social or cultural differences. However the incidence of osteoporosis of advanced osteoarthritis of knee joint was 40.54% in our study which was the highest, further proving that osteoarthritis and osteoporosis are not mutually exclusive diseases and co-exist quite often.

Conclusion

Osteoarthritis of knee joint is not protective against osteoporosis. Osteoarthritis of knee joint and osteoporosis can co-exist in same patient. There is no significant difference in bone mineral densitometry measurement between early and late osteoarthritis of knee joint.

Limitation of study

Our study had small sample size. Our study group had no control group. We used quantitative usg for measurement of BMD at calcaneus and not DEXA scan.

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