

Association between early menopause and incidence of Osteoarthritis in patients of Wardha district - An observational study

Research Article

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Abstract

Background: Osteoarthritis (OA) is a progressive musculoskeletal disease involving the degeneration of cartilage and bone, and is one of the leading causes of pain and disability worldwide. It is a multi-factorial, slowly progressing, and primarily non-inflammatory degenerative disorder of the synovial joints that is often age related and/or trauma induced. Women are more prone than men. It rises in prevalence, incidence, and severity with polyarticular involvement following menopause. **Aim and Objectives:** To evaluate the association between early menopause and incidence of Osteoarthritis in patients of Wardha District. **Methodology:** A cross sectional study was conducted among 60 post-menopausal female subjects having normal menopause and early menopause between the age group of 50 to 75 years of Wardha District. Group A comprised normal menopause subjects and Group B comprised early menopausal subjects. Then incidence of Osteoarthritis in both groups was assessed on the basis of diagnostic criteria by filling predesigned proforma and comparison was done by statistical analysis. **Observation and Discussion:** Patients of group B showed diagnostic features of Osteoarthritis like crepitus, restricted range of movement, bony enlargement and morning stiffness <30 minutes in more number of patient as compared to group A. This clearly indicates that incidence of Osteoarthritis was more in patients having early menopause as compared to normal menopause. **Conclusion:** This study concluded that there is strong association between early menopause and occurrence of Osteoarthritis.

Key Words: Menopause, Early menopause, Post-menopausal, Osteoarthritis.

Introduction

Osteoarthritis (OA) is the most frequent joint condition seen in daily practice and the second most prevalent rheumatological disorder (1). Osteoarthritis (OA) is a degenerative condition of the synovial joints that is multifactorial, slowly progressive, and mostly non-inflammatory. Articular cartilage and other joint tissues eventually undergo permanent destruction as a result of degeneration. The most prevalent musculoskeletal condition in the world, OA has serious negative effects on social, economic, and health outcomes. The start and evolution of the condition are significantly influenced by age-related deterioration of the articular cartilage and subchondral bone, limb overloading, malalignment, hereditary diseases, and metabolic abnormalities (2, 3).

An estimated 654 million people worldwide have OA, with women being more likely to have it (about

22%) than men (about 12 percent), and sex differences only becoming noticeable after age 50 (4). Incidence and prevalence of OA are significantly higher in women than in men after the age of 50, and there is a greater difference in the volume of cartilage lost between the sexes with ageing, especially in knee and hip OA, where the risk and prevalence both rise markedly from menopausal age (around 50 years) to 75 years when compared to men of similar age. The hand, knee, and hip are where OA is most common, especially elderly people. Post-menopausal women are more likely to develop OA, namely weight-bearing OA of the knee or hip (5,6). Menopause, which is marked by the end of the monthly cycle and the ensuing noticeably decreased levels of the sex hormones oestrogen and progesterone, is an important stage in a woman's life. Drs. Cecil and Harper initially discussed the association between OA and menopause in 1925 (7), and by 1952 it had been called "menopausal arthritis" (8). Since then, a number of studies have looked into how the menopausal transition's altered sex hormone profile affects the development and progression of OA. Because oestrogen deficit contributes to the higher prevalence of OA in older women (9), hormone replacement therapy (HT) is a major option to investigate when considering about how to maintain joint health in OA. (10,11).

Biomechanical effects along with several autocrine, paracrine, and endocrine cellular activities

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that affect cartilage degradation and regeneration culminate in pathological alterations in OA. Sarcopenia, regeneration, and degeneration may also play a role. Emerging data suggests that oestrogen plays an important role in preserving the homeostasis of articular tissue, and that postmenopausal ovarian atrophy (disuse atrophy) is associated with OA. Therefore, oestrogen protects against joint deterioration (12). Premature menopause is defined as beginning before the age of 40, while early menopause is defined as beginning at or before the age of 45, both of which are significantly ranging below the median age of natural menopause (at the age of 51 years) (13). Early menopause, or premature menopause, can occur naturally or be induced on by treatments like chemotherapy or operations like bilateral oophorectomy. It is now known that women who experience oestrogen deficiency at a young age—well before the median age of natural menopause—are at a greater risk for early morbidity and mortality, regardless of the underlying aetiology. All articular tissues are impacted by OA, which finally results in joint failure. Despite the long-standing belief that articular tissues are insensitive to estrogens or oestrogen deficiency, emerging research indicates that estrogens influence joint tissue function through complex molecular pathways that work at many different levels (14).

Need of study

Biology, genetic predisposition, and hormones present a triple danger of risk factors for arthritis in women by nature. However, a lot of women have included weight as a fourth risk factor. Attention must be paid to the significant rise in OA incidence amongst postmenopausal women. There is scientific evidence to support the notion that post-menopausal women are more susceptible to arthritis. Arthritis caused by menopause can run in families. This could result from faulty genes that are inherited from parents disrupting the metabolism of oestrogen. Keeping a healthy weight, doing frequent exercise and a well-balanced diet is essential to keep symptoms in check. It's crucial to lessen the pressure and consistent strain on the joints. Antioxidants and important nutritive components are abundant in both vegetables and fruits. They might lessen joint inflammation. A well-balanced diet will aid in weight management and lessen joint stress. The consumption of nuts, whole grains, and dry fruits helps the body get the calcium and magnesium it needs for strong, healthy bones. Oral dietary supplements can be helpful. Supplements of omega fatty acids, vitamin B3, and fish oil will aid to maintain the body healthy. Other management includes use of oral pain killers, injection intra-articular, physiotherapy, and splints. Surgical options is preferred when other options have been exhausted or for recognized deformities.

Hence this observational study was conducted with the aim to establish the association between early menopause and occurrence of Osteoarthritis in post-menopausal women. This will help to create awareness and to take preventive measures so as to avoid osteoarthritis and other disorders of the joints at an early

age by adopting preventive measures and starting early treatment to avoid further complications.

Aims and Objectives

Aim

- Study the association between early menopause and incidence of osteoarthritis in patients visiting MGACH & RC, Salod (H), Wardha.

Objectives

- To study the incidence of osteoarthritis in women visiting MGACH & RC.
- To study the association between incidence of osteoarthritis and early menopause in women visiting MGACH & RC.

Materials and methods

Place of work: Mahatma Gandhi Ayurveda College, Hospital & Research Centre, Salod (H), Wardha.

Sample size:60

- Group A (N=30) - Subjects having early Menopause (Before 45 years of age).
- Group B (N=30) - Subjects having normal Menopause (After 45 years of age).

Study type: Observational Study

Study Design:

A cross-sectional study was conducted among female patients of Osteoarthritis visiting MGACH&RC of Wardha District. Total 60 post-menopausal female patients suffering from Osteoarthritis between the age group 50 to 75 years (this is the normal age of menopause in female, below 45 years, we will found only early menopause hence to maintain similarity in both groups this age group was taken) were enrolled in the study. They were personally interviewed on the basis of pre designed structured proforma. Data was analyzed statistically by simple proportions. Ethical clearance and permission was obtained from Institutional ethical committee. Before interviewing, consent of each respondent was taken.

Definition of early menopause—Menopause before the age of 45 years of age (may be natural or surgical).

Osteoarthritis was clinically diagnosed by using - The American College of Rheumatology (ACR) Clinical classification criteria for Osteoarthritis. In these criteria the presence of pain along with at least three of the following six items can classify the knee OA in the patients

- Age > 50 years old
- Morning stiffness < 30 minutes
- Crepitus on knee motion
- Bony tenderness
- Bony enlargement
- No palpable warmth

All above parameters are taken only for confirmation of diagnosis of Osteoarthritis and not for assessment as it is an observational study. Hence there is no data for statistical analysis.

Duration of study: 6 months

Inclusion criteria

- Women willing to give consent.
- Postmenopausal female patients between the age group 50 - 75 years.
- Diagnosed cases or patients having classical signs and symptoms of Osteoarthritis.

Exclusion criteria

- Women suffering from fractures.
- Women suffering from other joint disorders like Rheumatoid arthritis, Gout, and psoriatic arthritis.
- Women suffering from Ligament strains and muscle sprains.

Data sources/ measurement

Data was collected from female patients visiting MGACH & RC between the age group of 50 to 75 years. Validated questionnaire were prepared to study the association between early menopause and incidence of osteoarthritis.

Observations and Results

Data collected was analyzed by using chi square and paired and unpaired t test.

Table 1: Distribution of patients as per Type of menopause: (Natural or Surgical)

Group	A (Normal menopause) (n=30)	B (Early menopause)	Chi Sq and P-value
Natural menopause	22 (73.3%)	26 (83.9%)	1.01 0.315 NS
Surgical menopause	8 (26.7%)	4 (16.1%)	
Total	30(100%)	30(100%)	

Distribution of patients as per type of menopause (Natural or Surgical), in group A (normal menopause), out of 30 patients, 22 patients (73.3%) had natural menopause and 8 patients (26.7%) had surgical menopause whereas in group B (early menopause), out of 30 patients, 26 patients (83.9%) had natural menopause and 4 patients(16.1%) had surgical menopause.

Comparison of both the groups was statistically non significant with Chi.sq. (1.01) and p value (0.315).Hence, both the groups are equal in distribution of patients as per type of menopause (Natural or Surgical).

Table 2: Distribution of patients as per Crepitus

Crepitus	A (Normal menopause) (n=30)	B (Early menopause) (n=30)	Chi Sq and P-value
Yes	6 (20%)	26 (84%)	24.939 <0.01 S
No	24 (80%)	4 (16%)	
Total	30(100%)	30(100%)	

Distribution of patients as per presence of crepitus, in group A (normal menopause), out of 30 patients, 6 patients (20%) had crepitus and 24 patients (80%) had no crepitus, whereas in group B (early

menopause), out of 30 patients, 26 patients (84%) had crepitus and 4 patients (16%) had no crepitus. Comparison of both groups was statistically significant with Chi.sq. (24.939) and p value (0.01). It is concluded that crepitus was present in more number of patients in group B as compared to group A.

Table 3: Distribution of patients as per Restricted range of motion

Restricted range of motion	A (Normal menopause) (n=30)	B (Early menopause) (n=30)	Chi Sq and P-value
Yes	11 (36.7%)	23 (74%)	8.7 0.00281 S
No	19 (63.3%)	7 (26%)	
Total	30(100%)	30(100%)	

Distribution of patients as per restricted range of motion, in group A (normal menopause), out of 30 patients, 11 patients (36.7%) had restricted range of motion and 19 (63.3%) patients had no restricted range of motion, whereas in group B (early menopause), out of 30 patients, 23 patients (74%) had restricted range of motion and 7 (26%) patients had no restricted range of motion. Comparison of both groups was statistically significant with Chi.sq. (8.7) and p value (0.00281). It is concluded that restricted range of motion was present in more number of patients in group B as compared to group A.

Table 4: Distribution of patients as per Bony enlargement

Restricted range of motion	A (Normal menopause) (n=30)	B (Early menopause) (n=30)	Chi Sq and P-value
Yes	3 (10%)	21 (71%)	23.43 <0.01 S
No	27 (90%)	9 (29%)	
Total	30(100%)	30(100%)	

Distribution of patients as per Bony enlargement, in group A (normal menopause), out of 30 patients, 3 patients (10%) had Bony enlargement and 27 patients (90%) had no Bony enlargement, whereas in group B (early menopause), out of 30 patients, 21 (71%) patients had Bony enlargement and 9 patients (29 %) had no Bony enlargement. Comparison of both groups was statistically significant with Chi.sq. (23.43) and p value (0.01 S), It is concluded that Bony enlargement was present in more number of patients in group A as compared to group B.

Table 5: Distribution of patients as per Morning stiffness < 30 minutes

Restricted range of motion	A (Normal menopause) (n=30)	B (Early menopause) (n=30)	Chi Sq and P-value
Yes	12 (40%)	22 (74.2%)	7.28 0.0063 S
No	18 (60%)	8 (25.8%)	
Total	30(100%)	30(100%)	

Distribution of patients as per Morning stiffness < 30 minutes, in group A (normal menopause), out of 30 patients, 12 (40%) patients had Morning stiffness < 30 minutes and 18 (60%) patients had no Morning stiffness < 30 minutes, whereas in group B (early menopause) out of 30 patients, 22 patients (74.2%) had Morning stiffness < 30 minutes and 8 (25.8%) patients had no morning stiffness < 30 minutes. Comparison of both groups was statistically significant with Chi.sq. (7.28) and p value (0.0063 S). It was concluded that Morning stiffness < 30 minutes was present in more number of patients in group B as compared to group A.

Discussion

The present cross sectional study comprised 60 women between the age group 50 - 75 years, 30 in each group having early menopause (before the age of 45 years) and normal menopause visiting our Hospital (from January 2022 to June 2022). The ethical permission was taken from the institutional ethic committee before the commencement of the study. A informed consent was obtained from the selected subjects. Subjects in both the groups were examined for OA as per diagnostic criteria like crepitus, restricted range of movement, bony enlargement and morning stiffness >30 minutes.

This study showed that both the groups are equal in distribution of patients as per type of menopause (Natural or Surgical). Distribution of patients as per presence of crepitus, it was found that in group A (normal menopause) 20% had no crepitus whereas in group B 84% patients had crepitus thus it showed that crepitus was found in more number of patients in group B.

Distribution of patients as per restricted range of motion, in group A (normal menopause), 36.7% had restricted range of motion whereas in group B (early menopause) 74% had restricted range of motion thus restricted range of motion was present in more number of patients in group B as compared to group A.

Distribution of patients as per Bony enlargement, showed that in group A (normal menopause) only 10% had Bony enlargement whereas in group B (early menopause) 21 (71%) patients had Bony enlargement thus Bony enlargement was present in more number of patients in group B as compared to group A.

Distribution of patients as per Morning stiffness < 30 minutes, in group A (normal menopause), 40% patients had Morning stiffness < 30 minutes whereas in group B (early menopause) 74.2% had Morning stiffness < 30 minutes was present in more number of patients in group B as compared to group A.

All these symptoms like crepitus, restricted range of movement, bony enlargement and morning stiffness >30 minutes are diagnostic features of Osteoarthritis are present in more number of patients having early menopause. This clearly indicates that incidence of Osteoarthritis was more in patients having early menopause as compared to normal menopause.

Numerous studies have shown that bone loss accelerates following menopause. The earlier in life that menopause occurs, the lower bone density will be later in life (15). Therefore, oophorectomy before age 45

years is a well-established risk factor for osteoporosis (16). Even in women who undergo bilateral oophorectomy after natural menopause, the risk of osteoporotic fracture may be increased compared with women with intact ovaries. Estrogen therapy prevents bone loss and reduces fracture risk following oophorectomy (17, 18).

In order to assess the prevalence of early osteoarthritis (OA) in the knee in women who were experiencing premature menopause, Ekram MD et.al. conducted an observational study. They discovered that the majority of patients with premature menopause expressed the onset of osteoporosis symptoms within a year, regardless of the cause of menopause, whether it was surgical or medical (19). A similar outcome was also noted in a few research conducted in India and elsewhere (20, 21). The development of polyarticular joint degeneration in women, particularly in obese postmenopausal women, is thought to be influenced by metabolic changes that occur during peri-menopause and post-menopause, including changes in sex hormone levels and an increased ratio of free oestrogen and progesterone (22).

In order to assess early onset osteoarthritis knee in premature (early) menopausal women, Sharma AK et al. performed a research study. Through clinical and radiological analysis, they diagnosed OA. They claimed that the beginning and development of OA are linked to Premature Menopause. Biomechanical stresses along with several autocrine, paracrine, and endocrine cellular activities that affect cartilage degradation and regeneration result in pathological alterations in OA. There is growing evidence that oestrogen plays a significant role in preserving the homeostasis of articular tissue, and that this relationship between OA and post-menopausal ovarian atrophy (disuse atrophy) is supported by this data. Oestrogen therefore prevents joint deterioration by acting as a preventive agent. In this study, early beginning of knee pain was found in 1 to 2 years. But late OA was noted after 6 to 7 years of menopause (23).

Women in cross-sectional studies were matched for age and menopausal status, which could have come about spontaneously or as a result of an oophorectomy. An age-matched hysterectomized group and an oophorectomized group that experienced menopause before age 45 were compared four years later. Mean T SE cortical Bone Mass Density in the oophorectomized group was 2.46 T 0.04 g/cm² compared to 2.80 T 0.05 g/cm² in the control group, 13% lower (P G 0.001) (24). The results of all cross-sectional studies by Gambacciani et al. (25), Richelson et al. (26), Nilas and Christiansen (27), Block et al. (28), and Pouilles et al. (29) demonstrated that an early menopause, typically before age 45, results in significantly lower bone mass and a higher incidence of osteoporosis. By age 65, BMD might be reduced by about one T score if menopause started 10 years early than intended, at an average age of 51.

The main effects of early menopause were oestrogen imbalance. (30, 31) Additionally, it has been demonstrated in a small number of studies that

oestrogen contributes significantly to the emergence of new cases of osteoporosis. (32-35).

All of these researches corroborate with this study findings and reaffirm the substantial link between OA and early menopause. It will undoubtedly contribute to raising awareness of its prevention.

Conclusion

This study concluded that there is strong association between early menopause and occurrence of Osteoarthritis.

Limitations

Sample size was less and this study was conducted in only Wardha district at one centre so multi-centric study on large population can be conducted.

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Conflict of Interest

Authors have no any conflict of interest.

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