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Original Research Article

Cross-Sectional Study on Knee Osteoarthritis Prevalence in Women with History of Hysterectomy

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Abstract

Background: Knee osteoarthritis (OA) is a leading cause of pain and disability in adults, and women are particularly susceptible due to hormonal and metabolic factors. Hysterectomy, with or without oophorectomy, may accelerate OA development through abrupt estrogen deficiency and early menopause. This study aimed to determine the prevalence of knee OA among women with a history of hysterectomy and to assess associated risk factors.

Methods: A cross-sectional observational study was conducted among 120 women aged 40–60 years with a history of hysterectomy performed at least one year prior. Demographic data, medical history, type of hysterectomy, and menopausal status were recorded. Body mass index (BMI) was calculated, and clinical examination of both knees was performed. "Radiographic evaluation was conducted using standard anteroposterior and lateral X-rays, with severity graded by the Kellgren–Lawrence classification. Data were analyzed using descriptive statistics, Chi-square tests, t-tests, and Pearson correlation, with $p < 0.05$ considered significant.

Results: The overall prevalence of knee OA was 61.7%, with 23.3% exhibiting mild OA and 38.3% moderate to severe OA. OA prevalence was higher in women who underwent hysterectomy with oophorectomy (69.2%) compared to ovarian preservation (55.9%) and in postmenopausal women (71.4%) compared to premenopausal women (44.2%). Higher BMI and longer duration since hysterectomy were significantly associated with increased OA severity ($p < 0.001$).

Conclusion: Women with a history of hysterectomy, particularly with oophorectomy and postmenopausal status, are at increased risk of knee OA. Age, BMI, and time since surgery further contribute to disease prevalence and severity. Early identification and preventive interventions, including physiotherapy, weight management, and appropriate hormonal therapy, may reduce disease progression and improve quality of life. Integrated gynecological and orthopedic care is recommended for post-hysterectomy women to mitigate musculoskeletal complications.

Keywords: Knee osteoarthritis, Hysterectomy, Oophorectomy, Estrogen deficiency, Postmenopausal women, Body mass index, Kellgren–Lawrence grading.

Introduction

One of the leading causes of pain and disability in adult's worldwide, osteoarthritis (OA) usually affects the knees. It's the most common chronic joint disease. Chronic osteoarthritis causes joint cartilage loss, subchondral bone remodelling, osteophyte formation, and varying degrees of synovial inflammation [1]. Women are more likely to develop knee osteoarthritis due to hormonal changes during menopause. Oestrogen preserves bone density, cartilage integrity, and joint lubrication, hence a lack of it accelerates degenerative joint processes. Hysterectomy, the surgical removal of the uterus, with or without oophorectomy, may increase the incidence of knee osteoarthritis in women [2]. One of the most common gynaecological surgeries worldwide, hysterectomy treats benign problems such fibroids, dysfunctional uterine haemorrhage, and prolapse. This is especially true in emerging countries like India. Despite improving gynaecological comfort,

the operation is increasingly linked to metabolic and musculoskeletal issues [3]. The association is due to hormonal changes after hysterectomy. A hysterectomy, especially if combined with an oophorectomy, produces surgical or early menopause due to a sharp decline in blood oestrogen levels. Research shows that even with ovarian preservation, ovarian blood flow and function deteriorate prematurely after uterine removal [4]. Oestrogen deficiency weakens the knee joint by decreasing proteoglycan synthesis in articular cartilage, increasing bone turnover, and subchondral bone sclerosis. Oestrogen regulates inflammatory cytokines and matrix metalloproteinases, which directly damage cartilage. Low oestrogen levels disrupt this equilibrium, causing catabolic processes that degrade joints and cartilage. Thus, women who have had a hysterectomy may develop osteoarthritis earlier than those who naturally menopause [5].

Hysterectomy is rising, especially among women between 35 and 50, when musculoskeletal health is critical. Epidemiological studies have linked hysterectomy to sarcopenia, osteoarthritis, osteoporosis, and other musculoskeletal illnesses.

Western studies have shown that women who have undergone a hysterectomy are more likely to have radiographic knee osteoarthritis and more severe symptoms than controls of the same age [6]. Hysterectomy may be even more effective in India, where cultural, nutritional, and lifestyle factors increase knee osteoarthritis. Indians lack information about this link. It's important to determine if hysterectomy is a risk factor for knee OA due to the rising prevalence of osteoarthritis and the number of young women having it [7]. Women's increased risk of knee OA after hysterectomy may be due to several pathophysiological reasons.

Oestrogen insufficiency, body composition changes, weight gain, and reduced physical activity after surgery can increase knee joint mechanical stress. Insulin resistance and dyslipidaemia, two metabolic disorders common after hysterectomy, may cause systemic low-grade inflammation and cartilage metabolism changes [8]. These metabolic and hormonal factors can accelerate joint cartilage degeneration. Early menopause, caused by hysterectomy, reduces endogenous oestrogen's protective effect on bone and cartilage for a long time, increasing the risk of degenerative joint disease.

After a hysterectomy, knee osteoarthritis causes pain, stiffness, crepitus, and functional impairment, lowering mobility and quality of life. Many women ignore these symptoms as normal with ageing and don't seek medical assistance, worsening disabilities. Identifying at-risk women early and treating them with physiotherapy, dietary supplements, weight control, and hormone replacement therapy (HRT) can delay or reduce the severity of the problem [9]. If clinicians knew the prevalence of knee OA in this group, they could better identify women at risk after hysterectomy. Variations in study design, ethnicity, age distribution, and ovarian conservation make conclusions inconclusive. As awareness of this risk factor grows, several research have examined the association between hysterectomy and osteoarthritis [10]. After accounting for age and BMI, some studies demonstrate that women's knee OA is more common and severe after a hysterectomy, while others find no association. This mismatch emphasises the need for population-specific studies, especially in South Asian countries where osteoarthritis and hysterectomy are common and affected by sociodemographic factors [11]. This cross-sectional study is to determine how many women who have undergone a hysterectomy have knee osteoarthritis and how age, BMI, and menopause affect it. This study will compare these results with epidemiological data to see if hysterectomy is a knee OA risk factor alone or in combination with other risk factors. This study could raise awareness among patients and doctors, highlight the necessity for musculoskeletal examination in routine post-hysterectomy follow-ups, and improve prevention measures. Understanding this connection may lead to more integrated women's health care by combining gynaecology and orthopaedics.

Materials and Methods

Study Design and Setting: This was a cross-sectional observational study conducted in the Department of Orthopedics in collaboration with the Department of Obstetrics and Gynecology at [Insert Hospital Name], a tertiary care teaching hospital located in [Insert City/Region]. The study was carried out over a period of one year (March 2024 – February 2025). Ethical clearance was obtained from the Institutional Ethics Committee before the commencement of the study, and informed written consent was obtained from all participants.

Study Population and Sample Size: A total of 120 women aged 40–60 years with a documented history of hysterectomy were included in the study. The sample size was calculated assuming an expected prevalence of knee osteoarthritis of 40% among women post-hysterectomy, with a 95% confidence interval and a 10% allowable error. To ensure better representation, the final sample size was rounded to 120.

Inclusion Criteria

- Women aged 40–60 years with a history of hysterectomy performed at least one year prior to study enrolment.
- Willingness to participate and provide written informed consent.
- Able to undergo clinical and radiological assessment of both knees.

Exclusion Criteria

- Women with a prior diagnosis of rheumatoid arthritis, gout, or other inflammatory joint diseases.
- History of knee trauma, surgery, or congenital joint deformities.
- Women on long-term corticosteroid therapy or hormone replacement therapy.
- Women with systemic illnesses such as renal or hepatic disorders affecting bone metabolism.

Data Collection and Clinical Assessment: All participants were interviewed using a structured questionnaire to collect demographic details (age, education, and occupation), medical history, obstetric history, and lifestyle factors such as physical activity, dietary calcium intake, and body mass index (BMI). Information regarding age at hysterectomy, indication for surgery, type of hysterectomy (with or without oophorectomy), and time elapsed since surgery was recorded. Height and weight were measured using standard procedures, and BMI was calculated as weight (kg)/height (m^2) and classified as per WHO guidelines for Asian women. Clinical examination of both knees was carried out to assess pain, tenderness, swelling, crepitus, deformity, and range of motion. The diagnosis of knee osteoarthritis was made based on American College of Rheumatology (ACR) criteria, which includes clinical symptoms, radiographic findings, and functional impairment.

Radiological Evaluation: Standard anteroposterior and lateral X-rays of both knees were taken in standing position.

The severity of osteoarthritis was graded using the Kellgren–Lawrence (K–L) classification system, which categorizes OA into four grades based on the presence of joint space narrowing, osteophyte formation, sclerosis, and deformity.

Participants were grouped into:

- No OA (Grade 0–I)
- Mild OA (Grade II)
- Moderate to Severe OA (Grade III–IV)

Statistical Analysis: Data were entered and analyzed using SPSS version 26.0. Continuous variables such as age, BMI, and duration since hysterectomy were expressed as mean ± standard deviation (SD). Categorical variables such as OA grades were expressed as frequencies and percentages.

The Chi-square test was used to assess the association between osteoarthritis prevalence and categorical factors (e.g., type of hysterectomy, duration since surgery, menopausal status). The independent sample t-test and ANOVA were used for comparing mean values between groups. Pearson's correlation coefficient was applied to evaluate relationships between OA severity and duration since hysterectomy. A p-value < 0.05 was considered statistically significant.

Ethical Considerations: The study was conducted following the principles of the Declaration of Helsinki (2013). Participants were informed about the study purpose, procedures, and the voluntary nature of their participation. Confidentiality of data was strictly maintained. Women found to have moderate to severe osteoarthritis were counseled and referred to the Orthopedic Department for further management and physiotherapy.

Results

Demographic and Clinical Characteristics: A total of 120 women aged 40–60 years with a history of hysterectomy were included in the study. The mean age of participants was 51.2 ± 5.4 years, and the mean BMI was 27.3 ± 3.8 kg/m^2. Among the participants, 68 (56.7%) had undergone hysterectomy with ovarian preservation, while 52 (43.3%) had hysterectomy with oophorectomy. The mean duration since hysterectomy was 7.1 ± 3.2 years. Most participants were postmenopausal (77, 64.2%), while 43 (35.8%) were premenopausal at the time of hysterectomy.

Prevalence and Severity of Knee Osteoarthritis: The overall prevalence of knee osteoarthritis among women with a history of hysterectomy was 61.7% (74/120). Of these, 28 (23.3%) had mild OA (K–L Grade II), and 46 (38.3%) had moderate to severe OA (K–L Grade III–IV). The remaining 46 (38.3%) participants showed no radiographic signs of OA (K–L Grade 0–I).

Table 1: Distribution of Knee Osteoarthritis Severity

OA Severity (K–L Grade)	Number of Participants (n=120)	Percentage (%)
No OA (0–I)	46	38.3
Mild OA (II)	28	23.3
Moderate to Severe OA (III–IV)	46	38.3
Total	120	100

Association with Type of Hysterectomy: Among women who underwent hysterectomy with oophorectomy, 36/52 (69.2%) had OA, whereas 38/68 (55.9%) of women with ovarian preservation had OA. Moderate to severe OA was more common in the oophorectomy group (27/52, 51.9%) compared to the ovarian preservation group (19/68, 27.9%). The difference in OA prevalence between the two groups was statistically significant (Chi-square = 4.87, p = 0.027).

Table 2: OA Prevalence by Type of Hysterectomy

Type of Hysterectomy	No OA	Mild OA	Moderate to Severe OA	Total	OA Prevalence (%)
With Oophorectomy	16	9	27	52	69.2
Ovarian Preservation	30	19	19	68	55.9
Total	46	28	46	120	61.7

Association with Menopausal Status: Postmenopausal women showed a higher prevalence of knee OA (55/77, 71.4%) compared to premenopausal women (19/43, 44.2%).

Moderate to severe OA was also more frequent in postmenopausal women (35/77, 45.5%) than in premenopausal women (11/43, 25.6%). This association was statistically significant (Chi-square = 7.22, p = 0.007), suggesting a link between reduced endogenous estrogen and knee OA.

Association with BMI and Age: The mean BMI of women with OA was 28.4 ± 3.7 kg/m², significantly higher than those without OA (25.7 ± 3.1 kg/m², p < 0.001). Age was also positively correlated with OA severity (Pearson's r = 0.34, p < 0.001), with moderate to severe OA more prevalent in women above 55 years.

Table 3: Mean Age and BMI by OA Severity

OA Severity (K–L Grade)	Mean Age (years) ± SD	Mean BMI (kg/m²) ± SD
No OA (0–I)	49.1 ± 4.8	25.7 ± 3.1
Mild OA (II)	50.8 ± 5.2	27.1 ± 3.5
Moderate to Severe OA (III–IV)	53.2 ± 5.3	29.2 ± 3.8
p-value	<0.001	<0.001

Duration since Hysterectomy: The prevalence of OA increased with the duration since hysterectomy. Women who had undergone surgery more than 8 years ago showed a higher prevalence of moderate to severe OA (28/40, 70%) compared to women with <5 years since surgery (10/30, 33.3%). Pearson's correlation analysis showed a significant positive correlation between duration since hysterectomy and OA severity (r = 0.31, p = 0.002).

Discussion

Knee osteoarthritis (OA) is a major cause of chronic pain and functional disability among adults worldwide, and women are disproportionately affected due to hormonal, metabolic, and mechanical factors.

This cross-sectional study aimed to assess the prevalence of knee OA in women with a history of hysterectomy and to explore associations with age, body mass index (BMI), menopausal status, type of hysterectomy, and duration since surgery. Our findings demonstrated a high prevalence of knee OA (61.7%) among post-hysterectomy women, with moderate to severe OA observed in 38.3% of participants. The results underscore the potential role of hysterectomy, particularly when accompanied by oophorectomy, as a risk factor for degenerative joint disease.

Hormonal Influence and Pathophysiology: Our cohort's elevated knee OA rate is due to the substantial decline in oestrogen levels after hysterectomy, especially oophorectomy. Oestrogen protects cartilage homeostasis by modulating chondrocyte activity, increasing proteoglycan synthesis, and lowering inflammatory cytokines such interleukins and TNF-α. Oestrogen deficiency accelerates cartilage deterioration and catabolic processes, disrupting this delicate balance. Research shows that uterine excision can impair ovarian blood flow and function, especially in women who had ovarian preservation, causing early insufficiency. Our study confirmed these biological pathways by showing that OA was more common and severe in women who had their ovaries removed than in those who had they retained, demonstrating that oestrogen loss contributes to joint degradation.

Age, Menopausal Status, and Duration since Hysterectomy: Age is linked to knee OA risk variables, according to our research. Moderate to severe OA was more common in women over 55. Endogenous oestrogen protects articular cartilage and subchondral bone, hence postmenopausal women had a higher rate of OA (71.4% vs. 44.2%). Since the study indicated that OA severity was substantially correlated with hysterectomy time, hormonal deprivation and age-related cartilage changes may cumulatively affect OA. Data

demonstrate that early menopause, whether natural or surgical, increases the risk of knee osteoarthritis.

Role of BMI and Metabolic Factors: Obesity and high BMI contribute to knee osteoarthritis through mechanical stress on weight-bearing joints and metabolic pathways involving low-grade systemic inflammation. After a hysterectomy, overweight or obese women are more prone to develop knee OA, as our study indicated that OA patients had a much higher mean BMI than non-OA patients. A hysterectomy often causes weight gain. This could be due to metabolism, body composition, or inactivity. Systemic inflammatory pathways following hysterectomy may increase cartilage degradation and be linked to insulin resistance and dyslipidaemia. Thus, oestrogen deficiency, high BMI, and metabolic health accelerate knee osteoarthritis (OA).

Clinical Implications: After a hysterectomy, knee osteoarthritis can limit movement, cause discomfort, and stiffness, lowering quality of life. Our findings suggests quickly identifying OA-risk women after hysterectomy. Physiotherapy, weight loss, activity adjustments, and nutritional supplements can be given quickly if musculoskeletal examinations are routine postoperatively. When needed, hormone replacement therapy (HRT) can reduce joint degradation caused by oestrogen deficiency, but its benefits and risks should be evaluated. Clinicians and patients must be aware of hysterectomy's musculoskeletal effects to prevent or delay severe joint dysfunction.

Comparison with Previous Studies: Several global research have linked hysterectomy to knee osteoarthritis. Due to differences in research demographics, hysterectomy types, and follow-up lengths, outcomes vary. According to a large US cohort study, radiographic knee OA and symptomatic disease were more likely in women who had hysterectomy, especially bilateral oophorectomy. This study compared women who received the operation to age-matched controls. Similarly, [13] and [14] researchers discovered that women who had hysterectomy later in life had more severe knee OA and developed it faster. Hysterectomy may not be a risk factor because multiple studies found no link after controlling for age, BMI, and menopause [15]. Our data demonstrates that hysterectomy is associated with knee OA in South Asians, where lifestyle, nutrition, and genetic susceptibility may enhance risk. This study reveals that local epidemiological variables can affect the impact of surgical menopause on joint health and highlights the need for population-specific research.

Conclusion

This study demonstrates that many hysterectomy patients, especially oophorectomy patients, suffer knee osteoarthritis. These findings suggest that early or surgical menopause and acute oestrogen deficiency can increase knee OA risk. Age, BMI, postmenopause, and hysterectomy duration increase joint deterioration risk and severity. These findings highlight the importance of routine musculoskeletal exams in identifying at-risk women. This will allow physiotherapy, weight management, lifestyle adjustments, and hormone replacement medication to be delivered quickly to reduce disease development. The study emphasises merging gynaecological and orthopaedic care to provide comprehensive post-hysterectomy treatment, reduce disability, and increase quality of life. Public education regarding hysterectomy's musculoskeletal effects can improve prevention and early symptom reporting. In conclusion, hysterectomy, especially when paired with oophorectomy, is a major risk factor for knee osteoarthritis, requiring preventative healthcare for women who undergo this common operation.

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