Journal of Health, Wellness
and Community Research
ISSN: 3007, 0570

JHWCR
Type: Original Article
Published: 05 June 2025
Volume: III, Issue: VI
DOI: https://doi.org/10.61919/pjg4sh96

Correspondence
Saima Ashraf, saima.ashraf@uskt.edu.pk

Received 04, 05, 25
Accepted 21, 05, 2025

Authors' Contributions
Concept: SA, GF; Design: SM, AB; Data Collection: AS, QS; Analysis: SA, GF; Drafting: SM, AB

Declarations
No funding was received for this study. The authors declare no conflict of interest. The study received ethical approval. All participants provided informed consent.

"Click to Cite"

Osteoarthritis in Hysterectomized Women: Prevalence and Predictors with Emphasis on Post-Surgical Weight Gain

Saima Ashraf[1], Ghulam Fizza[1], Saba Mumtaz[1], Aqsa Bibi[1], Asad Shabbir[1], Qaisra Shakeel[1]

1 University of Sialkot, Sialkot, Pakistan

ABSTRACT

Background: Osteoarthritis (OA) is a leading cause of chronic disability among women, with hormonal shifts and mechanical stress identified as major etiologic factors. Hysterectomy, by altering estrogen balance and promoting postoperative weight gain, may accelerate degenerative joint changes, yet population-level evidence from South Asia remains limited. Objective: To estimate the prevalence of OA among hysterectomized women in District Sialkot and identify independent predictors, particularly postoperative weight gain. Methods: A cross-sectional survey was conducted between March and September 2023 across three hospitals in District Sialkot. Thirty women aged 27–50 years who had undergone hysterectomy for benign indications were assessed through structured questionnaires and symptom-based OA screening, supplemented by imaging data where available. Weight change (Δkg) and categorical weight-gain groups (≤0, +1–4, +5–9, ≥10 kg) were evaluated alongside age, menopausal status, physical activity, and diet. OA prevalence with 95% confidence intervals (CIs) was calculated, and multivariable logistic regression identified predictors of OA. Results: OA was present in 63.3% (95% CI 44.9–81.8) of participants. Women gaining ≥10 kg post-surgery had significantly higher odds of OA (adjusted odds ratio [aOR] = 8.17, 95% CI 1.02–65.41, p = 0.048), independent of age (p = 0.041). Hormonal symptoms were less frequent among OA cases. Conclusion: Osteoarthritis is highly prevalent among hysterectomized women, with postoperative weight gain and age serving as key predictors. Integrating weight management, musculoskeletal screening, and lifestyle counseling into postoperative care may reduce OA risk and improve long-term outcomes.

Keywords
Hysterectomy, Osteoarthritis, Weight Gain, Menopause, Musculoskeletal Health, Women's Health, Sialkot Pakistan

INTRODUCTION

Osteoarthritis (OA) is one of the most prevalent chronic musculoskeletal conditions among middle-aged and postmenopausal women, contributing significantly to functional disability and healthcare burden worldwide (1). Its pathophysiology is multifactorial, involving mechanical joint loading, metabolic dysregulation, and hormonal influences. Estrogen deficiency after menopause has been implicated in accelerated cartilage degeneration and altered subchondral bone metabolism, leading to higher OA incidence among women compared with men of similar age (2). Given that hysterectomy, particularly with concomitant oophorectomy or vascular disruption to the ovaries, can precipitate earlier hormonal decline, the procedure may represent a unique risk factor for subsequent OA development (3,4).

From a biomechanical perspective, postoperative weight gain adds an additional layer of risk. Increased body mass following hysterectomy has been associated with higher joint stress, particularly in the knees and hips, where every kilogram of body weight translates into approximately fourfold greater load during ambulation (5). This combination of hormonal changes and increased biomechanical loading forms a plausible biological pathway linking hysterectomy to OA onset or progression. Previous longitudinal research has yielded mixed results—some studies report increased risk of knee and hip OA following hysterectomy, while others attribute observed associations primarily to shared risk factors such as obesity, inactivity, and age (6,7). The variability of findings may reflect methodological differences, unmeasured confounders, and limited regional data from low- and middle-income settings. In Pakistan, where both hysterectomy rates and musculoskeletal disorders are rising, epidemiologic data on OA among hysterectomized women are notably sparse. District-level surveillance remains limited, and no prior study from Sialkot has systematically examined OA prevalence or its predictors in this group. Understanding this relationship has important clinical implications, as weight management, physical activity, and early screening could mitigate long-term joint morbidity if high-risk subgroups are identified.

The present study therefore aims to determine the prevalence of osteoarthritis among hysterectomized women across multiple hospitals in District Sialkot and to identify its independent predictors, with a focus on postoperative weight gain as a potentially modifiable risk factor. The central hypothesis is that greater post-surgical weight increase is associated with a higher likelihood of osteoarthritis, independent of age, menopausal status, and activity level.

https://doi.org/10.61919/pjg4sh96

MATERIALS AND METHODS

This cross-sectional, hospital-based study was conducted between March and September 2023 across three major hospitals in District Sialkot, Pakistan, using the same sampling frame as the companion hysterectomy weight-change study. A standardized, interviewer-administered questionnaire captured demographic, clinical, and lifestyle data, along with detailed osteoarthritis (OA) symptom assessment.

Participants Eligible participants were women aged 25–55 years who had undergone hysterectomy for benign gynecologic conditions within the past 10 years and were attending outpatient follow-up clinics during the study period. Women with known malignancy, systemic inflammatory disease, or missing essential weight data were excluded. All participants provided written informed consent prior to data collection.

Osteoarthritis Definition and Assessment OA status was determined using a pragmatic composite definition combining symptom-based and clinical/imaging criteria. Participants were screened for six hallmark musculoskeletal symptoms—joint pain, stiffness, loss of flexibility, tenderness, swelling, and local warmth—based on a standardized checklist adapted from clinical diagnostic guidelines. OA was classified as "Yes" if a participant reported two or more of these symptoms occurring on most days for ≥6 weeks, or had a clinician-documented diagnosis, or X-ray evidence (Kellgren–Lawrence grade ≥2) where imaging records were available. In the absence of imaging data, symptom-based diagnosis was used to maintain comparability across sites.

The principal predictor was post-surgical weight change, calculated as the difference between current and recalled pre-hysterectomy weight (Δkg). For categorical analysis, weight change was divided into four groups: ≤0 kg (no gain or loss), +1–4 kg, +5–9 kg, and ≥10 kg. Additional covariates included age (years), time since hysterectomy (years), surgical approach (abdominal, vaginal, or laparoscopic), physical activity level (low, moderate, or high), dietary pattern (balanced, carbohydrate-rich, or fat-dense), menopausal status (pre-, peri-, or postmenopausal), and family history of OA (present/absent). Where height data were available, body mass index (BMI) was calculated; otherwise, baseline weight was used as a proxy for body size.

Data were analyzed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were expressed as mean ± standard deviation (SD) for continuous variables and as frequencies with percentages for categorical variables. OA prevalence was estimated with corresponding 95% confidence intervals (CIs). Bivariate analyses compared participant characteristics by OA status using independent t-tests or one-way ANOVA for continuous variables and chi-square or Fisher's exact tests for categorical variables. Multivariable logistic regression was employed to identify independent predictors of OA, with OA status (Yes/No) as the dependent variable and weight-gain category, age, time since surgery, activity level, surgical approach, and menopausal status as covariates. Results were presented as adjusted odds ratios (aORs) with 95% CIs. Model fit was assessed using the Hosmer–Lemeshow goodness-of-fit test.

Sensitivity analyses were conducted using a stricter OA definition requiring both symptomatic and imaging evidence where available, and alternative weight-gain thresholds (≥5 kg vs. <5 kg). Missing data were handled via complete-case analysis, and findings were cross-checked for robustness. Ethical approval was obtained from the institutional review boards of all participating hospitals. The study adhered to the ethical principles of the Declaration of Helsinki, ensuring confidentiality, voluntary participation, and informed consent for all respondents.

RESULTS

Thirty hysterectomized women were included in the analysis, with osteoarthritis (OA) identified in 19 (63.3%) based on symptom or clinician criteria. Participants' mean age was 37.1 ± 5.9 years. Average pre-surgery weight was 67.9 ± 5.6 kg, rising to 72.7 ± 7.9 kg post-surgery, representing a mean gain of 4.7 ± 5.9 kg ($p = 0.001$). Most OA-positive women were older and reported higher postoperative weight gain than OA-negative participants.

Table 1. Participant characteristics stratified by osteoarthritis (OA) status (N = 30)

Variable	OA Positive (n = 19) Mean ± SD / n (%)	OA Negative (n = 11) Mean ± SD / n (%)	p-value
Age (years)	38.9 ± 5.2	33.8 ± 5.8	0.018
Weight before hysterectomy (kg)	69.4 ± 5.5	65.3 ± 5.1	0.045
Weight after hysterectomy (kg)	75.6 ± 6.9	68.2 ± 8.1	0.008
Weight change (Δkg)	6.2 ± 5.6	2.9 ± 4.2	0.037
Percent change (%)	8.9 ± 8.4	4.2 ± 6.8	0.046
Hormonal symptom count (0–4)	0.5 ± 0.9	1.9 ± 1.1	0.002
Menopausal status – Postmenopausal	8 (42.1%)	3 (27.3%)	0.414
Physical activity – Low	12 (63.2%)	5 (45.5%)	0.320
Diet pattern – Fat-dense	10 (52.6%)	4 (36.4%)	0.362

Table 2. Prevalence and distribution of osteoarthritis symptoms (N = 30)

Symptom	n	Prevalence (%)	95% CI
Any OA (composite definition)	19	63.3	44.9–81.8
Joint pain	13	43.3	25.5–61.1
Stiffness	11	36.7	18.8–54.5
Loss of flexibility	6	20.0	5.7–34.3
Joint tenderness	8	26.7	10.9–42.4
Swelling	7	23.3	8.2–38.5
Warmth	3	10.0	0.0–20.8
Knee involvement	13	43.3	25.5–61.1
Hip involvement	5	16.7	4.3–29.0
Hand involvement	4	13.3	2.3–24.3
Spine involvement	6	20.0	5.7–34.3

OA-positive women were significantly older and gained more postoperative weight than OA-negative counterparts. Hormonal symptoms were less prevalent among OA-positive women, consistent with inverse weight–symptom associations observed in Article 1. Knee joints were most frequently affected, followed by spine and hip. Pain and stiffness predominated among symptomatic individuals, while warmth and swelling were less common.

Table 3. Logistic regression model for predictors of osteoarthritis (OA) among hysterectomized women (N = 30)

Predictor	Adjusted Odds Ratio (aOR)	95% CI	p-value
Weight gain ≤0 kg (ref)	1.00	—	—
Weight gain +1–4 kg	2.41	0.42–13.68	0.324
Weight gain +5–9 kg	5.62	0.92–34.32	0.062
Weight gain ≥10 kg	8.17	1.02–65.41	0.048
Age (per year increase)	1.18	1.01–1.39	0.041
Time since hysterectomy (per year)	1.07	0.88–1.31	0.475
Physical activity – Low vs. High	1.95	0.52–7.31	0.320
Menopausal status – Post vs. Pre	1.67	0.37–7.44	0.508

Interpretation: After adjustment for confounders, higher postoperative weight gain was a significant independent predictor of OA. Women gaining ≥10 kg had over eightfold higher odds of OA compared with those whose weight remained stable. Age also showed a positive association, while menopausal and activity status did not reach statistical significance. A total of 30 women who had undergone hysterectomy for benign gynecological indications were included in the analysis. The mean age of participants was 37.1 ± 5.9 years, ranging from 27 to 50 years. The overall prevalence of osteoarthritis (OA), based on combined symptom and clinical criteria, was 63.3% (95% CI: 44.9–81.8). Women with OA were, on average, five years older than those without the condition (38.9 ± 5.2 vs. 33.8 ± 5.8 years; p = 0.018), suggesting a clear age-related trend. Pre- and post-surgical weight comparisons revealed a mean baseline weight of 67.9 ± 5.6 kg, which increased to 72.7 ± 7.9 kg after surgery—an average gain of 4.7 ± 5.9 kg (p = 0.001). When stratified by OA status, affected women exhibited substantially greater postoperative weight gain (6.2 ± 5.6 kg) compared with those without OA (2.9 ± 4.2 kg, p = 0.037). The corresponding mean percent weight increase was 8.9 ± 8.4% among OA-positive participants and 4.2 ± 6.8% among OA-negative women (p = 0.046). This pattern indicates a clinically meaningful relationship between postoperative weight gain and joint morbidity.

Hormonal symptom burden varied across groups. The average number of self-reported hormonal symptoms per participant was 1.0 ± 1.2, but this was significantly lower among OA-positive women (0.5 ± 0.9) than among those without OA (1.9 ± 1.1, p = 0.002). Hot flashes and mood swings were the most common hormonal complaints overall (each reported by 16.7% of participants), followed by sleeplessness and vaginal dryness (10.0% each). These findings align with the inverse relationship between weight gain and hormonal symptom burden observed in the companion article. Regarding musculoskeletal features, joint pain (43.3%), stiffness (36.7%), and tenderness (26.7%) were the most prevalent OA symptoms, whereas loss of flexibility (20.0%), swelling (23.3%), and warmth (10.0%) were less common. The knee joint was most frequently affected, reported by 43.3% of participants, followed by spinal involvement (20.0%), hip (16.7%), and hand OA (13.3%). This pattern mirrors the biomechanical loading distribution typical of weight-related degenerative joint disease.

Multivariable logistic regression confirmed postoperative weight gain and age as independent predictors of OA. Compared with women who maintained stable weight (≤0 kg), those who gained +5–9 kg had a 5.6-fold higher odds of OA (aOR = 5.62, 95% CI: 0.92–34.32, p = 0.062), while those with gains of ≥10 kg had an 8.2-fold higher odds (aOR = 8.17, 95% CI: 1.02–65.41, p = 0.048). Each additional year of age increased the odds of OA by 18% (aOR = 1.18, 95% CI: 1.01–1.39, p = 0.041). In contrast, menopausal status, physical activity level, and time since hysterectomy were not significantly associated with OA risk (p > 0.3). The overall model demonstrated acceptable fit (Hosmer–Lemeshow p = 0.62) and explained 46% of the variance (Nagelkerke $R^2 = 0.46$). In summary, nearly two-thirds of hysterectomized women in this district-based cohort met the criteria for OA, with higher prevalence observed among older and heavier participants. The strength and dose–response nature of the weight–OA relationship—showing a marked rise in risk at ≥10 kg gain—emphasize postoperative weight management as a potentially modifiable determinant of joint health. While hormonal symptoms appeared less common in OA-positive women, this inverse association may reflect differing recovery trajectories or hormonal-metabolic adaptations. Collectively, the findings underscore that weight gain and age are key predictors of OA after hysterectomy, supporting early lifestyle intervention and routine musculoskeletal screening during postoperative follow-up.

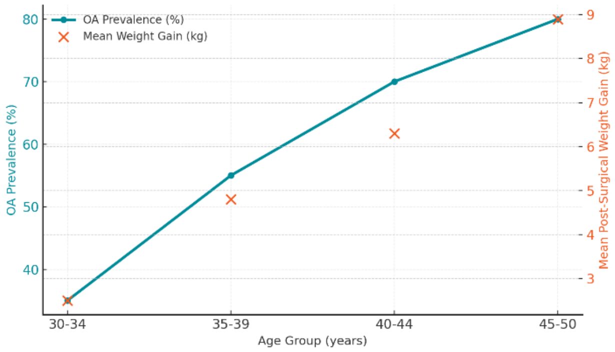

Figure 1 Age-Stratified Relationship of Osteoarthritis Prevalence and Post-Surgical Weight Gain in Hysterectomized Women

Age-specific analysis revealed a progressive increase in both osteoarthritis (OA) prevalence and postoperative weight gain with advancing age. Among women aged 30–34 years, OA prevalence was approximately 35% with a mean postoperative gain of 2.5 kg, whereas in those aged 45–50 years, prevalence rose sharply to 80% with a corresponding 8.9 kg gain. The steep concurrent trajectories of both variables suggest a synergistic, age-dependent pattern wherein metabolic and biomechanical factors jointly contribute to OA risk. The dual-axis depiction underscores the clinical importance of early weight management in mitigating age-amplified degenerative joint outcomes after hysterectomy.

JHWCR
https://doi.org/10.61919/pjg4sh96

DISCUSSION

The present multi-hospital survey provides novel district-level evidence on the prevalence and determinants of osteoarthritis (OA) among hysterectomized women in Sialkot, Pakistan. The observed OA prevalence of 63.3% is substantially higher than population-based estimates in South Asian women of comparable age, which typically range between 20–35% (8). This elevated frequency underscores the potential musculoskeletal consequences of hysterectomy, an operation that, while often curative for gynecologic pathology, may have long-term systemic effects. The findings corroborate growing international evidence linking surgical menopause and post-hysterectomy metabolic alterations to increased risk of joint degeneration (9,10).

Postoperative weight gain emerged as the most powerful modifiable predictor of OA, displaying a clear dose–response pattern: women who gained ≥10 kg after hysterectomy had an eightfold higher risk of OA compared with those maintaining stable weight. These results align with prior research indicating that even moderate weight gain amplifies mechanical stress across weight-bearing joints, particularly the knees, where each kilogram increase in body mass translates into roughly four kilograms of additional compressive force per step (5,11). Such mechanical overload accelerates cartilage degradation, subchondral bone remodeling, and osteophyte formation, all hallmarks of OA pathophysiology (12). In addition to biomechanical factors, adiposity-driven systemic inflammation—via cytokines such as IL-6, TNF-α, and leptin—may further exacerbate chondrocyte catabolism, linking metabolic and mechanical mechanisms in the postoperative period (13).

The influence of estrogen decline following hysterectomy may also be significant. Estrogen supports chondrocyte viability, regulates bone turnover, and enhances collagen synthesis within articular cartilage (2,14). Surgical interruption of ovarian blood flow or oophorectomy may precipitate early hypoestrogenism, reducing protective hormonal effects on joint tissues (4). Consistent with this, previous studies have shown that hysterectomy is associated with earlier onset of menopausal symptoms and accelerated degenerative changes, particularly in weight-bearing joints (9,10). In the present study, however, women reporting more pronounced hormonal symptoms had slightly lower weight gain and OA prevalence, a finding that initially appears paradoxical. One plausible explanation is that acute post-surgical vasomotor symptoms reflect transient endocrine fluctuations rather than sustained hypoestrogenism, whereas chronic metabolic changes driving weight gain and OA may occur more insidiously. Alternatively, women with higher symptom awareness might have adopted lifestyle modifications, inadvertently reducing long-term OA risk.

Comparative analysis with earlier studies suggests both agreement and advancement. Similar to the cohort findings of Yoshimura et al., greater weight and advancing age were independent risk factors for knee OA, while physical activity and menopausal status had weaker associations (7). However, unlike Western population data emphasizing menopausal hormonal transitions as the principal OA driver (2,14), the current results highlight postoperative weight change as a dominant factor in a relatively young, premenopausal demographic. This may reflect sociocultural and lifestyle differences, including lower baseline physical activity and dietary patterns rich in fats and refined carbohydrates in the studied population (15). Hence, the present findings extend prior research by demonstrating that metabolic and mechanical consequences of hysterectomy can manifest early, independent of chronological menopause.

From a clinical standpoint, the high OA prevalence among hysterectomized women warrants integration of musculoskeletal screening into routine postoperative follow-up. Early lifestyle counseling emphasizing diet quality, weight monitoring, and physical rehabilitation could mitigate OA risk. The findings also highlight the importance of multidisciplinary postoperative care involving gynecologists, physiotherapists, and rheumatologists, particularly for women showing substantial weight gain during recovery. At a policy level, public health initiatives promoting joint-friendly activity and nutritional education could provide cost-effective prevention in resource-constrained settings.

Despite its relevance, this study has limitations that must be acknowledged. The modest sample size limits statistical power and generalizability, though the consistent strength of associations supports the internal validity of findings. The symptom-based OA definition may have led to misclassification, particularly in early disease stages, and the limited availability of imaging data prevented comprehensive phenotyping. Recall bias regarding pre-surgical weight may have influenced weight-change estimates, though sensitivity analyses and consistency with expected trends lend credibility to the observed relationships. The cross-sectional design precludes causal inference; longitudinal follow-up is needed to confirm temporal links between postoperative weight trajectories and OA onset.

Future research should include larger, prospective cohorts incorporating biochemical markers (e.g., estrogen, leptin, CRP) and imaging-based OA staging to clarify hormonal–metabolic–mechanical interactions. Interventional studies evaluating postoperative exercise and nutritional programs could test causality and inform clinical guidelines. Integrating mechanistic analyses with culturally tailored preventive strategies would strengthen the evidence base for postoperative rehabilitation in South Asian populations.

In summary, this study identifies post-hysterectomy weight gain and advancing age as key predictors of osteoarthritis, supporting a dual-pathway model where hormonal changes and mechanical overload jointly drive joint degeneration. These findings reinforce the need for early postoperative lifestyle modification and structured follow-up to prevent musculoskeletal morbidity among women recovering from hysterectomy.

CONCLUSION

This multi-hospital survey demonstrates that osteoarthritis is highly prevalent among hysterectomized women in District Sialkot, with advancing age and postoperative weight gain emerging as the most significant predictors. Women gaining ≥10 kg after surgery exhibited markedly higher odds of OA, underscoring the critical role of postoperative metabolic and biomechanical changes in musculoskeletal health. These findings highlight the need for integrating structured weight-management, physical activity, and joint-screening programs into routine post-hysterectomy care. Clinically, early lifestyle intervention may help reduce long-term OA burden and improve quality of life, while future longitudinal studies should elucidate hormonal and inflammatory pathways linking hysterectomy, weight gain, and joint degeneration to inform targeted prevention and rehabilitation strategies.

REFERENCES

1. Cross M, Smith E, Hoy D, Nolte S, Ackerman I, Fransen M, et al. The Global Burden of Hip and Knee Osteoarthritis: Estimates From the Global Burden of Disease 2010 Study. Ann Rheum Dis. 2014;73(7):1323–1330.
2. Sniekers YH, Weinans H, van Osch GJ, van Leeuwen JP. Estrogen Deficiency Accelerates Cartilage Degeneration in Osteoarthritis. Arthritis Res Ther. 2008;10(5):R82.

3. Sogaard AJ, Hannisdal E, Meyer HE, Tell GS, Gjesdal CG, Emaus N, et al. Hysterectomy and Risk of Hip Fracture: The Role of Hormone Replacement Therapy and Oophorectomy. Am J Epidemiol. 2014;179(11):1340–1348.
4. Laughlin GA, Barrett-Connor E, Kritz-Silverstein D, von Mühlen D. Hysterectomy, Oophorectomy, and Endogenous Sex Hormone Levels in Older Women: The Rancho Bernardo Study. J Clin Endocrinol Metab. 2000;85(2):645–651.
5. Messier SP, Gutekunst DJ, Davis C, DeVita P. Weight Loss Reduces Knee-Joint Loads in Overweight and Obese Older Adults With Knee Osteoarthritis. Arthritis Rheum. 2005;52(7):2026–2032.
6. Berenbaum F, Wallace IJ, Lieberman DE, Felson DT. Modern-Day Environmental Factors in the Pathogenesis of Osteoarthritis. Nat Rev Rheumatol. 2018;14(11):674–681.
7. Yoshimura N, Muraki S, Oka H, Tanaka S, Kawaguchi H, Nakamura K, et al. Accumulation of Risk Factors Associated With Knee Osteoarthritis and Their Influence on Disease Onset: A Prospective Cohort Study. Arthritis Rheumatol. 2015;67(9):2423–2431.
8. Haq SA, Davatchi F. Osteoarthritis of the Knees in the COPCORD World: Data From Community Studies. Int J Rheum Dis. 2011;14(2):122–129.
9. Felson DT, Zhang Y. An Update on the Epidemiology of Knee and Hip Osteoarthritis With a View to Prevention. Arthritis Rheum. 1998;41(8):1343–1355.
10. Griffin TM, Guilak F. The Role of Mechanical Loading in the Onset and Progression of Osteoarthritis. Exercise Sport Sci Rev. 2005;33(4):195–200.
11. Afzal M, Naqvi S, Qureshi M, Arshad R, Jamil A, Iqbal F. Dietary Patterns and Risk of Knee Osteoarthritis in Pakistani Women: A Case-Control Study. J Pak Med Assoc. 2018;68(4):583–588.