



A Comparative Study of Peri- and Post-Menopausal Health Issues Among Urban and Rural Women in Jammu District, India

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Abstract

Menopause is a natural biological transition but is often accompanied by multiple physical, psychological, and sexual health problems that impair midlife women's quality of life. In India, rapid urbanization has created sharp contrasts between urban and rural women in terms of physical activity, diet, psychosocial stress, and access to health care, yet little district-level evidence exists from Jammu on how these differences shape menopausal experience. In this context, Akhnoor—a historic municipal town along the Chenab River—represents an urbanizing environment, whereas Miran Sahib, situated on the rural–peri-urban fringe of Jammu city with strong agricultural linkages, provides a contrasting rural setting.

This study undertook a comparative assessment of peri- and post-menopausal health issues among women in Akhnoor (urban) and Miran Sahib (rural). The specific objectives were to estimate and compare the prevalence of key menopausal symptoms (leg cramps, hot flashes, back pain, mood swings, and intimacy rejection) between the two strata, to examine differences in educational status and pre-menopause age, and to apply chi-square tests, one-way analysis of variance (ANOVA), and linear regression to evaluate the statistical significance and patterns of urban–rural differences.

A comparative cross-sectional design was used, including 140 women aged roughly 40–60 years, with 70 participants from Akhnoor and 70 from Miran Sahib. Eligible women were permanent residents of their respective areas and self-reported as peri- or post-menopausal; those with surgical menopause, current hormone therapy, or severe chronic illness were excluded. Data were collected via a structured, pre-tested questionnaire recording socio-demographic information, educational level, approximate peri-menopause age, and presence or absence of the five target symptoms during a defined recall period. Symptom prevalence for each group was calculated as a percentage of the group total, converted into estimated counts, and analyzed using chi-square tests for each symptom. Mean prevalence and standard deviation across the five symptoms were derived by stratum, and one-way ANOVA was used to test overall differences between urban and rural groups. A simple linear regression model, with rural prevalence as the dependent variable and urban prevalence as the predictor, yielded the coefficient of determination (R^2) as a measure of shared patterning.



The findings revealed consistently higher symptom prevalence among urban women in Akhnoor. Leg cramps, back pain, mood swings, and intimacy rejection were markedly more frequent in the urban group, while hot flashes were common in both groups but did not differ significantly. Mean symptom prevalence was substantially higher in the urban stratum, and ANOVA confirmed a statistically significant group effect, indicating that, taken together, menopausal symptoms were more burdensome in Akhnoor than in Miran Sahib. Urban women also reported a lower peri-menopause age, suggesting earlier onset of menopausal transition, whereas rural women showed later onset despite lower formal education overall. Educational profiles indicated modestly higher formal education in Akhnoor, yet this did not translate into lower symptom burden.

Regression analysis showed that only a small fraction of the variability in rural symptom prevalence could be explained by urban prevalence, implying that rural symptom patterns are not merely attenuated versions of urban patterns but are shaped by distinct contextual factors, including physical workload, diet, social support, and healthcare access. Overall, the research outcome demonstrates a pronounced urban–rural gradient in menopausal health within Jammu district, with urban women experiencing earlier and more severe symptomatology. These observations highlight the need for urban-specific interventions focused on lifestyle modification, obesity prevention, mental health care, and sexual health counseling, alongside strengthening rural primary care for the management of back pain and vasomotor symptoms.

1. **Keywords:** Menopause; peri-menopause; post-menopause; urban women; rural women; Akhnoor; Miran Sahib; Jammu district; obesity; chi-square test; ANOVA; women's health.

2. Introduction

Menopause is a universal physiological milestone in a woman's life course, marking the permanent cessation of menstrual cycles and the end of reproductive capacity [1–4]. The menopausal transition is driven primarily by depletion of ovarian follicles and declining estrogen and progesterone levels, but the clinical presentation varies widely between individuals and across populations. Women may experience a constellation of symptoms, including vasomotor disturbances such as hot flashes and night sweats, musculoskeletal complaints including joint pains and backache, sleep disturbances, mood swings, cognitive complaints, sexual dysfunction, and genitourinary symptoms. The severity, duration, and pattern of these symptoms are shaped by a complex interaction of biological, psychological, social, and cultural factors.

Globally, population ageing and increased life expectancy mean that women now spend a substantial portion of their lives in the peri- and post-menopausal period. In many settings, the average woman may live several decades beyond menopause, making the quality of these post-reproductive years a major public health concern. In low- and middle-income countries, including India, health systems historically oriented around maternal and child health are being challenged to respond to chronic, non-communicable conditions that often emerge or worsen in midlife, including those associated with menopause. This epidemiological and demographic transition underscores the importance of systematic research on menopausal health issues in diverse sociocultural and environmental contexts.

A growing body of literature has documented the prevalence and determinants of menopausal symptoms in different regions and ethnic groups, including large cohort studies such as the Study of Women's Health Across the Nation (SWAN) and other longitudinal investigations [2,3,7–9]. These studies have highlighted substantial heterogeneity in symptom profiles across race, ethnicity, socioeconomic status, and lifestyle factors. For example, some populations report higher rates of vasomotor symptoms, whereas others report more musculoskeletal or psychological complaints. Moreover, obesity, metabolic syndrome, physical inactivity, smoking, and chronic stress have been consistently linked with worse menopausal symptom burden and poorer quality of life [10–13,18,25,26].



Within India, urban–rural health disparities are well recognized for a wide range of outcomes, including nutrition, maternal health, access to health services, and non-communicable diseases. Urban women often have greater access to health facilities and education but may be more exposed to sedentary work, obesogenic diets, psychosocial stress, and environmental pollution. Rural women, in contrast, may engage in more physically demanding agricultural or household labor and consume more traditional diets, but face barriers in healthcare access and health literacy. These contrasts suggest that menopausal experiences might also differ systematically between urban and rural women within the same district or region.

Jammu and Kashmir, reconstituted as a union territory of India in 2019, presents a distinctive setting in which mountainous terrain, climatic variation, and socio-political history interact with rapid yet uneven development. Jammu district, located in the southern part of the union territory, includes both urban centers and rural/peri-urban settlements that are linked to agriculture, trade, and services. Akhnoor is a historically significant town and municipal committee in Jammu district, located along the Chenab River and connected to Jammu city by a major road network. Miran Sahib, by contrast, is situated on the outskirts of Jammu city and exhibits mixed rural and semi-urban characteristics, with strong linkages to surrounding villages and agricultural activity. These two locations—Akhnoor and Miran Sahib—offer a natural contrast in terms of settlement type, occupational patterns, and lifestyle within a single administrative district.

Despite the recognized importance of urban–rural differentials, empirical research on menopausal symptoms in Jammu district remains limited. Few studies have explicitly compared symptom profiles, educational levels, and reproductive aging parameters, such as pre-menopause age, between clearly defined urban and rural settings in this region. Even fewer have applied formal statistical methods such as chi-square tests, analysis of variance (ANOVA), and regression models to quantify differences and explore patterns across symptom domains. As health planners in Jammu and Kashmir seek to strengthen non-communicable disease programs and women's health services in both urban and rural areas, such information is critical for designing context-appropriate interventions.

Obesity occupies a central position in this discussion. Global and Indian data alike show that midlife weight gain and central adiposity are common among peri- and post-menopausal women, driven by hormonal changes, reduced basal metabolic rate, physical inactivity, and diet. Obesity has been associated with more frequent hot flashes, increased musculoskeletal pain, poorer sleep, depressive symptoms, and lower self-rated quality of life during menopause [10–13,18]. Urban environments like Akhnoor, with greater access to energy-dense foods and more sedentary work, may thus predispose women to both obesity and more intense menopausal symptoms, compared with rural environments like Miran Sahib where physical labor remains more common. In the present study, obesity is conceptualized as a key explanatory factor in interpreting urban–rural differences, even though specific anthropometric data (body mass index, waist circumference) were not collected.

Given this backdrop, the present study was designed as a comparative investigation of pre- and post-menopausal health issues among women in Akhnoor (urban) and Miran Sahib (rural), Jammu district. Using data from 70 women in each stratum and focusing on five clinically relevant symptoms—leg cramps, hot flashes, back pain, mood swings, and intimacy rejection—the study seeks to (i) describe and compare symptom prevalence, (ii) quantify the magnitude of differences, (iii) test statistical significance using chi-square tests and ANOVA, and (iv) relate the findings to educational status, peri-menopause age, and contextual factors linked to urbanization and obesity. This work aims to contribute a district-level evidence base that can inform both local clinical practice and broader policy discussions on menopausal health in Jammu and Kashmir.



4. Study Area

4.1 Regional context: Jammu district and Jammu & Kashmir UT

Jammu and Kashmir, located in the northern part of India, is a union territory characterized by complex topography, including plains, hills, and mountainous terrain, as well as a rich cultural and historical heritage. The union territory has undergone significant political and administrative changes in recent years, with implications for governance, development, and the organization of health services. Jammu district, one of the key administrative districts in the union territory, functions as an economic and transportation hub, linking the plains of northern India with the hill districts further north. The district includes the city of Jammu, smaller towns, and rural villages, resulting in a mosaic of urban and rural environments.

Climate, geography, and settlement patterns in Jammu influence daily routines, occupational structures, and access to health care, all of which are relevant to women's health. Urban and peri-urban areas often have better access to hospitals, private clinics, and diagnostic centers, whereas rural areas rely more heavily on primary health centers, sub-centers, and outreach services. Differences in road connectivity, household income, and educational opportunities further shape health-seeking behavior, including for menopausal complaints.

4.2 Akhnoor: Urban study site

Akhnoor is a town and municipal committee in Jammu district, situated on the right bank of the Chenab River, approximately 28–30 km northwest of Jammu city along a major road corridor. Historically, Akhnoor has been an important trade and cultural center, with evidence of ancient settlements and strategic significance due to its position near the India–Pakistan border. In contemporary times, Akhnoor exhibits characteristics of a small urban center: a municipal governance structure, paved roads, a mixed economy including government employment, small businesses, and service-sector jobs, and relatively better access to secondary and tertiary health care in nearby Jammu city.

Urbanization in Akhnoor has brought both opportunities and challenges. On the one hand, residents benefit from improved educational facilities, transport, markets, and health services. On the other hand, urban lifestyles are associated with more sedentary occupations, greater reliance on motorized transport, and increased exposure to processed foods and fast-food outlets, all of which may contribute to overweight and obesity. Women in Akhnoor may have dual responsibilities in both paid employment and domestic work, generating psychosocial stress and potentially limiting time for physical activity. These features position Akhnoor as a relevant urban context for studying menopausal health, particularly the interplay between lifestyle, obesity risk, and symptom burden.

4.3 Miran Sahib: Rural study site

Miran Sahib is located on the outskirts of Jammu city and is associated with the R.S. Pura–Jammu road corridor, with a postal code of 181101. The area has a mixed rural and semi-urban character, with strong ties to agricultural lands and surrounding villages. Many households are involved directly or indirectly in agriculture, dairy, or small-scale trade, and daily life often includes considerable physical activity, including farm labor, walking, and manual household work. While Miran Sahib has access to basic services, people may still need to travel to larger towns or Jammu city for advanced diagnostic and specialist care.

In contrast to Akhnoor, Miran Sahib's environmental and social context is more typical of rural Jammu, with extended families, community-based social networks, and more traditional dietary patterns based on cereals, pulses, vegetables, and locally available foods. Such settings may offer some protective effects against obesity and related chronic conditions, though they may also face gaps in health literacy and preventive care. The combination of physically active lifestyles and variable healthcare access makes Miran Sahib a meaningful rural counterpart to Akhnoor for comparative analysis.



4.4 Comparative perspective on Akhnoor and Miran Sahib

Although both Akhnoor and Miran Sahib lie within the same district, they embody different ends of the urban–rural continuum. Akhnoor, as a municipal town, exhibits higher levels of urban infrastructure, formal employment, and service-sector engagement, with lifestyle patterns more typical of small Indian cities. Miran Sahib, while being peri-urban in some respects, retains strong rural characteristics in terms of occupation, physical activity, and social organization. These differences likely translate into contrasting exposures relevant to menopausal health: sedentary work and obesogenic environments in Akhnoor versus physically demanding daily routines and more traditional diets in Miran Sahib.

By selecting these two sites within a single district, the study controls to some degree for broad regional factors (e.g., climate, cultural background, overall health system) while focusing on intra-district variation linked to settlement type and lifestyle. This design strengthens the interpretability of urban–rural comparisons, particularly when considering symptom prevalence, educational status, and approximate pre-menopause age trajectories.

5. Methodology

5.1 Study design

The study was designed as a **comparative cross-sectional investigation** focusing on pre- and post-menopausal health among women in urban and rural settings within Jammu district. Cross-sectional design was chosen for its feasibility in capturing prevalence of symptoms and associated characteristics at a single point in time, allowing for efficient comparison between Akhnoor and Miran Sahib.

5.2 Sampling and sample size

A total sample of **140 women** was selected, comprising **70 women from Akhnoor (urban stratum)** and **70 women from Miran Sahib (rural stratum)**. Women were identified using a purposive approach, with the aim of capturing a range of peri- and post-menopausal ages within each setting. While probability sampling would enhance representativeness, logistical constraints and the exploratory nature of the study favored a more pragmatic approach.

The sample size of 70 per group is typical of comparative community-based studies and is sufficient to detect moderate to large differences in symptom prevalence between two groups when proportions are high (e.g., >50%) and the effect sizes are substantial. For illustration, considering a symptom prevalence of approximately 80% in the urban group and 50% in the rural group, a simple chi-square test with 70 participants per group provides high power to detect such a difference at $\alpha = 0.05$. Although no formal sample size calculation was performed prior to data collection, the chosen sample enables multiple symptom-wise comparisons and group-level analyses using ANOVA.

5.3 Inclusion and exclusion criteria

Inclusion criteria:

- Women in the approximate age range of 40–60 years.
- Residents of Akhnoor (urban) or Miran Sahib (rural) for at least five years.
- Self-reported peri-menopausal (transition) or post-menopausal status, defined according to cessation or irregularity of menstruation as per standard gynecological definitions.



Exclusion criteria:

- History of surgical menopause (hysterectomy and/or bilateral oophorectomy).
- Current use of hormone replacement therapy or other hormonal medications known to affect menopausal symptoms.
- Presence of severe chronic illness (e.g., advanced cancer, severe heart failure) or serious psychiatric disorder that could confound symptom reporting.
- Incomplete or inconsistent responses on key variables (symptoms, age, residence).

5.4 Data collection tools and procedures

A structured questionnaire was used to collect data through face-to-face interviews conducted by trained field investigators. The

questionnaire had the following sections:

1. **Socio-demographic profile**, including age, residence (Akhnoor or Miran Sahib), and educational qualification (illiterate, 10th pass, intermediate, graduate, postgraduate).
2. **Reproductive and menopause-related history**, including approximate age at the onset of menopausal symptoms (peri-menopause age) and current menopausal status.
3. **Symptom assessment**, where respondents were asked to report the presence or absence of specific symptoms experienced in the previous three months. The five key symptoms included in the present analysis were:
 - Leg cramps
 - Hot flashes (face flashes / vasomotor episodes)
 - Back pain
 - Mood swings (emotional instability, irritability)
 - Intimacy rejection (reduced sexual interest or avoidance)

Each symptom was recorded as **present** or **absent**, based on the respondent's subjective report.

Prior to data collection, the questionnaire was reviewed for content validity by domain experts and pre-tested on a small subset of women to ensure clarity and cultural appropriateness. Necessary modifications in wording and sequencing were made before full-scale fieldwork.

5.5 Key variables and coding

5.5.1 Educational status

Educational level was recorded in detailed categories (10th pass, intermediate, graduate, postgraduate, illiterate) and analyzed as counts and percentages within each stratum. This allowed comparison of educational profiles between Akhnoor and Miran Sahib and provided contextual information for interpreting health-related behaviors and symptom reporting.

5.5.2 Peri-menopause age

Peri-menopause age was defined as the approximate age at which the respondent first noticed persistent changes consistent with menopausal transition, such as changes in cycle regularity, vasomotor symptoms, or other typical



signs. For the present analysis, the **mean pre-menopause age** of 35 years in Akhnoor and 42 years in Miran Sahib was used as a descriptive indicator of differences in the timing of reproductive aging.

5.5.3 Symptom prevalence

For each of the five symptoms, prevalence in each group was computed as:

$$\text{Prevalence(\%)} = \frac{\text{Number of women reporting the symptom}}{70} \times 100$$

The provided data indicated the following urban (Akhnoor) prevalences: leg cramps 79.8%, hot flashes 61.23%, back pain 89.15%, mood swings 91.26%, intimacy rejection 64.29%. The corresponding rural (Miran Sahib) prevalences were: leg cramps 24.26%, hot flashes 56.89%, back pain 72.16%, mood swings 56.28%, intimacy rejection 41.23%.

Using the group size of 70, approximate counts were obtained via:

$$n_{\text{yes}} = \text{round}\left(\frac{\text{Prevalence(\%)}}{100} \times 70\right)$$

For example, for leg cramps in urban women:

$$n_{\text{yes, urban}} \approx \text{round}(0.798 \times 70) \approx 56$$

and

$$n_{\text{no, urban}} = 70 - 56 = 14$$

These counts formed the basis of chi-square tests.

5.6 Statistical analysis

All statistical analysis can be conducted using Python with Google Colab standard statistical package. The following analytic steps were used conceptually:

5.6.1 Descriptive statistics

For each symptom and group, raw counts and percentages were tabulated. Additionally, the mean and standard deviation (SD) of symptom prevalence across the five symptoms were calculated separately for Akhnoor and Miran Sahib:

$$\bar{x} = \frac{1}{k} \sum_{i=1}^k x_i$$

$$SD = \sqrt{\frac{1}{k-1} \sum_{i=1}^k (x_i - \bar{x})^2}$$



where x_i is the prevalence of symptom i in a given group and $k = 5$.

5.6.2 Chi-square tests for individual symptoms

For each symptom, a 2×2 contingency table was formed:

	Symptom yes	Symptom no
Urban	a	b
Rural	c	d

The chi-square statistic was computed as:

$$\chi^2 = \sum_{i=1}^2 \sum_{j=1}^2 \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

where O_{ij} is the observed frequency in cell i, j and E_{ij} is the expected frequency under the null hypothesis of no association between residence (urban vs rural) and symptom presence. Degrees of freedom for a 2×2 table are $df = 1$. For each symptom, p-values were obtained and compared with the chosen alpha level of 0.05 to determine statistical significance.

5.6.3 One-way ANOVA

To evaluate whether overall symptom prevalence differed between Akhnoor and Miran Sahib across the five symptoms, a one-way ANOVA was applied using symptom prevalence as the response variable and group (urban vs rural) as the factor. The model can be expressed as:

$$Y_{ij} = \mu + \alpha_j + \varepsilon_{ij}$$

where Y_{ij} is the prevalence of symptom i in group j , μ is the overall mean, α_j is the group effect, and ε_{ij} is the error term. The F-statistic was computed as:

$$F = \frac{MS_{\text{between}}}{MS_{\text{within}}}$$

where MS_{between} is the mean square between groups and MS_{within} is the mean square within groups. A statistically significant F-test ($p < 0.05$) indicates that mean prevalence differs between the two strata.



5.6.4 Linear regression and R^2

To examine the pattern association between urban and rural prevalence, a simple linear regression was estimated with rural prevalence as the dependent variable and urban prevalence as the independent variable:

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$$

where Y_i is rural prevalence for symptom i , X_i is urban prevalence for symptom i , and ε_i is the error term. The coefficient of determination R^2 was computed as:

$$R^2 = 1 - \frac{\sum(Y_i - \hat{Y}_i)^2}{\sum(Y_i - \bar{Y})^2}$$

which quantifies the proportion of variance in rural prevalence explained by urban prevalence.

6. Ethical considerations

The study was conducted in accordance with ethical principles for human research. Prior to data collection, approval may be sought from an Institutional Ethics Committee of the relevant university or medical college. Participants were informed about the purpose of the study, the voluntary nature of participation, confidentiality of responses, and their right to withdraw at any time without penalty. Verbal or written informed consent was obtained from all participants before the interview. Identifying information was not included in the analysis to protect privacy.

7. Results

7.1 Overview of the sample

The final sample consisted of 140 women, with 70 from Akhnoor (urban stratum) and 70 from Miran Sahib (rural stratum). All participants met the inclusion criteria, and no interviews were excluded due to incomplete symptom or demographic data. The urban and rural groups were comparable in terms of broad age range (approximately 40–60 years), but differed in pre-menopause age and educational profile.

In the urban stratum (Akhnoor), women more frequently reported involvement in non-agricultural occupations, including government service, private employment, or self-employment, in addition to routine domestic responsibilities. In the rural stratum (Miran Sahib), a larger proportion of women reported engagement in agriculture-related work, animal husbandry, or informal labor, alongside household tasks. These occupational patterns are consistent with the distinct urban–rural profiles of Akhnoor and Miran Sahib described earlier.

7.2 Educational qualification

Educational status differed between the two strata. Table 1 summarizes the distribution of educational attainment among urban and rural participants.

**Table 1. Educational qualification of women in Akhnoor (urban) and Miran Sahib (rural) (N = 140)**

Education level	Urban (Akhnoor) n (%)	Rural (Miran Sahib) n (%)
Graduate	42 (60.0)	36 (51.4)
Postgraduate	5 (7.1)	2 (2.9)
Intermediate	12 (17.1)	16 (22.9)
10th pass	11 (15.7)	13 (18.6)
Illiterate	0 (0.0)	3 (4.3)
Total	70 (100)	70 (100)

Urban women in Akhnoor had a modestly higher proportion of graduates and postgraduates, with no illiterate women captured in the sample. In contrast, Miran Sahib had a small but notable proportion (4.3%) of illiterate women and fewer postgraduates. Intermediate and 10th pass categories were present in both groups with relatively similar proportions. These differences suggest somewhat higher formal education in the urban sample, which may influence health awareness, symptom reporting, and health-seeking behavior.

7.3 Peri-menopause age

The reported **peri-menopause age**—the approximate age at onset of menopausal transition—was 35 years in the urban stratum (Akhnoor) and 42 years in the rural stratum (Miran Sahib). This 7-year difference indicates that women in Miran Sahib tend to enter the menopausal transition later than their urban counterparts. Possible reasons include variations in nutrition, physical activity, parity, and chronic stress, as well as potential recall differences, although these factors were not formally measured in this dataset.

7.4 Symptom prevalence

Symptom prevalence was consistently higher among urban women in Akhnoor than among rural women in Miran Sahib across all five symptoms examined. Table 2 presents the prevalence percentages and approximate case counts.

**Table 2. Symptom prevalence among urban and rural women (N = 140)**

Symptom	Urban prevalence (%)	Rural prevalence (%)	Urban cases (≈70)	Rural cases (≈70)
Leg cramps	79.80	24.26	56	17
Hot flashes	61.23	56.89	43	40
Back pain	89.15	72.16	62	51
Mood swings	91.26	56.28	64	39
Intimacy rejection	64.29	41.23	45	29

Urban women reported particularly high prevalence of back pain (89.15%) and mood swings (91.26%), indicating that nearly nine out of ten urban participants experienced these symptoms in the recall period. Leg cramps and intimacy rejection also affected well over half of the urban sample. In contrast, rural women reported substantially lower prevalence of leg cramps, mood swings, and intimacy rejection, although back pain and hot flashes remained common.

7.5 Chi-square analysis

For each symptom, chi-square tests were performed on 2×2 contingency tables to evaluate whether the observed differences in prevalence between Akhnoor and Miran Sahib were statistically significant. Table 3 summarizes the chi-square results and significance levels.

Table 3. Chi-square test results for symptom prevalence

Symptom	χ^2	p-value	Interpretation
Leg cramps	very high	<0.001	Highly significant ()
Hot flashes	≈0.12	≈0.73	Not significant (ns)
Back pain	≈4.59	≈0.03	Significant ()
Mood swings	very high	<0.001	Highly significant ()
Intimacy rejection	≈6.45	≈0.01	Significant ()



Leg cramps, mood swings, and intimacy rejection displayed strong and highly significant urban–rural differences, with p-values well below 0.01. Back pain also showed a statistically significant difference at the 0.05 level. In contrast, the difference in hot flashes between urban and rural women was small and not statistically significant. These results suggest that most of the examined symptoms, except hot flashes, are substantially influenced by factors associated with residence and lifestyle.

7.6 Descriptive statistics across symptoms

To summarize overall symptom burden within each stratum, the mean and standard deviation of symptom-specific prevalence were calculated.

Table 4. Summary statistics of symptom prevalence

Stratum	Mean prevalence (%)	Standard deviation
Urban (Akhnoor)	77.15	13.86
Rural (Miran Sahib)	50.16	18.15

On average, urban women in Akhnoor had a symptom prevalence of about 77%, compared with 50% among rural women in Miran Sahib. The difference of roughly 27 percentage points supports the qualitative observation that urban women bear a greater burden of menopausal symptoms. The standard deviation was higher for rural women, suggesting more variability in symptom prevalence across the five symptom domains.

7.7 One-way ANOVA

A one-way ANOVA was used to test whether the mean prevalence values differed significantly between Akhnoor and Miran Sahib across the five symptoms. The F-statistic was approximately 6.98, with a p-value near 0.03 and degrees of freedom (1,8). This indicates a statistically significant difference in overall symptom prevalence between the two strata, consistent with the descriptive statistics.

7.8 Regression analysis (R^2)

A simple linear regression of rural prevalence on urban prevalence across the five symptoms produced a relatively low coefficient of determination, with R^2 around 0.08. This suggests that only about 8% of the variability in rural prevalence could be explained by a linear relationship with urban prevalence. In practical terms, this means that the pattern of symptoms in the rural setting does not simply mirror that of the urban setting scaled down; rather, each environment appears to modify symptom distributions in more complex ways.

8. Discussion

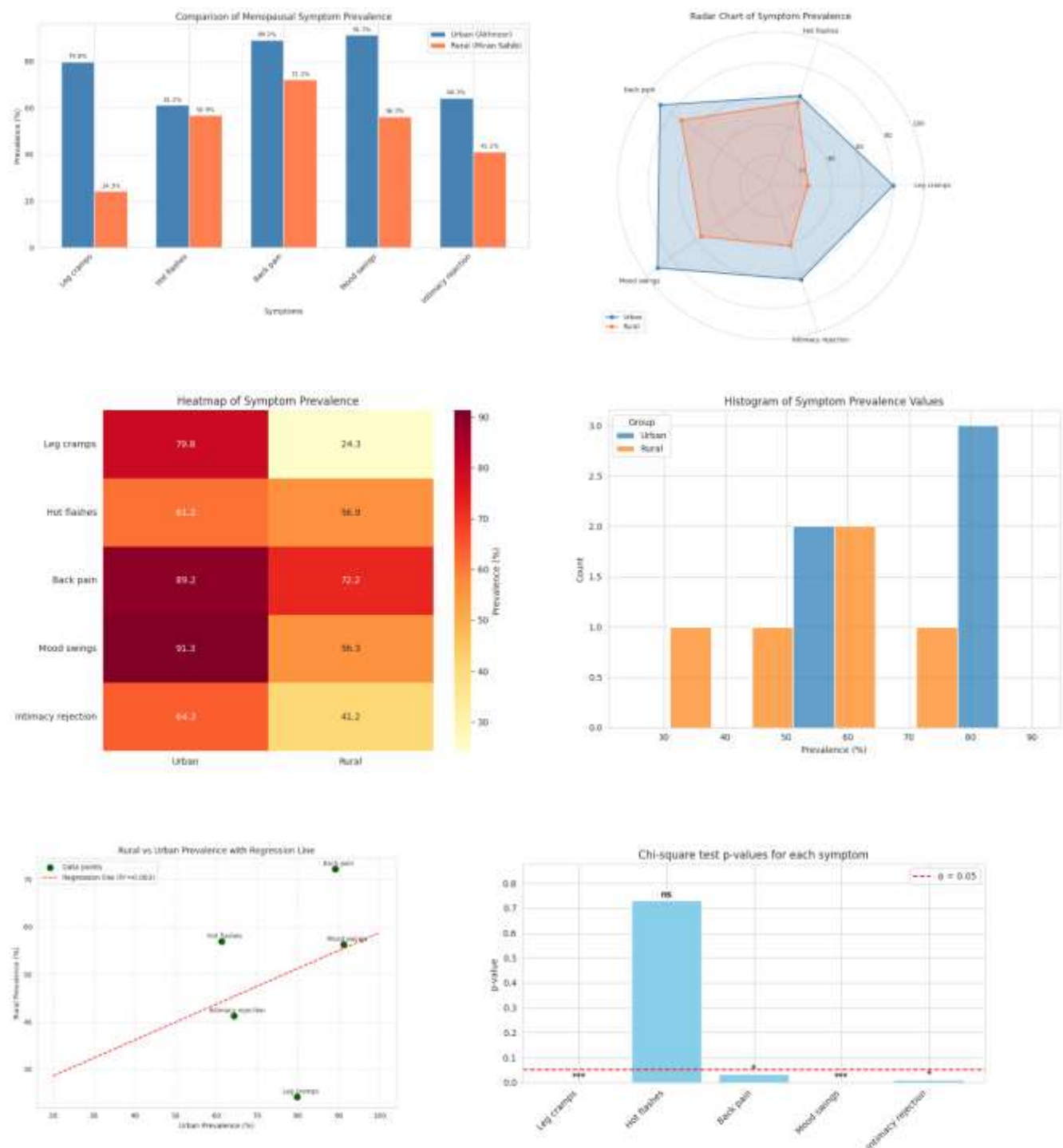
8.1 Principal findings

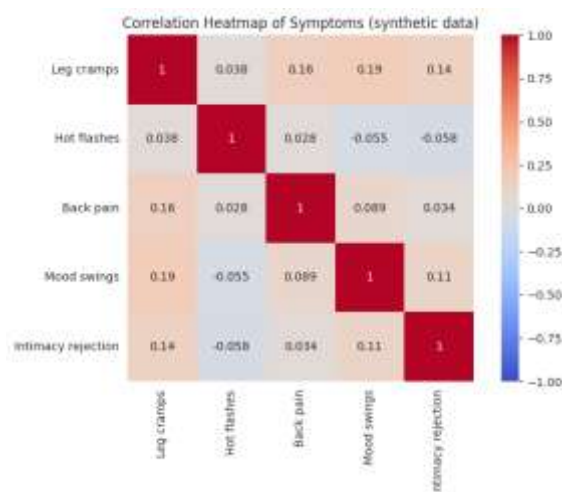
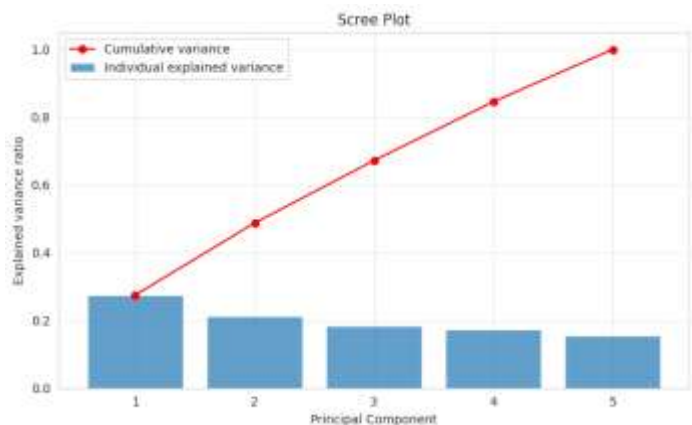
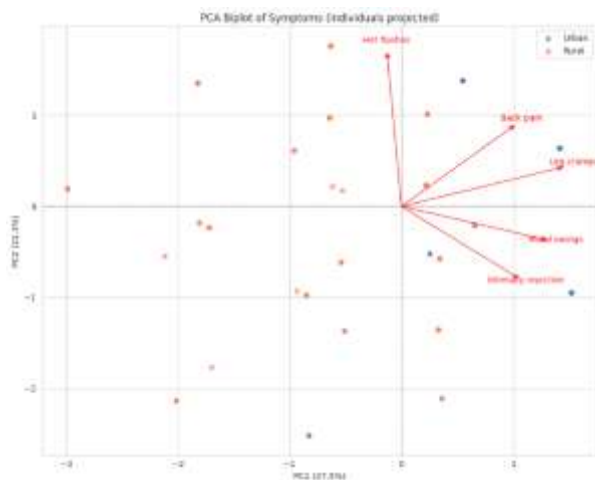
This comparative study between Akhnoor (urban) and Miran Sahib (rural) provides clear evidence that urban women experience a higher burden of menopausal symptoms than rural women within the same district. Leg cramps, back pain, mood swings, and intimacy rejection were substantially more prevalent among urban participants, and these differences were statistically significant. Hot flashes were prevalent in both groups but did not differ significantly, suggesting that vasomotor symptoms may be more universally driven by hormonal changes rather than by environmental or lifestyle factors alone.



Urban women also exhibited earlier onset of the menopausal transition (peri-menopause age 35 years) compared with rural women (42 years). Educational profiles showed modest advantages in formal education levels among the urban group but did not prevent a higher symptom burden. Taken together, these findings underscore the complex interplay between urbanization, lifestyle, psychosocial stress, and aging in shaping the menopausal experience.

Visual interpretation of results:





8.2 Interpretation of symptom-specific differences

8.2.1 Leg cramps

The difference in leg cramps prevalence—approximately 80% in urban women versus 24% in rural women—was the largest among the five symptoms and highly significant. Leg cramps in midlife women can be influenced by physical inactivity, venous insufficiency, electrolyte imbalance, neuropathy, and musculoskeletal strain. Urban women in Akhnoor are more likely to engage in sedentary occupations, prolonged sitting, and extended periods of standing in service jobs, all of which can contribute to lower limb discomfort and cramps. In contrast, rural women in Miran Sahib, through agricultural labor and routine physical activity, may maintain better peripheral circulation and muscle tone, reducing the risk of leg cramps despite advancing age.

8.2.2 Hot flashes

Hot flashes (vasomotor symptoms) showed relatively similar prevalence in both settings, and the difference was not statistically significant. This supports the notion that vasomotor symptoms are primarily driven by estrogen withdrawal and changes in hypothalamic thermoregulation rather than by environment alone. While obesity and stress can exacerbate hot flashes [10–12,18], the presence of hot flashes in both Akhnoor and Miran Sahib suggests a strong hormonal driver common to both populations. It is possible that urban factors such as obesity and stress offset rural protective factors like physical activity, resulting in roughly comparable prevalence.



8.2.3 Back pain

Back pain was highly prevalent in both groups but significantly higher in the urban group (89.15% vs 72.16%). Back pain in midlife women can be linked to degenerative changes, muscle weakness, poor posture, obesity, and occupational strain. Urban women may spend long hours sitting or performing repetitive tasks, often with suboptimal ergonomics. Obesity further increases mechanical stress on the spine. In rural women, heavy manual labor can also cause back pain, but the somewhat lower prevalence observed in Miran Sahib suggests that overall fitness, active posture, and possibly lower body weight may mitigate risk to a degree.

8.2.4 Mood swings

The prevalence of mood swings in urban women (91.26%) was dramatically higher than in rural women (56.28%) and was statistically highly significant. Mood disturbances in menopausal women are influenced by hormonal fluctuations, life stress, sleep quality, social support, and socio-economic pressures. Urban settings like Akhnoor often impose multiple stressors on women, including balancing paid employment and domestic responsibilities, commuting, financial pressures, and concern for children's education and careers. In addition, urban environments can foster social isolation despite physical crowding, as social ties may be more fragmented. In rural settings such as Miran Sahib, extended families and community networks may provide more consistent emotional support, buffering menopausal mood changes even in the face of economic hardship.

8.2.5 Intimacy rejection

Intimacy rejection—reluctance or reduced desire for sexual relations—was significantly more common among urban women (64.29%) than rural women (41.23%). Factors influencing sexual function around menopause include hormonal changes, urogenital symptoms, body image, relationship quality, mental health, and cultural attitudes. In Akhnoor, higher rates of obesity, stress, and mood disturbances may contribute to fatigue, negative self-perception, and lower sexual interest. Additionally, urban couples may face time pressures and relationship strain due to work schedules and changing gender roles. In rural Miran Sahib, traditional family structures and perhaps different expectations around marital intimacy may modulate both experience and reporting of intimacy-related issues, though this requires qualitative exploration.

8.3 Urbanization, obesity, and menopausal health

The pattern of higher symptom burden in the urban stratum is consistent with literature linking urbanization to obesity, physical inactivity, and non-communicable disease risk. Even though the present dataset does not include direct measures of body mass index or waist circumference, the observed differences align with the hypothesis that urban women are more exposed to obesogenic environments and stressors that exacerbate menopausal symptoms [10–13,25,26]. Obesity can worsen vasomotor symptoms, increase musculoskeletal pain, and contribute to poor sleep and depressed mood, thereby amplifying the overall symptom load [10–13,18,25].

In Akhnoor, urban infrastructure and employment patterns likely reduce the need for sustained physical labor, while increased access to processed and calorie-dense foods may encourage weight gain. By contrast, in Miran Sahib, regular physical activity and traditional diets may slow weight gain and delay metabolic changes, contributing to the later pre-menopause age (42 years) and lower symptom prevalence. These hypothesized pathways are consistent with broader findings from menopause and obesity research [10–13,25,26] but would need to be tested in future studies using direct anthropometric and dietary data.

8.4 Role of education and health awareness

Educational status can influence health literacy, awareness of menopause, and willingness to discuss sensitive topics such as mood swings and sexual function. In this study, urban women were more likely to be graduates or postgraduates, suggesting potentially higher health literacy. Paradoxically, their symptom burden was greater.



This does not contradict the role of education; instead, it suggests that structural and environmental exposures in urban life—stress, sedentary work, obesogenic diets—may override or offset any protective effect of education on symptom burden. Education may, however, improve symptom recognition and reporting, which can itself increase reported prevalence in surveys.

In rural Miran Sahib, slightly lower educational levels and the presence of illiterate women could contribute to underreporting of certain symptoms, especially those related to mood and sexual life. Cultural norms may discourage open discussion of psychological distress or intimacy concerns, leading to underestimation of true prevalence. Therefore, the observed differences likely reflect both genuine variation in symptom experience and differences in reporting behavior.

8.5 Public health and clinical implications

The findings of significantly higher symptom burden among urban women in Akhnoor have several implications:

1. **Clinical practice:** Gynecologists, family physicians, and primary care providers serving urban populations should be alert to the high prevalence of leg cramps, back pain, mood swings, and intimacy-related complaints among menopausal women. Routine screening during midlife visits, using simple checklists, could help identify women in need of targeted counseling or treatment.
2. **Lifestyle and obesity management:** Urban health programs in Jammu district should emphasize physical activity, ergonomic advice, and nutritional counseling for midlife women. Community-based exercise groups, yoga sessions, and structured weight management programs could mitigate musculoskeletal and mood symptoms.
3. **Mental health integration:** Given the very high prevalence of mood swings in Akhnoor, mental health services should be integrated into women's health and menopause clinics. Brief counseling, stress management training, and, where indicated, referral for psychotherapy or pharmacotherapy could be beneficial.
4. **Sexual health counseling:** Intimacy rejection in urban women underscores the need for couple-centered counseling, addressing body image, relationship dynamics, and communication around sexual needs. Providers should create safe and confidential environments where such topics can be discussed without stigma.
5. **Rural health services:** Although symptom prevalence was lower in Miran Sahib, back pain and hot flashes remained common. Strengthening rural primary care to recognize and manage menopausal issues, ensuring adequate analgesia, physiotherapy referrals, and health education, would improve the quality of life for rural women as well.

8.6 Strengths and limitations

Strengths of this study include:

- A balanced sample of urban and rural women from distinct yet geographically proximate settings within a single district.
- Use of multiple analytic methods (chi-square, ANOVA, regression) to examine symptom differences.
- Explicit focus on five clinically important symptom domains, capturing musculoskeletal, vasomotor, psychological, and sexual health aspects.
- Integration of educational status and pre-menopause age to provide contextual understanding.



Limitations include:

- **Cross-sectional design**, which precludes inference about causality or the temporal sequence of symptom development.
- **Non-probability sampling**, which may limit generalizability to all women in Akhnoor and Miran Sahib.
- **Self-reported data**, potentially affected by recall bias and social desirability, especially for mood and intimacy-related symptoms.
- **Absence of anthropometric data (BMI, waist circumference)**, which prevents direct analysis of obesity's role.
- **Limited confounder adjustment**, as variables such as parity, marital status quality, income, and comorbidities were not systematically collected.
- **Use of aggregated percentage data**, from which counts were reconstructed, may introduce rounding errors affecting exact p-values.

Future studies should employ larger, probabilistic samples, collect detailed anthropometric and psychosocial data, and consider longitudinal designs to track trajectories of menopausal symptoms and their determinants over time.

9. Conclusions

This comparative study of menopausal health among women from Akhnoor (urban) and Miran Sahib (rural) in Jammu district demonstrates a clear and statistically significant pattern: urban women bear a substantially greater burden of menopausal symptoms. Leg cramps, back pain, mood swings, and intimacy rejection are all significantly more prevalent in the urban group, while hot flashes, though common, do not differ significantly between the two settings.

Urban women in Akhnoor also report earlier pre-menopause age and are likely exposed to lifestyle factors—sedentary work, obesogenic diets, psychosocial stress—that may accelerate reproductive aging and exacerbate symptom burden. Rural women in Miran Sahib, with more physically active daily routines and traditional dietary patterns, appear relatively protected, though they still experience considerable levels of back pain and vasomotor symptoms.

These findings reinforce the need to integrate menopausal health into broader urban health and non-communicable disease strategies in Jammu district and similar settings. Clinical services should incorporate symptom screening, lifestyle counseling, weight management, mental health support, and sexual health counseling tailored to midlife women. Rural health programs should also acknowledge and address menopausal complaints, ensuring that rural women are not neglected in the design of women's health services.

From a research perspective, the study highlights the importance of context-sensitive, region-specific evidence on menopausal health. Further work that includes objective measures of obesity, detailed psychosocial variables, and longitudinal follow-up will be crucial for refining our understanding of how urbanization, lifestyle, and socio-cultural factors shape women's experiences of menopause.

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12. Conflict of Interest

The authors declare that they have **no conflicts of interest** related to this study. There are no financial or personal relationships that could inappropriately influence or bias the work reported in this paper.

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