



Original Research Article

Prevalence of Depression, anxiety, and stress among postmenopausal women in urban and rural areas of Chengalpattu district, Tamil Nadu, India: A cross-sectional study

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Abstract: Postmenopausal women are vulnerable to common mental disorders due to biological, psychosocial, and lifestyle changes. Evidence on depression, anxiety, and stress among postmenopausal women, particularly in community settings, remains limited. This study aimed to assess the prevalence of depression, anxiety, and stress among postmenopausal women in urban and rural areas of Chengalpattu district and to identify associated risk factors.

Methodology: A community-based cross-sectional study was conducted among 287 postmenopausal women aged ≥ 45 years using stratified random sampling. Data were collected through face-to-face interviews using a structured questionnaire, and psychological distress was assessed using the Depression Anxiety Stress Scale-21. Bivariate analysis and multivariable binary logistic regression were performed to identify factors independently associated with depression, anxiety, and stress. **Results:** The prevalence of depression, anxiety, and stress was 62.0%, 71.1%, and 40.4%, respectively. Junk or processed food consumption, abnormal body mass index, and social isolation were independently associated with depression. Underweight body mass index was independently associated with anxiety. No factors retained independent significance for stress after adjustment. **Conclusion:** A high burden of depression and anxiety was observed among postmenopausal women, highlighting the need for routine mental health screening and interventions addressing modifiable lifestyle and psychosocial factors.

Keywords: Psychological disorders; Demographics; Lifestyle; Social factors; Menopause

INTRODUCTION

Mental disorders account for a major component of global disease burden, with depression, anxiety, and stress being significant contributors to disability and denigrated quality of life. The World Health

Organization estimates that 3.8 % of people worldwide suffer from depression, and stress-related conditions are increasingly recognized as major public health concerns.¹ With an estimated 197.3 million people affected in 2017, including 45.7 million with depressive disorders and 44.9 million with anxiety disorders, mental diseases are particularly prevalent in

India.² Studies found that female gender, advancing age, low educational status, unemployment, and the prevalence of chronic medical disorders are all significant predictors of depression in adults and the elderly.³

Menopause is defined as the permanent cessation of menstruation for at least one year and marks a critical transition in a woman's life. In India, the average age at menopause is approximately 46.2 years, which is earlier than that reported in many Western populations.⁴ The menopausal transition is accompanied by a range of vasomotor, physical, psychological, and cognitive symptoms, including hot flashes, night sweats, sleep disturbances, irritability, mood swings, depressive symptoms, stress, and memory difficulties. These symptoms have a negative impact not only on physical health but also on psychological and emotional well-being, thereby compromising overall quality of life.⁵

Hormonal shifts, role transitions, caregiving duties, and social vulnerabilities predispose postmenopausal women to higher levels of stress. Measuring stress, anxiety, and depression in this population is critical for identifying precipitating and perpetuating factors and implementing timely preventative and corrective measures.⁶ Understanding the scope of these mental health issues and their associated risk factors is crucial for creating effective screening tools, focused interventions, and comprehensive mental health services for postmenopausal women. Moreover, addressing stigma, enhancing mental health literacy, and promoting help-seeking behavior are essential components of improving mental health outcomes in this population.

While mental health among adolescents and working-age adults has received considerable attention, postmenopausal women remain relatively underrepresented in community-based research.⁷ This gap is more pronounced in semi-urban and rural settings, where mental health concerns may be underrecognized or normalized as part of aging. Hence, the present study was therefore aimed to assess the prevalence of depression, anxiety, and stress among postmenopausal women residing in urban and rural areas of Chengalpattu district and to identify the associated demographic, lifestyle, and social risk factors.

Materials and Methods

This cross-sectional study was conducted over six months, from January to June 2025, in various urban and rural areas of Chengalpattu district in Tamil Nadu, India. Ethical approval was received from Institutional Ethical Committee before beginning the study. Written informed consent was obtained from all the study participants before data collection. We included women aged 45 and older who had naturally

gone through menopause at least a year before the study began. Women with a documented history of psychiatric disorders prior to menopause were excluded.

Sample size was calculated based on previous study conducted by Afshari et al. that reported a depression prevalence of 59.8%.⁸ With 95% confidence level and an absolute precision of 6% and using the standard formula for prevalence studies, we calculated a minimum sample size of 256. After considering a 10% non-response rate, we adjusted the final sample size to 281 participants. A stratified random sampling technique was utilized to ensure adequate representation of participants from both urban and rural areas. The study was carried out in outreach health centers attached to a tertiary care teaching institute. Eight field practice areas were initially identified, comprising four urban and four rural centers. From these, two urban and two rural areas were selected using simple random sampling by the lottery method. Postmenopausal women attending these selected centers during the study period were recruited consecutively until the required sample size was achieved.

Data collection was carried out using a structured, pretested questionnaire administered through face-to-face interviews. The questionnaire consisted of five sections. The first section recorded sociodemographic details, including age, education, occupation, marital status, and socioeconomic indicators. The second section assessed menopausal status and related characteristics. Lifestyle factors such as physical activity and dietary habits were measured in the third section, while the fourth section explored social factors, including family support and living conditions. The fifth section assessed depression, anxiety, and stress using the Depression Anxiety Stress Scale-21 (DASS-21), a validated instrument widely used to measure psychological distress in community settings⁹. The primary outcomes of the study were the prevalence of depression, anxiety, and stress among postmenopausal women and the identification of demographic, lifestyle, and social factors associated with these conditions. Participants identified as having severe levels of depression, anxiety, or stress were referred to the General Medicine outpatient department for further evaluation and appropriate management.

Statistical analysis

Data were entered into Microsoft Excel and analyzed using IBM SPSS Statistics version 27.0. Categorical variables were summarized using frequencies and percentages, while continuous variables were expressed as mean with standard deviation or median with interquartile range, depending on data distribution. Normality was assessed using the Shapiro–Wilk test. The prevalence

of depression, anxiety, and stress was estimated with 95% confidence intervals. Associations between categorical variables were assessed using the Chi-square test. Variables included in the binary logistic regression analysis were selected based on biological plausibility, prior literature, and results of univariate

RESULTS

A total of 287 postmenopausal women participated in the study. The median age of the participants was 59 years with an interquartile range of 9 years. The majority of the women were married (69.7%), followed by widowed participants (25.8%), while divorced or single women constituted a small proportion of the study population. Nearly half of the participants were illiterate (50.5%), and only 1.8% had attained graduate-level education. Most women were homemakers (46.0%), and more than three-fourths belonged to nuclear families (77.4%). A predominantly rural representation was observed, with 86.8% of participants residing in rural areas.

The prevalence and severity distribution of depression, anxiety, and stress among postmenopausal women are presented in Table 2. Depression was identified in 62.0% of participants, with moderate depression being the most common category (29.6%), followed by mild depression (15.7%). Severe and extremely severe depression were observed in 8.4% of women each. Anxiety was present in 71.1% of participants, with extremely severe anxiety constituting the largest proportion (25.1%), followed by moderate anxiety (25.4%) and severe anxiety (15.3%). Stress was comparatively less prevalent, affecting 40.4% of women; however, moderate stress was observed in 17.8% of participants, while severe and extremely severe stress were reported in 7.3% and 1.7%, respectively.

Bivariate analysis assessing the association between selected sociodemographic, lifestyle, clinical, and psychosocial factors with depression, anxiety, and stress is summarized in Table 3. Age group, marital status, educational level, employment status, type of family, physical activity level, sleep duration, hypertension, diabetes, presence of chronic conditions, and osteopenia/osteoporosis did not show statistically significant associations with depression. In contrast, consumption of junk or processed foods was significantly associated with depression, with a higher prevalence observed among those reporting such dietary habits (76.6%) compared to those who did not (56.7%) ($p = 0.002$). Body mass index also demonstrated a significant association with depression ($p = 0.025$), with higher prevalence noted among underweight and obese women. Social isolation or loneliness was significantly associated with depression, with a higher proportion of depression among women reporting social isolation compared to those who did not (71.1% vs. 58.1%; $p =$

analysis. Variables with a p -value < 0.20 in bivariate analysis and those considered clinically relevant were entered into the multivariable model to estimate adjusted odds ratios with 95% confidence intervals. A p -value less than 0.05 was considered statistically significant.

0.027).

With regard to anxiety, none of the sociodemographic or lifestyle variables showed a statistically significant association in bivariate analysis, although a higher prevalence of anxiety was observed among women residing in urban areas, those consuming junk foods, and those reporting social isolation. Similarly, for stress, residence showed a significant association, with a higher prevalence of stress among rural women compared to urban women (43.0% vs. 23.7%; $p = 0.024$). Social isolation was also significantly associated with stress, with more than half of the women reporting loneliness experiencing stress (51.8%) compared to those without perceived social isolation (35.5%) ($p = 0.011$).

In the multivariable binary logistic regression analysis, distinct patterns of independent associations were observed for depression, anxiety, and stress among postmenopausal women (Tables 4–6). For depression, junk or processed food consumption, body mass index, and social isolation emerged as significant independent correlates. Women who did not consume junk or processed foods had significantly lower odds of depression compared to those who did (adjusted odds ratio [AOR] = 0.38; 95% CI: 0.20–0.70). Both underweight (AOR = 2.07; 95% CI: 1.08–3.97) and obese women (AOR = 2.16; 95% CI: 1.10–4.21) had significantly higher odds of depression compared to women with normal BMI. Additionally, women reporting social isolation or loneliness had higher odds of depression (AOR = 0.53; 95% CI: 0.29–0.97). In contrast, age, marital status, educational level, residence, and hypertension did not retain statistical significance after adjustment. In the anxiety model, underweight BMI was the only factor that remained independently associated with anxiety, with underweight women demonstrating significantly higher odds compared to those with normal BMI (AOR = 2.52; 95% CI: 1.20–5.28). Other sociodemographic, lifestyle, clinical, and psychosocial variables, including age, marital status, residence, physical activity, sleep duration, obesity, osteopenia or osteoporosis, and social isolation, were not independently associated with anxiety. In the stress model, none of the included variables showed a statistically significant independent association after adjustment, although higher odds of stress were observed among women residing in rural areas, those reporting junk food consumption, shorter sleep

duration, hypertension, and social isolation.

Table 1: Socio-demographic characteristics of study population (n=287)

Variable	Category	n (%)
Age (years)	Median (IQR)	59 (9)
Marital status	Married	200 (69.7)
	Widowed	74 (25.8)
	Divorced/Single	13 (4.5)
Educational status	Illiterate	145 (50.5)
	Schooling	137 (47.7)
	Graduate	5 (1.8)
Employment status	Homemaker	132 (46.0)
	Employed	58 (20.2)
	Unemployed	75 (26.1)
	Retired	22 (7.7)
Type of family	Nuclear	222 (77.4)
	Joint	65 (22.6)
Residence	Rural	249 (86.8)
	Urban	38 (13.2)

Table 2: Prevalence and severity of depression, anxiety, and stress among postmenopausal women (N = 287)

Severity category	Depression n (%)	Anxiety n (%)	Stress n (%)
Normal	109 (38.0)	83 (28.9)	171 (59.6)
Mild	45 (15.7)	15 (5.2)	39 (13.6)
Moderate	85 (29.6)	73 (25.4)	51 (17.8)
Severe	24 (8.4)	44 (15.3)	21 (7.3)
Extremely severe	24 (8.4)	72 (25.1)	5 (1.7)

Table 3. Association of selected factors with depression, anxiety, and stress among postmenopausal women (N = 287)

Variable	Category	Depression n (%)	P value	Anxiety n (%)	P value	Stress n (%)	P value
Age (years)	≤59	88 (61.1)	0.808	99 (68.8)	0.229	60 (41.7)	0.665
	≥60	90 (62.9)		105 (73.4)		56 (39.2)	
Marital status	Married	123 (61.5)	0.895	139 (69.5)	0.227	80 (40.0)	0.827
	Not married†	55 (63.2)		65 (74.7)		36 (41.4)	
Educational level	Illiterate	88 (60.7)	0.491	98 (67.6)	0.320	54 (37.2)	0.533
	Schooling	88 (64.2)		103 (75.2)		60 (43.8)	
	Graduate	2 (40.0)		3 (60.0)		2 (40.0)	
Employment status	Employed	34 (58.6)	0.549	37 (63.8)	0.114	25 (43.1)	0.641
	Not employed‡	144 (62.9)		167 (72.9)		91 (39.7)	
Residence	Urban	23 (60.5)	0.859	29 (76.3)	0.289	9 (23.7)	0.024
	Rural	155 (62.2)		175 (70.3)		107 (43.0)	
Type of family	Joint	35 (53.8)	0.146	44 (67.7)	0.295	22 (33.8)	0.220
	Nuclear	143 (64.4)		160 (72.1)		94 (42.3)	
Physical activity	Sedentary	95 (62.5)	0.903	109 (71.7)	0.896	60 (39.5)	0.729
	Moderate/Active	83 (61.5)		95 (70.4)		56 (41.5)	
Junk food consumption	No	119 (56.7)	0.002	144 (68.6)	0.079	81 (38.6)	0.292
	Yes	59 (76.6)		60 (77.9)		35 (45.5)	
Sleep duration	<6 hours	34 (64.2)	0.857	40 (75.5)	0.247	28 (52.8)	0.118
	6–8 hours	129 (62.0)		149 (71.6)		79 (38.0)	
	>8 hours	15 (57.7)		15 (57.7)		9 (34.6)	
Hypertension	No	76 (60.8)	0.715	85 (68.0)	0.358	51 (40.8)	0.908
	Yes	102 (63.0)		119 (73.5)		65 (40.1)	
Diabetes	No	113 (63.1)	0.618	125 (69.8)	0.322	72 (40.2)	0.931
	Yes	65 (60.2)		79 (73.1)		44 (40.7)	
	No	101 (64.3)	0.394	110 (70.1)	0.388	67 (42.7)	0.392

Presence of at least one chronic condition	Yes	77 (59.2)		94 (72.3)		49 (37.7)	
Osteoporosis / osteopenia	No	138 (62.2)	0.519	157 (70.7)	0.468	86 (38.7)	0.284
	Yes	40 (61.5)		47 (72.3)		30 (46.2)	
BMI (kg/m ²)	Underweight	4 (40.0)	0.025	6 (60.0)	0.079	3 (30.0)	0.115
	Normal	51 (70.8)		59 (81.9)		33 (45.8)	
	Overweight	44 (71.0)		45 (72.6)		31 (50.0)	
	Obese	79 (55.2)		94 (65.7)		49 (34.3)	
Social isolation	No	118 (58.1)	0.027	138 (68.0)	0.053	72 (35.5)	0.011
	Yes	59 (71.1)		65 (78.3)		43 (51.8)	

†Not married includes widowed, divorced, and single women

‡Not employed includes homemakers, unemployed, and retired women

Chi-square test applied; statistically significant P values shown in bold.

Table 4: Multivariable Binary Logistic Regression Analysis Showing Factors Associated with Depression

Variable	Adjusted Odd's Ratio (Exp B)	95% CI	P-value
Age (≤59 years vs ≥60 years)	1.05	0.61 – 1.80	0.864
Marital status (Married vs Not married)	0.98	0.54 – 1.76	0.935
Schooling vs illiterate	4.90	0.69 – 34.70	0.112
Graduate vs illiterate	6.04	0.85 – 42.98	0.072
Residence (Urban vs Rural)	0.82	0.39 – 1.72	0.607
Junk/processed food consumption (No vs Yes)	0.38	0.20 – 0.70	0.002*
Underweight vs Normal BMI	2.07	1.08 – 3.97	0.028*
Overweight vs Normal BMI	0.42	0.11 – 1.65	0.213
Obese vs Normal BMI	2.16	1.10 – 4.21	0.025*
Hypertension (No vs Yes)	0.80	0.47 – 1.35	0.401
Social isolation / loneliness (No vs Yes)	0.53	0.29 – 0.97	0.039*

*Statistically significant at p < 0.05

Reference categories: Age ≤59 years; Married; Illiterate; Urban residence; No junk/processed food consumption; Normal BMI; No history of hypertension; No social isolation/loneliness

Table 5. Multivariable Binary Logistic Regression Analysis Showing Factors Associated with Anxiety

Variable	Adjusted OR (Exp B)	95% CI	P-value
Age (>59 vs ≤59 years)	0.90	0.52 – 1.58	0.723
Marital status (Not married vs Married)	0.78	0.41 – 1.48	0.448
Educational level (Ref: Illiterate)			
School level	2.50	0.35 – 17.88	0.362
Graduate	4.06	0.56 – 29.23	0.165
Residence (Rural vs Urban)	1.28	0.56 – 2.90	0.562
Physical activity (Active vs Sedentary)	1.13	0.66 – 1.95	0.660
Junk/processed food consumption (Yes vs No)	0.64	0.34 – 1.21	0.168
Average hours of sleep/day (Ref: <6 hours)			
6–8 hours	2.22	0.76 – 6.43	0.144
>8 hours	1.90	0.79 – 4.59	0.154
BMI category (Ref: Normal BMI)			
Underweight	2.52	1.20 – 5.28	0.014*
Overweight	0.72	0.18 – 2.88	0.639
Obese	1.48	0.75 – 2.91	0.259
Osteopenia/osteoporosis (Yes vs No)	1.00	0.51 – 1.95	0.989
Social isolation / loneliness (Yes vs No)	0.67	0.35 – 1.29	0.226

*Statistically significant at p < 0.05

Reference categories: Age ≤59 years; Married; Illiterate; Urban residence; No junk/processed food consumption; Normal BMI; No history of osteopenia/osteoporosis; No social isolation/loneliness; Sleep <6 hours/day; Sedentary

physical activity.

Table 6: Multivariable Binary Logistic Regression Analysis Showing Factors Associated with Stress

Variable	Adjusted OR (Exp B)	95% CI	P-value
Age (>59 vs ≤59 years)	0.88	0.51 – 1.54	0.659
Marital status (Not married vs Married)	0.87	0.47 – 1.61	0.656
Residence (Rural vs Urban)	1.36	0.61 – 3.05	0.456
Junk/processed food consumption (Yes vs No)	0.61	0.33 – 1.14	0.119
Average hours of sleep/day (Ref: <6 hours)			
6–8 hours	1.96	0.70 – 5.51	0.202
>8 hours	1.75	0.74 – 4.15	0.201
Hypertension (Yes vs No)	0.80	0.46 – 1.38	0.417
Social isolation / loneliness (Yes vs No)	0.63	0.34 – 1.19	0.157

Reference categories: Age ≤59 years; Married; Urban residence; No junk/processed food consumption; Sleep <6 hours/day; No history of hypertension; No social isolation/loneliness.

DISCUSSION

The present study provides comprehensive insight into the burden of depression, anxiety, and stress among postmenopausal women residing in urban and rural areas of Chengalpattu district and identifies factors associated with these mental health outcomes. The findings highlight a substantial prevalence of common mental disorders in this population, underscoring post menopause as a vulnerable phase in a woman’s life that warrants focused attention from both clinical and public health perspectives.

In this study, nearly two-thirds of postmenopausal women experienced some degree of depression, and more than seventy percent reported anxiety, with a considerable proportion falling into moderate to extremely severe categories. Similarly, a meta-analysis of studies from India and other low- and middle-income countries also documented a high prevalence of psychological distress during the postmenopausal period.¹⁰ Hormonal changes associated with estrogen withdrawal, coupled with age-related physiological changes, comorbidities, and evolving psychosocial roles, may collectively contribute to this heightened vulnerability.¹¹ The comparatively lower prevalence of stress observed in the present study, although still substantial, may reflect differences in individual coping mechanisms, social expectations, or cultural perceptions of stress.

The bivariate analysis demonstrated that dietary habits, body mass index, and social isolation were significantly associated with depression, while social isolation and residence were associated with stress. These associations highlight the multifactorial nature of mental health problems among postmenopausal women, where biological, behavioral, and social determinants interact in complex ways.¹² However, many sociodemographic variables such as age group, marital status, educational level, and employment status did not show significant associations, suggesting that mental health challenges in post

menopause may cut across traditional demographic boundaries.

Multivariable regression analysis further refined these associations by identifying independent predictors after adjustment for potential confounders. Junk or processed food consumption emerged as a significant factor associated with depression, with women reporting such dietary habits having higher odds of depressive symptoms. Similarly, a study conducted by Godos J et al (2023) reported a positive association between processed food consumption and depressive symptoms.¹³ This finding aligns with emerging evidence linking unhealthy dietary patterns to inflammation, oxidative stress, and dysregulation of the gut–brain axis, all of which have been implicated in the pathophysiology of depression.¹⁴

Body mass index demonstrated a significant independent association with depression, with both underweight and obese women exhibiting higher odds compared to those with normal BMI. This relationship between BMI and depression has been reported in previous studies and suggests that both nutritional deficiency and excess adiposity may adversely influence mental health.¹² Underweight status may reflect poor nutritional intake, chronic illness, or frailty, while obesity is associated with metabolic disturbances, systemic inflammation, and psychosocial factors such as stigma and reduced mobility, all of which may contribute to depressive symptoms.¹⁵

Social isolation or loneliness emerged as a consistent and important correlate of depression and stress. Women reporting social isolation had significantly higher odds of depression, even after adjusting for other variables. This finding highlights the critical role of social connectedness in maintaining psychological well-being during the postmenopausal period. In the Indian sociocultural context, postmenopausal women may experience shifts in family roles, reduced social engagement, and diminished emotional support,

particularly in nuclear family settings or in the presence of widowhood, which may exacerbate feelings of loneliness and psychological distress. In contrast to depression, anxiety showed fewer independent associations in the adjusted model, with underweight BMI being the only factor that remained statistically significant. Similarly, none of the variables included in the stress model retained statistical significance after adjustment, although higher odds were observed for rural residence, unhealthy dietary habits, shorter sleep duration, hypertension, and social isolation.

The study has certain limitations that should be acknowledged. The cross-sectional design precludes causal inference, and the reliance on self-reported measures may introduce reporting bias. Additionally, the predominantly rural sample may limit generalizability to urban populations. Despite these limitations, the study's strengths include a community-based approach, use of a validated screening tool, and simultaneous evaluation of depression, anxiety, and stress, providing a comprehensive assessment of mental health among postmenopausal women.

Conclusion

In conclusion, the present study demonstrates a high burden of depression and anxiety among postmenopausal women and identifies dietary habits, body mass index, and social isolation as key factors associated with depressive symptoms. The findings of this study have important implications for clinical practice and public health. Routine screening for depression, anxiety, and stress among postmenopausal women, particularly in primary care and community settings, could facilitate early identification and timely intervention. Addressing modifiable factors such as diet, nutritional status, and social isolation through health education, community-based support programs, and lifestyle counseling may contribute to improved mental health outcomes in this population.

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