Original Article

A Cross-sectional Assessment of Depression, Anxiety, and Cognition in Perimenopausal and Menopausal Women

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Abstract

Introduction: Menopausal transition involves failure of ovarian function followed by cessation of menstruation. This has been said to lead to psychiatric comorbidities such as depression and anxiety. Estrogen also has beneficial effects on cognition and thus fluctuation in the same can lead to cognitive decline. Given the number of women undergoing menopause, timely screening of the comorbidities is of importance. **Aims and Objectives:** Our study aimed at assessment of anxiety, depression, and cognitive impairment in perimenopausal and postmenopausal women presenting in the medicine and gynecology units of a tertiary care hospital. The objectives were to screen the peri- and postmenopausal women presenting with medical and gynecological complaints for the presence of depression and anxiety and assess their cognitive function. To find association of their symptoms with psychosocial and menopausal factors with the psychiatric parameters. **Settings and Design:** Our study was conducted among the perimenopausal and postmenopausal women visiting gynecology and medicine units in a tertiary care hospital. One hundred and five women in the age group of 45–55 were assessed using a specialized pro forma, Beck's Anxiety Inventory, Beck's Depression Inventory, and Addenbrooke's Cognitive Examination III. **Statistical Analysis Used:** The results were analyzed using SPSS software (version 20.0). **Results:** 21.9% of females had moderate levels of anxiety, 24.76% had clinical depression, and 13.33% had mild cognitive impairment. The presence of psychosocial stressors had a significant impact on the anxiety, depression, and cognitive impairment. There was no significant association found between psychiatric parameters and peri- and postmenopausal stage as well between natural or surgical menopause.

Keywords: *Anxiety, cognition, depression, menopause*

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Introduction

Menopause is the loss of ovarian follicle development due to the permanent cessation of menstruation. "Perimenopause" is a defined period that begins with the onset of irregular menstrual cycles and ends with the last menstrual period, characterized by changes in reproductive hormones.[1]

Each year, 1.5 million women go through menopause transition, presenting with vasomotor symptoms, vaginal dryness, decreased libido, insomnia, fatigue, hot flushes, forgetfulness, psychiatric symptoms (depressive and anxiety), and cognitive decline.[2]

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Ovarian estrogen and progesterone production ceases with menopause thus depression during perimenopause is likely due to fluctuating and declining estrogen levels.[3] Higher cortisol levels linked with perimenopausal cognitive decline to hot flushes, depressive, or anxiety symptoms.[3]

A study done in Indian tertiary care hospital, 48 (44.44%) of the 108 perimenopausal women evaluated

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had psychiatric disorders, which included 34 (31%) with major depressive disorder, 8 (75) with anxiety disorder.[4] Estrogens have beneficial neurophysiological effects, leading to a hypothesis that a decrease in estrogen (which occurs during menopause) would be detrimental to cognition.[3]

A cross-sectional association between self-reported forgetfulness and being perimenopausal was also found in the Study of Women's Health Across the Nation, with the most common complaints being difficulty remembering words or numbers, the need for memory aids, and forgetting why one was doing something.[5]

Increase in life expectancy and growing menopausal population necessitates significant efforts in educating, creating awareness of menopausal symptoms, aiding in early recognition, reduction of fear, discomfort, and seeking timely medical care. Such studies will help corroborating data and planning strategies for the middle-aged women suffering from these menopausal symptoms.[6]

Our objectives were to assess depression, anxiety, and cognition in perimenopausal and menopausal women and to find association between these psychiatric parameters with medical and gynecological symptoms and menopausal and psychosocial factors.

Methods

This was a cross-sectional study. The study was conducted in a tertiary care hospital during August 2020–December 2022. All peri- and postmenopausal women (surgical and natural) within the age group of 45–55 years coming to the general medicine and gynecology outpatient departments and who consented to participate in the study were included. Those with already diagnosed psychiatric illness undergoing treatment, major illnesses preventing interview, on hormonal therapy or any treatment for perimenopausal complaints were excluded.

Consent was taken from the subjects for the following study and the subjects were asked to answer a specially designed pro forma including obstetric, gynecological, psychiatric, psychosocial history, and relevant scales for assessment. The privacy and confidentiality of the interview was maintained.

The study was approved by the institutional ethics committee before the initiation of the study. The participants were explained about the nature of the study and informed consent was obtained from all participants before initiation of data collection.

Tools used:

1. ICD-10 Diagnostic Criteria for Research: It is the 10th revision of the International Statistical Classification of Diseases and Related Health Problem (ICD-10 DCR), a medical classification list by the World Health Organization
2. Beck's Anxiety Inventory: The Beck's Anxiety Inventory (BAI) is a 21-question multiple-choice self-report inventory that is used for measuring the severity of anxiety in children and adults. The highest possible total for the whole test was 63 and lowest possible is 0
3. Beck's Depression Inventory: The Beck's Depression Inventory (BDI) is a 21-question multiple-choice self-report inventory; it is used to measure severity of depression. The highest possible total for the whole test was 63 and lowest possible was 0
4. Addenbrooke's Cognitive Examination: The Addenbrooke's Cognitive Examination (ACE) is used to measure attention, memory, fluency, language, and visuospatial abilities. The results of each activity are scored to give a total score out of 100 (18 points for attention, 26 for memory, 14 for fluency, 26 for language, and 16 for visuospatial processing). Scores below 88 will be considered mild cognitive impairment (MCI). (Cutoff at 88 has sensitivity = 1.0 and specificity = 0.96).[7]

Statistical analysis

The collected data were coded and entered into Microsoft Excel sheet. The data were analyzed using Statistical Package for the Social Sciences (SPSS, IBM SPSS statistics Version 25.0, Chicago) version 20.0 software. The results were presented in a tabular and graphical format. For quantitative data, the mean, standard deviation, and median were calculated. For qualitative data, various frequencies, rates, ratio, and percentage were calculated. For quantitative data *t*-test and for qualitative data Chi-square test was used for comparison of variables.

Results

A total of 105 perimenopausal and postmenopausal women within the age group of 45–55 years were included in the study. Out of total 105 patients, 55 women were perimenopausal and 50 women were postmenopausal. The sociodemographic factors are described in Table 1. Twenty women with menstrual complaints were seen in gynecology unit, which was the highest. In medicine unit, 25 females were seen for infection-related complaints. Females with menstrual-related complaints did not present to medicine unit and one female with complaints of

disturbed sleep, weakness, and headache presented to gynecology unit.

As explained in Table 2, 23 (21.9%) patients showed moderate severity on BAI whereas 26 (24.76%) females scored moderately, and an equal number scored severely on BDI and were considered as presence of clinical depression. It also depicts that around 13.33% of women had ACE III scores below 88.

Table 3 shows the domain-wise representation of average scores on ACE III among our population. On the attention domain, the mean for the entire sample was 17.04. Similarly, on the fluency domain, the mean was 11.93; on the language domain, it was 25.32; on the memory domain, it was 24.59; and on the visuospatial domain, it was 15.54 as the average for entire sample.

Table 4 shows the significant association between the primary complaints the women presented with and BAI and BDI severity scores and ACE III scores. We found that 7 (41.17%) females who reported disturbed sleep, weakness, and headache as their primary complaint showing moderate severity on BAI scale and 9 (52.94%) who reported similar complaints showing the presence of clinical depression on BDI severity, were significantly associated. We found an association between 5 (25%) females who reported menstrual complaints (increased bleeding, hot flushes, sweating, irregular menses, spotting, and menorrhagia) as their primary complaint and ACE III scores <88.

Table 1: Sociodemographic parameters and primary complaints

	Frequency (%)
Age	
45–50	50 (47.61)
51–55	55 (52.38)
Marital status	
Married	95 (90.5)
Divorced	2 (1.9)
Widowed	8 (7.6)
Education category	
Uneducated	12 (11.4)
Graduation + diploma	35 (33.3)
Secondary + higher secondary	58 (55.2)
Occupation	
Homemaker + unemployed	69 (65.7)
Domestic help	13 (12.4)
Professionals	23 (21.9)
Family structure	
Extended	5 (4.8)
Joint	19 (18.1)
Nuclear	81 (77.1)
Menstrual history	
Perimenopausal	55 (52.38)
Postmenopausal: Natural	19 (18.1)
Postmenopausal: Surgical (hysterectomy done)	31 (29.5)

Location of the presenting complaints		
Primary complaints	**Medicine**	**Gynaecology**
Follow-ups	15	3
Menstruation-related complaints	0	20
Other complaints	12	6
Fever, cough, cold, sore throat, itching	25	7
Disturbed sleep, weakness, headache	16	1

In our study, 70 patients had reported no psychosocial stressors, while the remaining 35 had reported some psychosocial stressors. Among the 35 patients, adjustment to life events was the most common which was found in 12.4% (13) of patients, followed by 10.5% (11) who reported some family and marital discord with husband, family members, and friends. 6.7% (7) of patients reported having financial issues and 3.8% (4) were stressed about current issues/health.

On comparing the psychosocial stressors reported by the females with BAI and BDI severity, 6 (54.54%, $P \leq 0.0001$) women who reported stressors regarding family and marital discord had a strong association with BAI severity scores. 5 (71.42%, $P \leq 0.0001$) women who reported stressor regarding finances had significant association with BDI severity scores. 25 (71.42%, $P = 0.04$) females with ACE III scores <88 had a significant association with the women reporting presence of all stressors.

As per Table 5, we also did not find any association between the status of menopause, i.e., perimenopausal and menopausal women with the BAI, BDI, and ACE III scores. Table 6 shows the comparison between the type of menopause (natural or surgical) with depression and anxiety severity scores and ACE III scores. We found no statistically significant association among both, although 8 (25.80%) and 11 (35%) women who underwent menopause surgically (hysterectomy with bilateral oophorectomy) showed moderate anxiety and presence of clinical depression on BAI and BDI severities, respectively. 6 (19.35%) females with surgical menopause scored <88 on ACE III. Among the women who underwent menopause naturally, 3 (15.78%) had moderate anxiety on BAI and an equal number of women had presence of clinical depression as well. 2 (10.52%) females who attained menopause naturally scored <88 on ACE III.

Discussion

Our study aimed at assessing the anxiety, depression, and cognitive impairment among the women undergoing menopause. We found that there were 21.9% of females with moderate anxiety scores and 24.76% of females were

Table 2: Prevalence of Beck's Anxiety Inventory severity, Beck's Depression Inventory severity, and Addenbrooke's Cognitive Examination III scores

Severity	Frequency (%)
BAI severity	
Low (0–21)	82 (78.1)
Moderate (22–35)	23 (21.9)
Severe (36 and above)	0
BDI severity	
Normal (1–10)	60 (57.1)
Mild (11–16)	8 (7.6)
Borderline depression (17–20)	11 (10.5)
Moderate (21–30)	24 (22.9)
Severe (31–40)	2 (1.9)
ACE III scores	
<88	14 (13.33)
≥88	91 (86.66)

BAI: Beck's Anxiety Inventory, BDI: Beck's Depression Inventory, ACE III: Addenbrooke's Cognitive Examination III

Table 3: Domain wise representation of Addenbrooke's cognitive examination III scores

	Total (*n*=105)		<88 (*n*=14)		≥88 (*n*=91)	
	Mean	SD	Mean	SD	Mean	SD
Attention (18)	17.04	1.74	14.86	2.28	17.37	1.38
Fluency (14)	11.93	2.84	9.36	1.08	12.33	2.82
Language (26)	25.32	1.30	23.86	2.54	25.55	0.79
Memory (26)	24.59	3.28	18.00	5.33	25.60	0.71
Visuospatial (16)	15.54	0.98	13.86	1.41	15.80	0.56

SD: Standard deviation

found to have presence of clinical depression. According to a study done in Chandigarh by Khatak *et al*., peri- and postmenopausal women showed prevalence of minimal depression among 61%, mild − 38.5%, and moderate - 0.5% also, 29.5% had mild anxiety symptoms, and 1% had moderate anxiety symptoms.[8]

In our study, we found no significant association on comparing the sociodemographic parameters such as age, education, family type, occupation, substance use, and comorbidities with the anxiety (BAI) and depression (BDI) severity scores.

In our study, on ACE III, there were 91 women with a score value of ≥88 and 14, i.e., 13.33% of patients with that of <88. These 14 females were referred to as having MCI. ACE III measured cognition across various domains such as memory, attention, fluency, language, and visuospatial abilities.

The Women's Health Initiative Memory Study found that 4.5% of 6376 postmenopausal women had MCI, but the relationship between MCI and menopausal factors is still poorly understood.[9]

In a study done in Thailand, on prevalence and risk factors of MCI in menopausal women, they found that the prevalence of MCI in menopause screened using Thai MoCA test was 16.7%.[10]

In the present study, we found that BAI and BDI severity scores are significantly associated with the

Table 4: Association of primary complaints with Beck's Anxiety Inventory severity, Beck's Depression Inventory severity, and Addenbrooke's Cognitive Examination III scores

	BAI severity (low)	BAI severity (moderate), *n* (%)	*P*	BDI (normal to borderline), *n* (%)	BDI (presence of clinical depression), *n* (%)	*P*	ACE III score ≥88	ACE III score <88, *n* (%)	*P*
Follow-up (*n*=18)	16	2 (11.11)	0.0430*	15	3 (16.66)	0.032*	17	1 (5)	0.036*
Menstrual complaints (*n*=20)	13	7 (35)		12	8 (40)		15	5 (25)	
Other (*n*=18)	14	4 (22.22)		16	2 (12.5)		15	3 (16.67)	
Fever, cough, cold, sore throat, itching (*n*=32)	29	3 (9.3)		28	4 (12.5)		27	5 (15.62)	
Disturbed sleep, weakness, headache (*n*=17)	10	7 (41.17)		8	9 (52.94)		16	1 (5.8)	

*P<0.05 is considered significant. BAI: Beck's Anxiety Inventory, BDI: Beck's Depression Inventory, ACE III: Addenbrooke's Cognitive Examination III

Table 5: Association of peri and postmenopausal stage with Beck's Anxiety Inventory severity, Beck's Depression Inventory severity, and Addenbrooke's Cognitive Examination III scores

	BAI severity (low)	BAI severity (moderate), *n* (%)	*P*	BDI (normal to borderline)	BDI (presence of clinical depression), *n* (%)	*P*	ACE III score ≥88	ACE III score <88, *n* (%)	*P*
Perimenopausal (*n*=55)	43	12 (21.81)	0.999	43	12 (21.81)	0.311	49	6 (10.90)	0.568
Postmenopausal (*n*=50)	39	11 (22)		36	14 (28)		42	8 (16)	

BAI: Beck's Anxiety Inventory, BDI: Beck's Depression Inventory, ACE III: Addenbrooke's Cognitive Examination III

Table 6: Association of natural and surgical menopause with Beck's Anxiety Inventory severity, Beck's Depression Inventory severity, and Addenbrooke's Cognitive Examination III scores

	BAI severity (low)	BAI severity (moderate), *n* (%)	*P*	BDI (normal to borderline)	BDI (presence of clinical depression), *n* (%)	*P*	ACE III score ≥ 88	ACE III score < 88, *n* (%)	*P*
Natural (*n*=19)	16	3 (15.78)	0.50	16	3 (15.78)	0.20	17	2 (10.52)	0.69
Surgical (*n*=31)	23	8 (25.80)		20	11 (35)		25	6 (19.35)	

BAI: Beck's Anxiety Inventory, BDI: Beck's Depression Inventory, ACE III: Addenbrooke's Cognitive Examination III

primary complaints that the females presented with and a stronger association with complaints of sleep disturbances, weakness, and headache. Furthermore, 94.11% of females with the above complaints presented to the medicine department.

In a study by Becker *et al*. done in Israel, where they studied psychological distress around menopause, the main finding of the study also was the significant correlation found between nonspecific psychosomatic symptoms, such as headaches and fatigue, and psychological distress parameters. This suggests that there might be a group of women in menopause who are "psychologically vulnerable" and who report higher rates of psychological distress unrelated to their menopausal status.[11]

Whereas, on comparing the psychosocial stressors with anxiety and depression severity scores in our study, there were significant associations. Females who reported stressors regarding family and marital discord displayed a significant association with anxiety and depression severity whereas those who reported stressor regarding finances, had a significant association with depression severity scores.

Freeman *et al*. in their study also reported that psychosocial stressors are some of the risk factors (including poor social support and stressful life events) for depression associated with menopause.[12]

In an Australian study, where experiences during transitions in women's life were studied; they concluded that most women manage the "classic" transitions of menopause and the "empty nest" relatively well but the impact of divorce, the aging and death of parents present more serious long-term challenges to women.[13]

We found that the presence of stressors was significantly associated with a lower ACE III score. In a study that evaluated effect of stress on cognition in women with increased BMI before and after menopause, they found that premenopausal women with stress showed a significant ($P < 0.05$) decrease in the cognitive parameters' attention and orientation, fluency, language, and visuospatial ability. Memory did not show any significant changes in this group. In the postmenopausal stressed women, all the cognitive functions except fluency showed a significant ($P < 0.05$) decrease after menopause.[14]

Further in our study, we found no association between the type of menopause (natural or surgical), perimenopausal or menopausal stages and anxiety or depression severity scores. A prospective longitudinal study in an urban community in China by Tang *et al*. found that the prevalence of symptoms of depression rose from 14.5% during perimenopause to 18.2% during the menopausal transition and 19.6% in the postmenopausal period. The prevalence of symptoms of anxiety rose from 3.1% perimenopause to 7.0% during the menopausal transition and 7.4% in the postmenopausal period.[15]

Furthermore, cognitive parameters did not differ between the females who were peri- or postmenopausal, indicating that the cognitive markers were uniformly distributed in our sample. 10.90% of perimenopausal women scored below 88 on ACE III and 16% of postmenopausal women scored below 88. We compared the mean scores on each domain of ACE III with the perimenopausal and postmenopausal women, but there was no significant association found.

In a study done in Melbourne, regarding experience of women about their memory during menopause transition; they contrastingly found that memory problems are more common during the perimenopausal period than during the pre-or post-menopausal periods.[16]

Among the women who underwent surgical menopause (hysterectomy with bilateral oophorectomy), 25.80% and 35% of females showed moderate anxiety and presence of clinical depression, respectively, and 19.35% females showed MCI (ACE III <88). Among the females who attained menopause naturally, 15.78% showed moderate anxiety and clinical depression, whereas 10.52% had MCI. In a study done in OBGY Department in Delhi, India, they found that hot flushes and mood swings were observed more frequently in women with surgical menopause as compared to women in the natural menopause group and this difference was found to be statistically significant.[17]

ACE III scores did not vary with the type of menopause (natural or surgical) in our study. However, contrastingly in very small, short-term, randomized, controlled trials of high-dose estrogen treatment, it was

found that surgical menopause may be accompanied by cognitive impairment that primarily affects verbal episodic memory. Observational evidence also suggested that the natural menopausal transition is not accompanied by substantial changes in cognitive abilities.[18]

Thus, our study found that menopausal transition is a stressful life event in a female's life. Acute life changing stressors present during the same time will aggravate the underlying symptoms of anxiety and depression. Furthermore, it is vital that females in this age group presenting to a physician be screened for the same, as the above symptoms can present as nonspecific somatic complaints. We also found that although surgical menopause was not significantly associated with the tools used, it does have a higher burden of anxiety, depression, and cognitive impairment.

Conclusion

Thus, females in perimenopausal and postmenopausal age group might present with a variety of nonspecific somatic complaints to a physician's and gynecological units. The presence of stressors might exacerbate the existing anxiety, depressive, and cognitive features. Surgical menopause has higher burden of anxiety, depression, and cognitive impairment and thus screening for the same before considering surgical menopause will be beneficial.

Limitations

Our study was a cross-sectional study with no control group for comparison and analysis. Our study design did not allow for follow-up with the sample collected, to rule out whether the depressive and anxiety features and cognitive impairment were reversible after the menopausal transition.

Recommendations

This study recommends screening of peri and post-menopausal women for cognitive impairment and psychiatric morbidity. Further research can include follow-up studies among females going through menopause, beyond the transitional period, to understand the residual cognitive impairment, if any.

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Conflicts of interest

There are no conflicts of interest.

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