

Prevalence and Determinants of Depression among Adult Women in an Urban Population in Kerala

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Abstract:

Background: Depression is a common mental disorder that contributes to disability and mortality. There is observed female preponderance in the prevalence of neurotic disorders and depression in particular. The prevalence of depression in urban populations is not extensively studied in the state of Kerala.

Objective: The objective of this study is to estimate the prevalence and determinants of depression among adult women in an urban population of Kochi.

Methods: The present Cross – sectional study was conducted among 1,210 adult women of Kochi from 2016-2017. Cluster sampling was used as the sampling method and a total of 1,210 women were screened for depression using PHQ-9. Sociodemographic data and history of domestic violence were also included. Descriptive statistics and univariate and multivariate analysis were done for factors associated with common mental disorder.

Results: The prevalence of depression was 13.6% among the urban women population. Women who were diabetic had 4.76 times the odds of having depression compared to non-diabetic women (95% CI 3.27 – 6.9, P<0.001). The final model included seven variables, of which the following were found to be the determinants of depression: having never married, being widowed, divorced, or separated (OR 1.89; 95% CI 1.29 – 2.77); mental illness among family members (OR 3.41; 95% CI 1.64 – 7.02); having had major surgery in the past (OR 1.83; 95% CI 1.12 – 2.96); having experienced adverse life circumstances in one's own life (OR 2.64; 95% CI 1.35 – 3.01); diabetes (OR 2.15; 95% CI 1.27 – 3.62); hypertension (OR 2.84; 95% CI 1.61 – 5.01) and perceiving oneself as ill (OR 2.01; 95% CI 1.24 – 3.31).

Conclusions: Depression is a common mental disorder with high prevalence and various sociodemographic and psychological determinants. Adverse life events, family history of depression and comorbidities are important determinants of depression.

Keywords: Depression, Prevalence of, Determinants of, Domestic Violence, Urban Women.

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Introduction

Common Mental Disorder (CMDs) are the group of distress states manifesting as anxiety, somatic and depressive symptoms and are the contemporary equivalent of neurotic disorders typically encountered in community and primary care settings. [1] There are 322 million people suffering from depression worldwide. Due to the comparatively higher populations of South-East Asia and the Western Pacific Regions (which include China and India), nearly half of the world's population resides there. Between 2005 and 2015, the estimated total number of people living with

depression rose by 18.4%. [2] The National Mental Health Survey (2015–16) found that women were more likely than men to experience depressive disorders in India. It is critical to understand how the specific community context influences the reform of the societal, economic, infrastructural, legal, and environmental elements that impact women's mental health. Depression is an important predictor of suicides among women. In this study we wanted to estimate the prevalence and determinants of depression among adult women in an urban population of Kochi and understand the

social factors determining depression in urban women in Kerala.

Materials and Methods

A cross sectional study was conducted in Cochin corporation among 1210 adult women of Ernakulam district, Kerala between November 2016 and April 2017. Ethical committee approval and written informed consent were obtained from participants.

The study population consisted of all women above 18 years living in Cochin Corporation. Included were all ladies who have lived in Cochin Corporation for longer than five years. In order to improve the comparability of sociocultural elements among permanent residents, this minimum residency duration was settled upon. Patients who were too sick to participate in the study or who were bedridden, as well as those who were unwilling to do so, were omitted from the research. Individuals with documented cognitive impairments, vision impairments, or hearing impairments were also excluded.

Sample Size: According to a study done by Subramani Poongothai et al on the prevalence of depression in a large urban South Indian population(CURES-70), the prevalence of depression among women was 15.9% (13). Sample size was estimated by using the formula $4pq/d^2$, where, $p=15.9$ $q=84.1$, Allowable error=20%, Here minimum sample size is 529. Rounded off to 550. Clusters will be chosen according to PPS sampling. As this is a cluster sampling, design effect is assumed as 2 and the minimum sample size was calculated to be 1100.

Sampling Technique: Cluster sampling was adopted for this study. Using Probability

Proportional to Size (PPS) technique, the smallest administrative unit i.e.; corporation division, was chosen as a cluster. The total number of population included in the sampling frame is 388439. Of the 74 divisions that make up Cochin Corporation, 40 were selected through the application of the PPS approach. For the study, interviews with 1210 adult women were conducted.

The study population was screened for depression using the Patient Health Questionnaire-9, or PHQ 9. PHQ-9 depression scores and the levels of depression they related to are given in the order of 0-4(non-minimal), 5-9(mild), 10-14(moderate), 15-19(moderately severe) and 20-27(severe).

A pre-tested semi-structured questionnaire in Malayalam was used to obtain information on socio demographic and health related variables, after obtaining informed consent. Information regarding socio demographic characteristics, dietary factors, alcohol and tobacco use, medications and other co-morbidities were collected.

HITS tool was also used in the semi-structured questionnaire for screening domestic violence and intimate partner violence. Hurt, Insult, Threaten, and Scream is a screening tool and scale that is simple to use, known as the HITS tool.

Statistical Analysis: The collected data were tabulated on MS Excel, and the analysis was done using IBM SPSS Statistics for Windows Version 20.0. (Armonk, NY: IBM Corp). To test the statistical significance between various factors and CMDs, the Chi-square test was done. Independent determinants were determined by backward logistic regression analysis.

Results

Table 1: Distribution of respondents according to symptoms of depression using PHQ-9 score

Score	Variable	Number	Percentage
0-4	Normal	1045	86.4
5-9	Minimal Depressive Symptoms	112	9.3
10-14	Major Depression, Mild Severity	44	3.6
15-19	Major Depression, Moderate Severity.	7	0.6
20 OR Higher	Major Depression, Severe Severity	2	0.2

The above table shows the overall prevalence of depression was 13.6% (95% CI; 11.7-15.57) according to PHQ-9. Here minimal depression affected 112 participants (9.3%) 95%C.I .7-11) and major depression affected 44(3.6%) having 95% C.I (2.1- 4).

Table 2: Association between co-morbidities and depression

No	Variable	Depression		ODDS RATIO	95% CI	P Value
		Depression	Total			
Diabetes						
1.	No	105(10.1)	1038	1		
	Yes	60(34.9)	172	4.76	3.27-6.9	<0.001
Hypertension						
2.	No	118(10.7)	1100	1		
	Yes	47(42.7)	110	6.21	4.01-9.48	<0.001

Cardiac Illness						
3.	No	143(12.3)	1162	1		
	Yes	22(45.8)	48	6.03	3.32-10.92	<0.001
Arthritis						
4.	No	151(13.1)	1155	1		
	Yes	14(25.5)	55	2.27	1.21-4.26	0.009
Others						
5.	No	154(13.2)	1168	1		
	Yes	11(26.2)	42	2.33	1.15-4.74	0.016
H/O Major Surgeries in the Past						
6.	No	119(11.3)	1050	1		
	Yes	46(28.8)	160	3.15	2.13-4.61	<0.001
Menstrual Problems						
7.	No	143(13.1)	1094	1		
	Yes	22(19)	116	1.55	0.94-2.55	0.079

The above table shows the uni-variate analysis for the association between comorbidities and depression. Compared to women without diabetes, diabetic women had 4.76 times the likelihood of experiencing depression (95% CI 3.27 – 6.9, P<0.001). Compared to 10.7% of women without hypertension, 42.7% of women with systemic hypertension experienced depression (OR 6.21; 95% CI 4.01 – 9.48, P<0.001). Women who had a history of cardiac illness such as CAD, RHD or congenital heart diseases had significantly higher depression (45.8%) compared to normal healthy women (OR 6.03 ; 95% CI 3.32 – 10.92). Women

who suffered from arthritis were also found to be more depressed (25.5%) than normal women (OR 2.27; 95% CI 1.21 – 4.26). Higher depression rates were also found to be among women having other medical conditions like cancer, gynaecological problems, epilepsy, connective tissue disorders and thyroid diseases(OR 2.33; 95% CI 1.15 – 4.74). Women who had undergone major surgeries in the past had higher risk of developing depression at (28.8%) (OR 3.15; 95% CI 2.13 – 4.61). Menstrual problems were not found to be significant risk factors for depression in the study.

Table 3: Association of depression with personal habits, adverse life circumstances, domestic violence and perception of illness

No	Variable	Depression		Odds Ratio	95%CI	p Value
		Depression	Total			
Sleep Problems						
1.	Yes	32(9.7)	331	1		
	No	133(15.1)	879	1.66	1.107-2.506	0.014
Food Habits						
2.	Vegetarian	20(9.6)	208	1		
	Others	245(24.4)	1002	3.042	1.877-4.931	<0.001
Ever use of Alcohol						
3.	No	149(13)	1143	1		
	Yes	16(23.9)	67	2.08	1.16-3.37	0.012
Ever use of Tobacco						
4.	No	155(13.4)	1156	1		
	Yes	10(18.5)	54	1.46	0.72-2.97	0.285
H/O Drug use						
5.	No	160(13.3)	1201	1		
	Yes	5(55.6)	9	8.13	2.16-30.6	<0.001
Adverse Life Circumstances						
6.	No	46(9.68)	475	1		
	Yes	119(16.19)	735	1.802	1.255-2.587	0.001
Domestic Violence (Using Hits Tool)						
7.	Domestic violence (Yes)	22 (26.3)	87			
	Domestic violence (No)	101(73.7)	854	2.52	1.49-4.27	<0.001
Perception of Illness						
8.	No	99(9.6)	1035	1		
	Yes	66(37.7)	175	5.72	3.95-8.28	<0.001

The above table shows the uni-variate analysis for association of depression with personal habits, adverse life circumstances, perception of illness and domestic violence. Among women who had reported sleep problems, 9.7% had depression; (OR 1.66; 95% CI 0.31 – 0.92). A higher proportion of women with a non- vegetarian diet had depression (24.4%). 16.19% of women with unfavourable personal circumstances related to money, health, and social interactions were reported to be depressed (OR 1.802; 95% CI 1.255-2.587). 22.7% of women who had financial problem was found to be depressed; (OR 2.507; 95% CI 1.166-5.392).

Among substance abuse, 23.9% of women who had ever consumed alcohol were depressed while a significant proportion of women who had a history of drug use (55.6%) suffered from depression (OR 8.13, 95% CI 2.16-30.6, $P < 0.001$). Tobacco smoking did not have a significant statistical association with depression. Not surprisingly, 26.3% of the women who were facing domestic violence were more likely to be depressed. The participants who perceived that they were ill (95% CI 3.95-8.28; $P < 0.001$) were 6 times more likely to have depression.

Table 4: Logistic Regression Analysis for Determinants of Depression

No	Variable	Adjusted Odds Ratio	95 % CI	p Value
1.	Marital status- Unmarried, divorced, separated and widowed	1.89	1.29-2.77	<0.001
2.	Perception of Illness	2.01	1.24-3.31	0.004
3.	H/o mental illness among family members	3.41	1.64-7.02	<0.001
4.	Diabetes	2.15	1.27-3.62	0.004
5.	Hypertension	2.84	1.61-5.01	<0.001
6.	H/o major surgeries in the past	1.83	1.12-2.96	0.015
7.	Adverse life circumstances	2.64	1.35-3.01	<0.001

The above table shows the multivariate logistic regression analysis for independent predictors of depression. All the variables with p value less than 0.2 which included variables like age, marital status, education, occupation, comorbidities, sleep problems, food habits, adverse life circumstances, ever use of alcohol, h/o drug use, quality of relationship with husband and perception of illness were selected for multivariate analysis. The final model included seven variables, of which the following were found to be the determinants of depression: having never married, being widowed, divorced, or separated (OR 1.89; 95% CI 1.29 – 2.77); mental illness among family members (OR 3.41; 95% CI 1.64 – 7.02); having had major surgery in the past (OR 1.83; 95% CI 1.12 – 2.96); having experienced adverse life circumstances in one's own life (OR 2.64; 95% CI 1.35 – 3.01); diabetes (OR 2.15; 95% CI 1.27 – 3.62); hypertension (OR 2.84; 95% CI 1.61 – 5.01) and perceiving oneself as ill (OR 2.01; 95% CI 1.24 – 3.31).

Discussion

Based on the results of the Patient Health Questionnaire-9, 13.6% (95% Confidence Interval 11.7–15.57) of Kochi Corporation's female employees over the age of 18 experienced depression. This is in line with the percentages that the WHO reported for underdeveloped nations (10–44%). [3] A methodologically sound, large sample study found a prevalence of 15.9% for depression, which is comparable to the Western statistics

(Poongothai et al). [3] According to Ali et al. (2002), women in northern states of India had a higher overall depression prevalence of 28.6%. [4] Two studies conducted in Kashmir, where there was continuous low-level fighting, revealed a significantly higher prevalence of depression among women (45.98% and 55.72%) (Muhammad Gadit and Mugford, 2007). [5] Research conducted especially in Indian primary care or medical settings has revealed depression in 21 percent of individuals (Pothen M et al). The majority of patients who see general practitioners or receive care from physicians in various specialties are at a higher risk of co-occurring depression, which is still largely underdiagnosed.[3] In the study by Pothen M et al., depression was the most prevalent manifestation (83.8%).[6] Several Indian studies have found that between 17 and 46 percent of patients who visit basic health centers had common mental disorders (CMD). In primary care institutions, depression was the most prevalent illness among patients with CMDs (63.6%). [6] A recent study by Kohli C et al. in a secondary hospital in Delhi found that among outpatient attendees, the prevalence of depression was 30.3%. [7] It is crucial to comprehend the frequency of depression because research has demonstrated a strong correlation between depression and suicide fatalities, with 15% of depressed hospital patients dying by suicide. As with farmer suicides, vulnerable persons may be more vulnerable (Bhise M C et al). [8] Research on psychological autopsies revealed that depression prevalence in suicide

victims ranged from 2% to 37.7% (Chavan B S et al). [6]

According to community-based studies on the elderly, females and urban inhabitants have a higher frequency of depression (3.9% - 47%). Risk factors for depression in the elderly include living alone, stressful life events, a lack of social support networks, the recent loss of a loved one, a lower socioeconomic standing, and the existence of concomitant medical conditions. [6]

The current study was consistent with this finding with higher prevalence of depression among women aged >60 years with an Odds ratio of 1.45. This was in agreement with other studies in India which showed a higher prevalence in middle age

around 45 years (Reddy and Chandrashekhar.,1998) [9].

The NMHS(2015-16) was undertaken in 12 states across 6 regions of India[North(Punjab & UP); South(Tamil Nadu & Kerala); East(Jharkhand & West Bengal); West(Rajasthan & Gujarat); Central(Madhya Pradesh & Chhattisgarh) and North-east(Assam & Manipur)].[6]

In NMHS a multistage, stratified, random cluster sampling technique with random selection based on PPS at each stage; all individuals 18 years and above in the selected households were interviewed. In NMHS (2015-16), a female predominance was observed for depressive disorders (3.0%) and a male predominance was observed for alcohol use disorders (9.1%). [6]

Table 5: Comparison of results from current study with other similar studies

Study Done By:	Place	Survey	Study Population	Depression
Present study	Kochi	Door to door survey using(PHQ-9)	Urban adult women population	13.6%
Patel.et al, 2002	Goa	Structured interview using(GHQ)	Rural women of low income	13%
Poongothai et al, 2009	Chennai	Door to door survey using(PHQ-9)	Representative Chennai sample; males & females	15.1%
Chandran.et al, 2002	Vellore	Structured interview(CIS-R)	Rural women of low income	11%
A.PS.et al, 2017	Kerala	Door to door survey(PHQ-9)	Middle aged rural women population	24.2%
NMHS, 2015-2016	India(12 states)	Household survey(PPS)	Household population ; females	3.0%
Biswas, et al, 2009	Vellore	Door to door survey(CIS-R)	Elderly urban population	31.5%
Rajala.et al, 1994	Finland	Self-reported survey(ZSR-scale)	Elderly population	9.5%
Aluoja.et al, 2004	Estonia	Structured interview(EST-Q)	Estonian population	11.1%
Ovuga et al, 2005	Uganda	Structured interview(13-BDI)	Rural population	17.4%
Vasiliadis et al, 2007	USA	Telephone survey(DSM-4)	Urban population	8.2%
Muhammad Gadit et al, 2006	Pakistan	Telephone survey(DSQ)	House-hold population	45.9%
Olsen et al, 2004	Denmark	Self-reported survey(MDI)	Danish-general population	3.3%

The frequency of depression in various populations is shown in Table 5. It is evident that estimates of the prevalence of depression varies significantly amongst populations. This variation may be related to the diverse ethnic and demographic makeup of the study groups, as well as the use of various diagnostic criteria and research methods.

Research has indicated that the prevalence of depression was twice as high in those 60 years of age and older than in the general population (Poongothai et al., 2009; Bromet et al., 2011). [3]

With an odds ratio of 1.45, the latest study supported this finding by showing a higher prevalence of depression in women over 60. In this study, women over 60 years of age showed a substantial initial correlation with greater levels of depression; however, this link vanished during regression analysis. Additionally, there was a trend toward an increase in the prevalence of depression as people aged up to 50, after which there was a slight reduction. This was consistent with findings from other Indian research (Reddy and Chandrashekhar, 1998) that indicated a higher

frequency in middle age, specifically around 45 years. [9]

Here in this study those who had < 12 years of education had significantly higher depression than those with > 12 years of schooling (OR 1.53; 95% CI 1.12 – 2.12). However after regression, this association disappeared. Research has indicated that those with lower educational attainment are more likely to experience depression (Bromet et al., 2011; Gomel, 1997; Lim et al). [10] In this study employed women have 1.58 times more risk of depression compared to those who were unemployed probably due to the stress associated with multiple responsibilities. But after regression this association disappeared. Therefore, the presence of CMD is closely linked to social disadvantage factors. Low education level is associated with socioeconomic conditions. [11]

Prevalence of depression among cancer patients in palliative and non-palliative care settings is 24.6% and 20.7%, respectively. Depressive symptoms were 7.85 times more likely among cancer patients when compared to those without cancer and 6.03 times more likely in those suffering from other disease conditions. [12] The study conducted by Taneja et al. shows that the prevalence of depression among diabetics as high as 88.5%. [13]

In the current study there was difference between various socioeconomic classes but in the case of depression the difference was statistically significant in the case of lower middle class family (OR 2.73;95% CI 1.13-6.57). In the case of anxiety, the difference was statistically significant in the case of lower middle class family (OR 2.56; 95% CI 1.26-5.24). However after regression, this association disappeared. Additionally, a strong correlation (OR 2.52) between depression and domestic violence was found in this study. In line with the findings of a meta-analysis that revealed a two to three fold increase in the risk of major depressive disorder among such women, women who were experiencing domestic violence had almost three times the odds (OR 2.71) of having higher prevalence of depression (Beydoun et al., 2012). [14] In a study of 3,504 women in Bangladesh, 35% had a positive score related with CMD. The study showed that all forms of domestic violence were associated with higher levels of CMD. [15] The present study investigated the issue of domestic violence by using HITS tool, however a “bad” relationship with their partner was a fact that should be considered and treated with attention.

Emerging evidence from South Asia has shown that psychosocial factors like depression and stress at work or home have a significant association with acute myocardial infarction (odds ratio 2.62). [16]

Conclusions

A significant percentage of women living in cities suffer from depression. The effectiveness of developing mental health programs depends on mainstreaming a gender perspective in the field by informing women at all societal levels about the potential for services and programs, as well as the possibilities for mental health interventions. Therefore, gender mainstreaming of mental health services is required. Depression is often associated with chronic diseases such as Diabetes Mellitus and Hypertension. Illness-associated depression impairs quality of life and results in higher health care utilization and costs.

References

1. World Health Assembly, 65. Global burden of mental disorders and the need for a comprehensive, coordinated response from health and social sectors at the country level: report by the secretariat. World Health Organization; 2012. Available from: <https://apps.who.int/iris/handle/10665/78898>.
2. World Health Organization. Depression and other common mental disorders-Global Health Estimates. Geneva: WHO 2017.
3. Poongothai S, Pradeepa R, Ganesan A, Mohan V. Prevalence of depression in a large urban South Indian population-The Chennai Urban Rural Epidemiology study (CURES-70). *PLoS One* 2009;4(9):e7185.
4. Archana PS, Das S, Philip S, Philip RR, Joseph J, Punnoose VP, et al. Prevalence of depression among middle aged women in the rural area of Kerala. *Asian J Psychiatry* 2017; 29: 154–9.
5. Muhammad Gadit AA, Mugford G. Prevalence of Depression among Households in Three Capital Cities of Pakistan: Need to Revise the Mental Health Policy. Heo M, editor. *PLoS One* 2007;2(2):e209.
6. World Health Organisation. Depression in India-Let's Talk. World Health Organisation 2017.
7. Farahzadi M. Depression; Let's talk. *J Community Health Res* 2017;6(2):74–6.
8. Solomon S. Depression: Let's talk. *J Curr Res Sci Med* 2017;3(1):1.
9. Reddy MV, Chandrarashekar CR. Prevalence of mental and behavioural disorders in India: a meta-analysis. *Indian J Psychiatry* 1998;40(2): 149-57.
10. Lim GY, Tam WW, Lu Y, Ho CS, Zhang MW, Ho RC. Prevalence of Depression in the Community from 30 Countries between 1994 and 2014. *Sci Rep*. 2018 Dec;8(1):1–10.
11. Patel V, Kirkwood BR, Pednekar S, Weiss H, Mabey D. Risk factors for common mental

- disorders in women. *Br J Psychiatry* 2006;189 (06):547–55.
12. Yang Y-L, Liu L, Wang Y, Wu H, Yang X-S, Wang J-N, et al. The prevalence of depression and anxiety among Chinese adults with cancer: a systematic review and meta-analysis. *BMC Cancer*. 2013; 13:393.
 13. Taneja N, Adhikary M, Chandramouleeswaan S, Kapoor SK. Prevalence of common mental disorders among patients with diabetes mellitus and hypertension in an urban east delhi slum – a cross-sectional study. *Telangana J Psychiatry*. 2015;1(1):27–31.
 14. Beydoun HA, Beydoun MA, Kaufman JS, Lo B, Zonderman AB. Intimate partner violence against adult women and its association with major depressive disorder, depressive symptoms and postpartum depression: A systematic review and meta-analysis. *Soc Sci Med* 2012; 75(6):959-75.
 15. Ziaei S, Frith AL, Ekström EC, Naved RT. Experiencing lifetime domestic violence: associations with mental health and stress among pregnant women in rural Bangladesh: The MINIM at Randomized Trial. *PLoS One* 2016; 11(12):e0168103.
 16. Joshi P, Islam S, Pais P, Reddy S, Dorairaj P, Kazmi K, et al. Risk factors for early myocardial infarction in South Asians compared with individuals in other countries. *JAMA*. 2007; 297:286–94.