



## Prevalence and association of Depression with other chronic morbidities among adults in an urban area of Haryana

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### Abstract

**Background:** Depression is the leading cause of ill health and disability worldwide. According to WHO, more than 300 million people are now living with depression and many of them with chronic co-morbidity.

**Materials & Methods:** There were 14 AWCs in the study area, 6 AWCs area were selected using probability proportionate to size and 100 households were surveyed from each selected area, using systematic random sampling, making a total of 600 households.

**Results:** The overall crude prevalence of depression was 16.2 % (97/600) using PHQ-9. Out of total 600 study participants, 37.7% had one or more chronic morbidity (already diagnosed). Prevalence of depression was higher in study participants with chronic morbidity (20.4%) as compared to those who had no chronic morbidity (15.8%) and this difference was found statistically significant ( $p$  value <0.05).

**Conclusion:** In the end it can be concluded that the prevalence of depression among adults in an urban area of Haryana was found to be 16.2%. Presence of chronic co-morbidities was significantly associated with depression.

**Keywords:** Depression, Urban, Adults, Co-morbidity.

### Introduction

The burden of mental disorders is growing with significant impact on health and well-being. Depression is the leading cause of ill health and disability worldwide with major social, human rights and economic consequences in all countries of the world.

According to the latest estimates from WHO, more than 300 million people are now living with depression, an increase of more than 18% between

2005 and 2015 with unipolar depressive disorders, ranked third in the leading cause of the global burden of disease in 2004 and if current trends continues it will move into the first place by 2030. (1,2) Earlier Indian studies have reported prevalence rates of depression that vary from 21–83% in primary care practices. (3-5)

In India, many studies have estimated the prevalence of depression in community samples

and the prevalence rates have varied from 1.7% (severe) to 48 %.<sup>(6-20)</sup>

Any chronic or serious illness that is life threatening or out of a person's control can lead to depression. This is reflected in findings from studies done in the past<sup>(11,21-23)</sup> But these studies were done in elderly. Due to paucity of data of comorbidity of depression and other Non-communicable diseases (NCDs) in the adult population, this study was aimed at finding out the prevalence of depression and its association with NCDs.

### Materials & Methods

**Study Design:** The subjects for this study were recruited from thesis research done to find out prevalence of depression and its various correlates. The study was a community based cross-sectional study.

**Study Area:** The study was carried out in the urban field practice area of Department of Community Medicine (Unit-2), Pt. B D Sharma PGIMS, Rohtak. The field practice area is used for the purpose of teaching, training and research activities for undergraduate medical students and postgraduate students of the department. Study area included 14 AWCs and a total of 5581 households.

**Sample size:** One of the recent large urban-population based study in south India reported the prevalence of depression to be 15.1%.<sup>(19)</sup> So taking the prevalence of depression (15.1%) from this study as basis for calculating sample size, with allowable error taken as 20% of prevalence.

The sample size was thus calculated by using formula:  $n = Z^2_{1-\alpha/2} P \times Q/d^2$  Where, Z is standard normal variate,  $Z_{1-\alpha/2}$  = value of two tailed alpha error (value is 1.96) at 5%, P = expected prevalence in fraction i.e. 15.1% in fraction is 0.151, Q = 1 - P, d = allowable error = 0.0302 (here, taken as 20% of prevalence = 3.02%) Minimum subjects from this calculation came out to be 540. The final study was done in 600 subjects.

**Study Period:** The study was conducted over a period of one year from April 2016 to March 2017

**Study population:** Adult population (age 18-59 years) residing in the study area for more than 6 months.

### Exclusion criteria

- 1) Those who were not willing to participate.
- 2) Those who could not be contacted even after two follow up visits.
- 3) Subjects having gross hearing impairment, diagnosed organic brain pathology or articulation disorders.

**Data collection:** There were 14 AWCs and a total of 5581 households in the study area. Out of the 14 AWC area, 6 were selected using probability proportionate to size and 100 households were surveyed from each selected area making a total of 600 households. Selection of households from each study area was done using systematic random sampling.

The selected houses were then visited by the investigator. Males and females were selected from alternate selected houses. Selection of individuals from each selected house was done by applying lottery method on eligible subjects. Informed written consent was taken from subjects before initiating the interview. The confidentiality, of the interview data, was ensured.

The age of the subjects were ascertained by 10th certificate/driving license/Adhar card/voter ID card. All eligible locked houses were visited again at least 2 times and if a house found locked even after 2 follow-up visits, consecutive house was then selected for the study.

**Study tool:** A widely used screening tool, Patient health questionnaire-9 (PHQ-9) was used for the study. PHQ-9 consist of nine questions rating the severity of symptoms over the past 2 weeks. The nine questions are answered from 0 (not at all) to 3 (nearly every day) Each question is answered from 0 to 3 therefore for each of the nine tested criteria there are four possible answers: The maximum total score is  $9 \times 3 = 27$  points. Depression severity is graded based on the PHQ-9 score: 0-4 none 5-9, mild 10-14, moderate 15-19 moderately severe, 20-27 severe. A valid Hindi version of the questionnaire PHQ-9 is available

and was used for the study. Those study subjects found depressive were referred to Psychiatry OPD, PGIMS, Rohtak for further detailed workup and required treatment.

In Addition to PHQ-9, sociodemographic data with information on already diagnosed chronic morbidities was taken. Chronic morbidity was taken as present, if records of already diagnosed morbidity was available.

**Data analysis:** Collected data were entered in the MS EXCEL spread sheet, coded appropriately. Analysis was carried out using SPSS (Statistical Package for Social Sciences) v20.0.

Categorical data were presented as percentage (%). Pearson’s chi square test was used to evaluate differences between groups for categorized variables. All tests were performed at 5% level of significance, thus an association was considered significant if the p value was less than 0.05

**Results**

Equal number of males and females were included in the study. Mean age of the study participants was 37.91 ± 11.75 years. The overall crude prevalence of depression was 16.2 % (97/600) using PHQ-9 (Patient health questionnaire-9). About 9.5% of the study participants had mild depression, 4.7 % had moderate depression. Moderately severe and severe depression was found to be 1.2% and 0.8 % respectively. (Table 1)

**Table 1.** Distribution of study subjects, by severity of Depression (n=600)

Depression severity (PHQ-9)	Frequency (%)
No depression	503 (83.8)
Mild	57 (9.5)
Moderate	28 (4.7)
Moderately severe	7 (1.2)
Severe	5 (0.8)
Total	600 (100)

**Table 2** Prevalence of already diagnosed chronic morbidity (n=600)

Name of chronic morbidity	Frequency*	Percentage*
Any chronic morbidity	226	37.7
Respiratory	42	7
Diabetes mellitus	36	6
Gastro intestinal disorders	15	2.5
Hypertension	28	4.7
Genitourinary Disorders	22	3.7
Eye disorders	26	4.3
ENT Disorders	12	2
Skin diseases	24	4
Musculo-skeletal disorders	35	5.8
Neurological Disorders	22	3.7
Others	20	3.3

**\*Multiple response (One person may be affected by more than one chronic morbidity).**

As mentioned in Table-2, out of total 600 study participants, 37.7% had one or more chronic morbidity (already diagnosed). Most common chronic morbidity was related to respiratory system (7%), followed by diabetes mellitus (6%). Already diagnosed hypertension was 4.7%. Among all study participants 5.8% had musculoskeletal disorder, 4.3% had eye disorder, 4% had skin disease, 3.7% had genitourinary disorder, and 3.7% had neurological disorders. Other diseases (related to cardiovascular system, endocrine system, malignancy etc.) contributed 5.2% of the total disease burden.

**Table 3.** Prevalence of depression, by chronic morbidity (n=600)

Chronic morbidity	Depression Significance			Significance
	Yes (%)	No (%)	Total (%)	
Yes	46 (20.4)	180 (79.6)	226 (100)	$\chi^2=4.690$ $p = 0.030$ $df = 1$
No	51 (15.8)	323 (84.2)	374 (100)	
<b>Total</b>	97 (16.2)	503 (83.8)	<b>600 (100)</b>	

As shown in Table-3, Prevalence of depression was higher in study participants with chronic morbidity (20.4%) as compared to those who had

no chronic morbidity (15.8%) and this difference was found statistically significant (p value <0.05).

**Table 4** Prevalence of depression, by some of the individual chronic morbidities (n=600)

Chronic morbidity		DepressionSignificance			Significance
		Yes (%)	No (%)	Total (%)	
Respiratory diseases	Yes	9 (21.4)	33 (78.6)	42 (100)	$\chi^2=0.921$ p = 0.336
	No	88 (15.8)	470 (84.2)	558 (100)	
Hypertension	Yes	10 (35.7)	18 (64.3)	28 (100)	$\chi^2=11.225$ p = <b>0.000</b>
	No	87 (15.2)	485 (84.8)	572 (100)	
Diabetes mellitus	Yes	13 (36.1)	23 (63.9)	36 (100)	$\chi^2=11.240$ p = <b>0.000</b>
	No	84 (14.9)	480 (85.1)	564 (100)	
Musculo- skeletal disorders	Yes	6 (17.1)	29 (82.9)	35 (100)	$\chi^2= 0.026$ p = 0.871
	No	91 (16.1)	474 (83.9)	565 (100)	
Neurological disorders	Yes	7 (31.8)	15 (68.2)	22 (100)	$\chi^2= 4.127$ p = <b>0.042</b>
	No	90 (15.6)	488 (84.4)	578 (100)	

Table 4 depicts, the prevalence of depression to be 21.4% among those with respiratory disorders, 35.7% among hypertensives, 36.1% among diabetics, 17.1% among those with muscular-skeletal disorders and 31.8% among individuals with any neurological disorder. Prevalence of depression was higher among the mentioned chronic morbidities compared to those participants without the concerned morbidities. This difference was found statistically significant for hypertension, diabetes mellitus and neurological disorders.

**Discussion**

**Depression prevalence**

We report that the crude prevalence of depression to be 16.2%. This is consistent with the figures reported from various community based studies in India. (6-20)

Mathias et al. (2015) in Uttarakhand, India and Maideen et al. (2014) Malaysia, both studies using PHQ-9 as a study tool, showed that the prevalence of depression to be 6% and 10.3% respectively. The prevalence observed in present study was higher (16.2%) compared to these studies, despite using the same study tool, this difference can be because Mathias et al. and Maideen et al. used a higher cut off for labelling depression (>10 point on PHQ-9) compared to present study where mild depression (≥5 points on PHQ-9) was also included. (10,24)

A large urban population-based study from South India by Poongothai et al (2009) using PHQ-9 and reported overall prevalence of depression to be 15.1%. This similarity with present study may be

attributed to the similarity in the population type and the study tool used for the assessment of depression. (19)

**Depression and other chronic morbidities:**

Prevalence of depression was higher in study participants with chronic morbidity (20.4%) as compared to those who had no chronic morbidity (15.8%) and this difference was found statistically significant (p value <0.05). (Table 3).

Prevalence of depression was higher among subjects with individual chronic morbidities compared to those participants without the concerned morbidities. This difference was found statistically significant for hypertension, diabetes mellitus and neurological disorders. (Table 4)

In a population based study by Pilia et al. (2017) in Haryana showed prevalence of depression to be higher in study participants with chronic morbidity (20.9%) as compared to those who had no chronic morbidity (6.9%) and this difference was found statistically significant for diseases like diabetes (35.3%), hypertension (31%), respiratory disorders (23.3%) and hemiparesis (12.8%). (11)

Mukeshimana and Mchunu (2016) in a review of articles published from 1991 to 2012 on comorbidity of Depression and other Chronic Non-communicable Diseases found that the prevalence of depression was significantly higher in those with chronic non-communicable diseases in all regions of the world. The health effects of depression found in literature review included a high morbidity and mortality. Chronic diseases

such as cardiovascular diseases, diabetes, cancer and chronic respiratory diseases were associated with higher rates of depression than others.<sup>(25)</sup>

A study conducted by Maideen et al. (2014) in Selangor, Malaysia, using PHQ-9 with the cut-off score of 10, showed similar trends of depression with chronic morbidity. Prevalence of depression was higher among those participants who were suffering from among asthma (13.3%), hypertension (10.6%), stroke (40%) and heart diseases (16.7%) compared to the prevalence among those without any other disease and also with the overall prevalence of 10.3% found the study.<sup>(24)</sup>

Poongothai et al. (2009) in South India, also using PHQ-9 as a study tool showed association of raised systolic and diastolic blood pressure and mean blood sugar level with depression and this association was found statistically significant with p value <0.001.<sup>(19)</sup>

Other population based studies Maufya and Peltzer (2013), Rajkumar et al. (2009) also corroborated this finding of high depression prevalence among those with one or the other chronic morbidity. Maufya and Peltzer (2013) noted that the depression in study participants was significantly associated with asthma.<sup>(22)</sup> While Rajkumar et al. (2009) observed that participants with history of diabetes had 2.37 times higher odds of having depression.<sup>(26)</sup>

The comorbidity of depression with other chronic diseases is evidenced from the discussed studies. Chronic morbidity can affect the person's ability to perform daily chores and make them dependent on others. Also the economic burden of the cost of treatment coupled with loss of earning with increased absenteeism from work, confinement, loss of social interaction, reduced sleep all contribute towards more depression among those with some or the other chronic morbidities.

### Limitations

- 1) As with all cross-sectional studies, present study can't completely determine the

causal relations about the factors we studied.

- 2) The present study assessed already diagnosed chronic morbidities as a factor for depression. True prevalence of chronic morbidity may be much higher than reported in the study. Also depression itself can act as a factor for various chronic morbidities this reverse relationship was not assessed in the present study.

### Strength

An internationally used instrument, the Patient Health Questionnaire (PHQ) – 9 item was used in the study for screening depression. PHQ-9 is also a reliable and valid measure of depression severity. With lower cut off ( $\geq 5$  point for mild depression) sensitivity of the test was improved which was ideal for screening.

### Conclusion & Recommendations

In the end it can be concluded that the prevalence of depression among adults in an urban area of Haryana was found to be 16.2%. Our findings clearly indicate that depression among adults in urban community in Haryana is significantly associated with presence of chronic comorbidities.

Therefore there is need to integrate mental health services with general health services with inclusion of sentinel screening programmes targeting the vulnerable group, with one or the other chronic morbidities. Along with that community screening programmes should be organized to find out the hidden burden of depression, for that there should be appropriate training and strengthening of peripheral workers which will early detection of depressive symptoms in community and timely referral to higher centres and help in spreading awareness about mental health and diseases.

### References:

1. World Health Organization. "Depression: let's talk" says WHO, as depression tops

- list of causes of ill health [Internet]. Geneva:World Health Organization; 2017 [cited 2017 Oct 10]. Available from: <http://www.who.int/mediacentre/news/releases/2017/world-health-day/en/>
2. World Health Organization. Depression [Internet]. Geneva: World Health Organization; 2017 [cited 2017 Oct 20]. Available from: <http://www.who.int/mediacentre/factsheets/fs369/en/>
  3. Kishore J, Reddaiah V, Kapoor V, Gill J. Characteristics of mental morbidity in a rural primary health center of Haryana. *Indian J Psychiatry*. 1996;38(3):137–42.
  4. Amin G, Shah S, Vankar GK. The prevalence and recognition of depression in primary care. *Indian J Psychiatry*. 1998;40(4):364–9.
  5. Pothen M, Kuruvilla A, Philip K, Joseph A, Jacob KS. Common mental disorders among primary care attenders in Vellore, South India: nature, prevalence and risk factors. *Int J Soc Psychiatry*. 2003;49(2):119–25.
  6. Charlson FJ, Baxter AJ, Cheng HG, Shidhaye R, Whiteford HA. The burden of mental, neurological, and substance use disorders in China and India: a systematic analysis of community representative epidemiological studies. *Lancet*. 2016;388:376–89.
  7. Ferrari AJ, Charlson FJ, Norman RE, Patten SB, Freedman G, Murray CJL, et al. Burden of Depressive Disorders by Country, Sex, Age, and Year: Findings from the Global Burden of Disease Study 2010. *PLoS Med* [Internet]. 2013[cited 2017 Oct 7];10(11):e1001547. Available from:<http://journals.plos.org/plosmedicine/article/file?id=10.1371/journal.pmed.1001547&type=printable>
  8. Rao T, Tandon A, Saraswathi N, Darshan M, Raman R, Karthik K, et al. Suttur study: An epidemiological study of psychiatric disorders in south Indian rural population. *Indian J Psychiatry*. 2014;56(3):238-45.
  9. Shidhaye R, Gangale S, Patel V. Prevalence and treatment coverage for depression: a population-based survey in Vidarbha, India. *Soc Psychiatry Psychiatr Epidemiol*. 2016;51(7):993–1003.
  10. Mathias K, Goicolea I, Kermodé M, Singh L, Shidhaye R, Sebastian MS. Cross-sectional study of depression and help-seeking in Uttarakhand, North India. *BMJ Open* [Internet]. 2015[cited 2017 Oct 7];5(11):e008992. Available from: <http://dx.doi.org/10.1136/bmjopen-2015-008992>
  11. Pilia M, Bairwa M, Khurana H, Kumar N. Prevalence and predictors of depression in community-dwelling elderly in rural Haryana, India. *Indian J Community Med*. 2017;42(1):13–8.
  12. Padma K, Kashi R, Rao R, Sita B, Chandra S, Deotale PG. A Study on Socio Demographic and Psychological Risk Factors for Depression among Adult Population of Karimnagar District. *Indian J Public Heal Res Dev*. 2015;6(2):193–8.
  13. Grover S, Dutt A, Avasthi A. An overview of Indian research in anxiety disorders. *Indian J Psychiatry*. 2010;52(7):178-88.
  14. Patel V, Kirkwood BR, Pednekar S, Weiss H, Mabey D. Risk factors for common mental disorders in women: Population-based longitudinal study. *Br J Psychiatry*. 2006;189(6):547–55.
  15. Patel V. Gender Disadvantage and Reproductive Health Risk Factors for Common Mental Disorders in Women. *Arch Gen Psychiatry*. 2006;63:404–13.
  16. Patel V, Chisholm D, Kirkwood BR, Mabey D. Prioritizing health problems in women in developing countries: Comparing the financial burden of reproductive tract infections, anaemia and depressive disorders in a community

- survey in India. *Trop Med Int Heal*. 2007;12(1):130–9.
17. Chandran M, Tharyan P, Muliyl J, Abraham S. Post-partum depression in a cohort of women from a rural area of Tamil Nadu, India: Incidence and risk factors Post-partum depression in a cohort of women from a rural area of Tamil Nadu, India. 2013;499–504.
  18. Patel V, Rodrigues M, DeSouza N. A Study of Mothers in Goa , India. *Am J Psychiatry*. 2002;159(1):43–7.
  19. 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* [Internet]. 2009 [cited 2017 Sep 7];4(9):e7185. Available from:<http://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0007185&type=printable>
  20. Sethi B, Prakash R. Depression in Industrial population. *Indian J Psychiatry*. 1979;21:359–61.
  21. Mukeshimana M, Mchunu G. The co-morbidity of depression and other chronic noncommunicable diseases: a review of literature on the epidemiology, diagnosis and health effects. *Rwanda J*. 2016;3(1):44–50.
  22. Mafuya N, Peltzer K, Chirinda W, Musekiwa A, Kose Z, Hoosain E, et al. Self-reported prevalence of chronic non-communicable diseases and associated factors among older adults in South Africa. *Glob Health Action* [Internet]. 2013[cited 2017 Oct 7];6: 20936. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3779355/pdf/GHA-6-20936.pdf>
  23. Sundru M, Goru K. Epidemiological study of depression among population above 60 years in Visakhapatnam, India. *Int J Med Sci Public Heal*. 2013;2(3):695–702.
  24. Kader Maideen SF, MohdSidik S, Rampal L, Mukhtar F. Prevalence, associated factors and predictors of depression among adults in the community of Selangor, Malaysia. *PLoSOne* [Internet]. 2014[cited 2017 Oct 7];9(4):e95395. Available from:<http://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0095395&type=printable>.
  25. Mukeshimana M, Mchunu G. The co-morbidity of depression and other chronic non-communicable diseases: a review of literature on the epidemiology, diagnosis and health effects. *Rwanda J*. 2016;3(1):44–50.
  26. Rajkumar AP, Thangadurai P, Senthilkumar P, Gayathri K, Prince M, Jacob KS. Nature, prevalence and factors associated with depression among the elderly in a rural south Indian community. *IntPsychogeriatrics*. 2009;21(2):372–8.