# **Original Research Article**

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# Prevalence of depression among hypertensive individuals in urban Trivandrum: a cross sectional study

Prathibha M. T.<sup>1</sup>\*, Sara Varghese<sup>2</sup>, Gokul Dev V.<sup>3</sup>, Jincy J.<sup>2</sup>

Department of Community Medicine, <sup>1</sup>Azeezia Institute of Medical Sciences and Research, Meeyannoor, Kollam, <sup>2</sup>Government Medical College, Trivandrum, Kerala, India

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\*Correspondence: Dr. Prathibha M. T.,

E-mail: prathibha.m.t@gmail.com

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#### **ABSTRACT**

**Background:** People with chronic diseases are more likely to have depression than those without any physical illness. Lack of adherence to treatment, poor compliance to life style modification therapy and lost to follow up are major concerns raised in the management of hypertension among subjects with co-morbid depression. Hence it is very important to explore the epidemiology of depression among hypertensives.

**Methods:** The study was conducted in Medical College health unit area of urban Trivandrum as a cross sectional survey among adults >18 years who were diagnosed to have hypertension. The subjects were interviewed using a semi structured questionnaire to collect the socio-demographic variables and the 9 item Patient Health Questionnaire (PHQ 9) to capture depression. Data from a sample of 432 hypertensive individuals collected were analyzed and Chi square, t test, was done to find the associated factors.

**Results:** Mean age of the study subjects was 62.47 years. Among the study subjects the blood pressure was under control among only 33.8% of the study population. The prevalence of depression was found to be 33.3% (144) with 95% C.I (27.98-39.14). Gender, Socio economic status, marital status, low educational status, regular physical activity, duration of hypertension, uncontrolled BP, were found to be significantly associated with depression.

**Conclusions:** The prevalence of depression among hypertensive individuals is high in this study population. Adequate control of BP along with awareness among primary care physicians in identifying those with hypertension and co-morbid depression is essential.

Keywords: Depression, Hypertension, Uncontrolled blood pressure, PHQ 9

# INTRODUCTION

The promotion, protection and restoration of mental health have been a vital concern of individuals, communities and societies throughout the world. There is strong evidence elucidating the bidirectional relationship between mental health and physical outcomes. Depression is one of the most common mental health disorders that affect not only mind but also body. Globally, more than 350 million people of all ages suffer from depression. People with chronic diseases are more likely to have depression than those without any physical

illness.<sup>3</sup> This is of great concern because depression may make the chronic disease worse and affects its prognosis. When a chronic physical health problem is either found or is known to be present, co-existing depression may be overlooked as we will shift our focus to the physical illness.<sup>4</sup> Discovering depression earlier make it easier for people to cope with their condition, leading to better health and quality of life.<sup>5</sup> Several studies have focused on the association between depression and chronic diseases especially cardiovascular diseases; depression and diabetes etc. however, the relationship between depression and hypertension has received less attention.

<sup>&</sup>lt;sup>3</sup>Department of Orthopedics, Medical trust Hospital, Ernakulam, Kerala, India

Hypertension has been increasing considerably in recent years and owing to globalization there is a slow shift in the incidence of this disease from developed to developing nations. People with depression and chronic hypertension are relatively common in primary and general hospital care, but they are usually diagnosed less. They usually present with their physical problems whereas psychological symptoms as a presenting complaint is shown by only a minority. It will be challenge for the health care professionals to investigate for the causes of such symptoms. Lack of adherence to treatment, poor compliance to life style modification therapy and lost to follow up are the major concerns raised in management of hypertension among subjects with co-morbid depression.

While the global burden of depression along with comorbid hypertension poses a substantial public health challenge, both at the social and economic levels, there are a number of well-defined and evidence based strategies that can effectively address or combat the situation. Economic analysis has indicated that treating depression in primary care is feasible, affordable and cost-effective. These results indicate the urgency of addressing depression as a public-health priority to reduce disease burden and disability, and to improve the overall health of populations. But little studies were done to estimate the extent of depression among subjects with physical illness particularly hypertension and among them population based studies are few in number.

Considering the role of depression in suicide and other chronic non communicable diseases and the feasibility of identifying and treating depression at the primary health care level, there is a definite need for community surveys in order to understand the real burden and risk factors of the disease. Hence we are conducting this study to find out the prevalence of depression among hypertensive individuals in urban Trivandrum.

# **METHODS**

A cross sectional survey was conducted among adults above 18 years of age who were diagnosed to have hypertension for a period of at least 1 year (evidenced by the prescription form) residing in Medical College Health unit area of urban Trivandrum. The health unit is situated under the Trivandrum Corporation area and covers a population of 113000. The study size was estimated at 5% precision and power of 80% which came out to be 432. The study was conducted during January 2015 to December 2015.

The variables under this study were grouped into exposure and outcome variables. The exposure variables which included socio demographic variables, physical activity, alcohol and tobacco use, history of hypertension, its duration, treatment undertaking, compliance to treatment etc. were documented. Blood pressure was recorded after completing the interview, twice for a

person 5 minutes apart on the right arm, and the average value was taken as the person's BP expressed in terms of mm of mercury.

The main outcome variable is depression which was assessed using the validated Malayalam version (local language) of patient health questionnaire (PHQ- 9). The PHQ-9 is a10-item self-administered version of the Depression portion of the PRIME-MD interview, which uses DSM-IV criteria. It can be scored to provide a dichotomous diagnosis of major depression (commonly called depression) and to grade symptom severity via a continuous score. Items1through 9 are used to calculate symptom severity measure. Item 10 assesses the extent to which depressive symptoms interfere with day-to-day functioning but is not included in the symptom severity score. Each of the 9 items of the PHQ can be scored from 0 ("not at all") to 3 ("nearly every day") depending on the severity of symptoms. Therefore, the PHQ 9 scores ranges from 0 to 27. According to many studies the PHQ 9 cut off score for diagnosing depression in medically ill patients are different from general population. Stafford et al. reported that a cut off score of  $\geq 6$  has optimized sensitivity (83%) and specificity (79%) among CAD outpatients.<sup>10</sup>

Each house was visited with the help of a community volunteer (ASHA) and all the participants were interviewed in local language. Informed consent was obtained from the participants before the start of the study and Institutional ethical committee clearance was obtained.

The data was analyzed using Statistical Package for Social Sciences (SPSS) software. The categorical variables have been summarized using frequencies and proportions with 95% Confidence Intervals. Quantitative variables have been summarized as mean with standard deviation for normally distributed data. The statistical significance of association was tested using independent sample t - test for quantitative variables and Pearson Chi-square test for qualitative variables and the strength of association was expressed using Odds ratio.

### **RESULTS**

The study included 432 adults above the age of 18 years who were diagnosed to have hypertension, residing in the Medical College Health unit area of Urban Trivandrum. Mean age of the study subjects was 62.47 (10.8) years and 65% of the study population were females. Majority of the study subjects had completed primary (27.5%) and high school (38.4%) education. Median duration of hypertension of the study participants is 6 years (Figure 1).

96.8% (418) of the study participants follow modern medicine and the rest diet restriction (1.4%) and other system of medicine (1.4%). Among the study participants 223 (51.6%) suffered from various co morbidities. The

most common was diabetes mellitus for 184 (42.5%) participants.

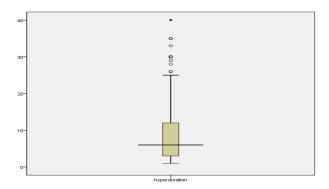


Figure 1: Box plot showing the distribution of duration of hypertension among study subjects, N=432.

Depression in the study subjects was assessed using the validated Malayalam version (local language) of PHQ 9 questionnaire. The cut off score fixed was  $\geq$ 6 as the population was medically ill different from the general population. According to this criterion prevalence of depression was found to be 33.3% (144) with 95% C.I (27.98-39.14) (Table 1).

Severity of depression in the study sample was also assessed based on PHQ 9 score. The classification includes severe major (score 20-27), moderate major depression (score 15-19), mild major depression (score 10-14) and minimal depression (score 5-9). The percentages in each category are shown in Figure 2.

Table 1: Prevalence of depression among the study subjects, N=432.

Factor	Frequency (n)	%
<b>Depression (PHQ ≥6)</b>	144	33.3
No depression (PHQ <6)	288	66.7
Total	432	100

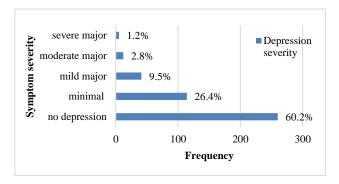


Figure 2: Bar diagram showing the proportion of depression symptom severity among the study subjects, N=432.

The factors significantly associated with depression were assessed by Chi square test and those found significant (p <0.05) with measure of risk is shown in Table 2. The table shows that female gender, low socioeconomic status, low educational attainment, uncontrolled blood pressure status were found to be risk factors for depression among the study subjects. Whereas regular physical activity and living with spouse were found to be protective against depression.

Table 2: Factors found significantly associated with depression among the study subjects.

Factor	Category	Depressive n (%)	Non depressive n (%)	p value	OR <sup>b</sup> (CI)
Gender	Females	111 (77.1%)	170 (59%)	- <0.001	2.33 (1.48-3.67)
	Males	33 (22.9)	118 (41%)	<0.001	
SES <sup>a</sup>	BPL	60 (41.7%)	72 (25%)	< 0.001	2.14 (1.40-3.27)
	APL	84 (58.3%)	216 (75%)		
Marital status	Living with spouse	87 (60.4%)	225 (78.1%)	- <0.001	0.42 (0.27-0.66)
	Single	57 (39.6%)	63 (21.9%)	<0.001	
Educational	Low	126 (87.5%)	183 (63.5%)	<0.001	4.01 (2.30-6.90)
status	High	18 (12.5%)	105 (36.5%)	<0.001	
Physical activity	Regular	11 (7.6%)	61 (21.1%)	<0.001	0.32 (0.15-0.62)
	Irregular	133 (92.4%)	227 (78.8%)		
Blood pressure	Uncontrolled	110 (76.4%)	176 (61.1%)	0.002	2.05 (1.31-3.23)
control status	Controlled	34 (23.6%)	112 (38.9%)	- 0.002	

a =socioeconomic status assessed by ration card. BPL- below poverty line, APL- above poverty line; b =odds ratio with 95% confidence interval.

The median duration of hypertension also varied significantly in depressed (8 years) and non-depressed (6 years) hypertensive individuals. (p =0.042 by Mann Whitney-U test).

# DISCUSSION

The prevalence of depression among hypertensive individuals in this study was found to be 33.3% (27.98-39.14). A systematic review and meta-analysis done by

Li et al found 41 studies on the same topic and summarized the prevalence of depression among hypertensive to be 26.8% (21.7-32.3%). They concluded that the heterogeneity in values is due to the difference in the method of evaluation. A large population based study in rural China showed much lesser prevalence of depression than our study which may be due to ethnical differences.<sup>12</sup> A hypertensive clinic based cross sectional study conducted in South India showed a prevalence of depression as 25% among hypertensive subjects.<sup>13</sup> The prevalence in this study is less compared to the present study as the sample size was less and it was rather not a population based study. The studies done among hypertensive are less but coronary artery disease, which can be considered as equivalent to hypertension shows a prevalence of depression which varies from 17-44% in several studies. 14 The prevalence of depression in medically ill patients will be slightly more than that of general population. Rabkin et al. found a 3-fold higher frequency of major depression in patients treated for hypertension. 15 A large population-based study from South India, which screened more than 24,000 subjects in Chennai using patient health questionnaire (PHQ)-12 that the overall prevalence of depression was 15.1% which was conducted in general population and the prevalence of depression in the present study will be higher as it is in medically ill subjects. 16

Bivariable analysis showed that gender, education, marital status, socio economic status, physical activity, uncontrolled Blood pressure and duration of hypertension was associated with depression among hypertensives. Female gender was found to be a risk factor for the development of depression with significant odds ratio of 2.33. WHO facts on gender and health also emphasis that depression is twice common in females.<sup>17</sup> Another study done in Kashmir (India) and in a western community also reveal similar finding with prevalence of depression in females significantly higher than that of males across all age groups. 18,19 It has been implicated that in addition to genetic and psychosocial factors, responsibilities of females especially in India contribute to much higher depressive symptoms in females compared to males.

In the present study low educational status and low socio economic status was significantly associated with depression. The reason may be attributed to low awareness and difficult accessibility to health care facilities. A few studies revealed similar findings stating that the prevalence of major depressive disorder (MDD) is higher in those with low levels of educational attainment, the unemployed and those with low social status. <sup>19-21</sup> Occupational status was not significant in the present study may be because the type of job, job satisfaction, work stress may also interfere with the development of depression symptoms. This was comparable to a study done by Christ et al, it where it was found out that mental health benefit of work is affected by the particular job sector in which the person

works and difference in level of depressive symptoms is not affected by work status.<sup>22</sup>

Being married and living with the partner was found to be significantly associated with less depressive symptoms among hypertensives. Townsend et al also found out that being married is protective against the development of depressive symptoms.<sup>23</sup> Bulloch et al, Akhtar et al, Kessler et al also implicated that married persons will be able to cop up with emotional stressors than non-married couples.<sup>19,24,25</sup>

Smoking and Alcoholism were the habitual factors studied in the present study. But we didn't find any significant association. This is different from many studies in which nicotine dependence was a risk factor for the development of depression.<sup>26-28</sup> Alcoholism was also found to be significantly associated with depressive episodes in a study conducted by Sullivan et al.<sup>29</sup> In the present study, among the smokers and alcoholics, current users were less in number and none of them had dependence, this may be the reason why both were not significant in this study. Moreover the study population was different from the above mentioned studies as they studied among alcoholics and smokers only and most of them were males. Physical activity was found to be a protective factor against depression in the present study, which is similar to a study done by Yates et al. on the clinical features of depression with or without co-morbid physical illness.<sup>30</sup>

Duration of hypertension in the study participants was more among depressives than non-depressives and it was significantly associated. Uncontrolled blood pressure was found to be risk factor for depression in this study. Rubio Guerra et al in their study found out that depression was a risk factor for poor blood pressure control among hypertensives.<sup>31</sup>

Generalizability is good for this study as it a population based study and the sample size was fairly good enough calculated scientifically accounting for good precision and power. The few limitations to be mentioned here are the following. Firstly, the presence of depression was based on a screening tool rather than diagnosis by a psychiatrist or DSM IV criteria. Secondly, self-reported symptoms may have been prone to recall bias and other socio cultural factors. Thirdly, due to the cross sectional study design, the risk factors found out may be substantiated by further case control studies and also temporality of any association could not be found out.

To conclude, we found a high prevalence of depression among hypertensive patients which is greater than in general population. Females, low socioeconomic status, long duration of hypertension, not living with spouse, physical activity, low educational attainment, uncontrolled BP were associated with depression. The higher prevalence of hypertension and co existing depression has many implications on individuals, families

as well as in the community. The study showed insights into the relationship between hypertension and depression by concluding the role of control of blood pressure and adequate treatment of depression necessary in individuals. A multidisciplinary approach in tackling the situation including physicians, psychiatrists, clinical psychologists and community volunteers will bring a desirable change in the burden of both the diseases.

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