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PREVALENCE AND DETERMINANTS OF DEPRESSION AMONG ADULT HYPERTENSIVE PATIENTS IN BURAYDAH

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ABSTRACT

Background: Both depression and hypertension exist from a complex interaction of biological, social, and behavioural factors. **Objectives:** To assess depression and its associated factors among hypertensive patients attending primary healthcare centers, Ministry of health in Buraydah city. **Subjects and Methods:** A cross-sectional study including a representative sample of adult hypertensive patients registered at primary healthcare centers in Burayadah has been conducted throughout the period August- September, 2019. The Arabic version of Patient health questionnaire-9 scale (PHQ-9) was utilized to assess for depression. In addition, demographic and hypertension-related characteristics were collected. **Results:** Two hundred and eighty hypertensive patients completed the study questionnaire, giving a response rate of 69.6%. Mean age of patients was 54.5 (±11.3). Males and females were almost equal. Overall, 46.1% of participants had uncontrolled Blood pressure (uncontrolled systolic or diastolic BP). The prevalence of depression was 37.1%, mainly mild (26.4) whereas moderately severe and severe forms were reported among 2.5% and 0.7% of patients, respectively. Depression was more frequent among unmarried, p=0.004; illiterate, p=0.006; and low-income participants, p=0.008 compared to their counterparts. Depression was not associated with BP control status but was significantly higher among those who had 2 or more antihypertensive drugs, 45% versus 24% for patients who take only one drug, p<0.001. Furthermore, the percentage of depression was more than two fold higher among participants who reported family history of depression compared to those who reported none, p=0.002. **Conclusion:** Depression was common among hypertensive patients attended PHC centers in

Burayadah. Therefore, screening for depression as well as its effective and early management among them is recommended.

KEYWORDS: Age, hypertension, blood pressure, smoking, physical activity, PHQ-9, Buraydah.

INTRODUCTION

Background

Mental health problems are common issues worldwide. It is estimated that 4.4%of the population globally had depression in 2015 and it affects more than 300 million people all over the world. also its more common in female (5.1%) than male(3.6). There are many contributing factor affect the incidence and prevalence of depression including age, gender, poverty, and medical health status.[1] Living with hypertension is a stressful lifelong experience that subjects patients to depression or aggravates it. Depressed patients who also suffer from hypertension are less likely to be compliant with medical advices and more prone to complications and death.[2]

In Saudi Arabia, around one in 7 adults are Hypertensive. Hypertension risk increases with advancing age.[3] Similarly around one in six adult PHCC attendees suffer from depression.[4] While one third of Saudi elderly have some depressive symptoms.[5,6]

Hypertensive patients are more prone to various cardiovascular adverse complications.[7-9] It affects nearly one-fourth of adult population around the world. And it is estimated to affect one-third of them by the year 2025.[10]

Depression was associated with increased risk of dying from numerous major illnesses, including hypertension complications.[11] Rationality of the study is although both of hypertension and depression are common disorders among Saudi population, limited number of studies investigated the link between both orders with none of them was carried out in Buraydah. Lack of compliance to treatment, life style modification, and lost to follow up are major problems reported in the management of hypertension among patients with depression. Therefore, exploring depression among hypertensive patients and its management will help in controlling hypertension.

Aim

To assess depression and its associated factors among hypertensive patients.

Objectives

1) To estimate the prevalence of depression assessed by Patient Health Questionnaire-9 (PHQ-9) among hypertensive patients in Buraydah, Saudi Arabia.
2) To determine the associated factors for depression among hypertensive patients in Buraydah.

SUBJECTS AND METHODS

Study design

Cross-sectional study

Study setting

Buraydah city, the capital of Qassim province, has a population of 668,319 according to 2018 estimated popukation.[23] There are 43 primary health care centers (PHCCs) in Buraydah city. These health centers are administratively supervised through two districts, north and south districts, with 21and 22 PHCCs respectively.

As most of hypertensive patients are registered at PHCCs, where medications are refilled monthly by PHCC doctors, we chose PHCCs to be our study setting.

***Study population*:** Adult hypertensive patients in Buraydah

Sampling Frame: All adult hypertensive patients (aged over 18 years) who attended selected PHC centers in Buraydah during the study period were eligible for inclusion.

Study period: August- September, 2019.

Inclusion criteria: Any adult hypertensive patient, of either genders (males and females), of any nationality, who visited selected PHCCs during the study period.

Exclusion criteria: Non-Arabic speaking hypertensive patients

Sample size:

Based on the sample size equation

$$n=z^2_{1-\alpha}\, p\,(1-p)$$

$$d^2$$

$\mathbf{Z}_{1-\alpha}$ is the value from the standard normal distribution reflecting the confidence level that will be used (Z = 1.96 for 95%)

d is the desired margin of error (0.06).

P is the proportion of depression in the hypertensive patients.[24] (p=0.48) i.e. 48% was used to generate the largest sample size.

Accordingly, the estimated sample size was 267 participants

Sampling technique

We used two stage sampling method to select our sample. In the first stage, we randomly selected 12 PHCCs, 28% of Buraydah PHCCs. We randomly selected six PHCCs from each district using Microsoft Excel command for random number generation. In the second stage, at each PHCC, we invited equal number of males and females to voluntarily participate in the study. Convenient sample of eligible PHCC attendees were invited to participate. We continued data collection daily until we fulfilled the targeted study sample.

Data collection: PHCC doctors or nurses collected this survey data. They distributed the questionnaires to the selected patients while they were waiting for their appointments with PHCC physicians. Patient selection did not follow any specific or unified method. A doctor or nurse was assigned in each health center for data collection. They were oriented about the survey, trained on selecting patients, and helping patients to fill up the questionnaire as well as interviewing illiterate patients.

They explained the purpose of the study to each participant, ensured understanding and took his or her verbal consent.

Patient who can read and write were given the questionnaire to fill it themselves, while data collectors administered the questionnaire for those who have reading difficulties. To ensure confidentiality, questionnaires were kept anonymous.

Data collection form (the questionnaire)

The questionnaire consisted of seven demographic characteristics (age, nationality, gender, marital status, educational level, employment status and monthly income), and the Arabic version of Patient health questionnaire-9 scale (PHQ-9) to assess for depression. The PHQ-9 is brief and useful in clinical practice. The PHQ-9 is completed by the patient in minutes and is rapidly scored by the clinician. The PHQ-9 can also be administered repeatedly, which can reflect improvement or worsening of depression in response to treatment.[25]

Scoring of PHQ-9 responses: The PHQ-9 has 9 questions with a score ranging from 0 to 3 for each setting to consider initiating treatment with antidepressants.[26] The following table describes the provisional diagnoses for scoring classes.

PHQ-9 score	Provisional diagnosis
• 0-4	None
• 5-9	Mild depression
• 10-14	Moderate depression
• 15-19	Moderately severe depression
• 20-27	Severe depression

Data analysis

Data were analyzed using SPSS software version 25. Categorical variables were presented as frequencies and proportions while continuous variables were described using arithmetic mean and standard deviation.

Categorical variables were compared using Chi-square test and P-value less than 0.05 was considered significant.

Ethical approval

The project proposal was reviewed and approved by Qassim Provincial Bioethics committee, approval number 1411793. We then got a written approval from the provincial PHCC director for field work. At each selected primary care center, we orient the PHCC director about the survey, arrange for data collection and ask for a volunteer coordinator.

RESULTS

During three weeks period, August-September 2019, we distributed 402 questionnaires at the selected 12 PHCCs in Buryadah. Two hundred and eighty participants completed the questionnaires, giving a response rate of 69.6%. Mean age of patients was 54.5 (+11.3), 84% were less than 65 years of age. Males and females were almost equal and majority were married (85.7%). Only seven participants were Non-Saudi citizens. About half had low income while around one third were illiterate, Table (1).

Overall, 46.1% of participants had uncontrolled BP (uncontrolled systolic or diastolic BP), 61.4% had 2 or more antihypertensive agents, and 9.3% had hypertension related complications. Other comorbidities were reported by 45.0% of patients. Of these, diabetes was the commonest, 36.7%. Minority of patients reported obesity, ischemic heart disease, or dyslipidemia, 3.2%, 3.2%, and 2.1% respectively, Table (2).

Assessment of lifestyle factors showed that about two thirds are physically active but only 14.6% declared having regular physical exercise and 7.9% were smokers. However, all

smokers were males, giving a 15.8% prevalence of smoking among our male participants. while no single female admitted being smoker. Females reported less activity than males (56.7% vs. 70.5%), this difference is statistically significant, P-value=0.0001. Literacy rate among females was also less than that of males, 57.4% compared to 82.7%, this difference is also statistically significant, P-value=0.0001.

Past history of depression among patients or their relatives was infrequently reported,4.3% and 5.4% respectively, while 3.9% reported recent loss of close relative.

Participants' detailed responses to PHQ-9 items are depicted in **Table** 3 with calculation of the mean score for each item. Among our hypertensive patients sample, prevalence of depression of any degree was 37.1% (95% CI= 31.5- 43.1%). Most of these had mild depression, 26.4% followed by moderate degree,7.5%, while moderately severe and severe were uncommon, 0.7% and 2.5% respectively.

Around one fifth of the total participants reported mild or moderate limitations of activities of daily life (ADLs).

There was no statistically significant difference between mean age of depressed and non depressed hypertensive patient, P- value 0.53. While being unmarried, illiterate, or low-income participants had significantly higher percentages of depression compared to their counterparts.(Table 4)

Regarding clinical factors, depression was not associated with BP control status but was significantly higher among those who had 2 or more antihypertensive drugs, 45% versus 24% compared with patients who are maintained on one drug, P-value= 0.0003.(Table5)

Table 1: Participants' sociodemographic characteristics.

Parameter	Category	Frequency	Percentage
Gender	Male	139	49.6
	Female	141	50.4
Nationality	Saudi	273	97.5
	Non-Saudi	7	2.5
Marital status	Single	3	1.1
	Married	240	85.7
	Divorced	11	3.9
	Widowed	26	9.3
No. children	0	6	2.1
	1	7	2.5

	2	13	4.6
	3	40	14.3
	4+	214	76.4
Educational level	Illiterate	84	30.0
	Up to primary school	39	13.9
	Up to secondary school	17	6.1
	Up to high school	62	22.1
	university degree	72	25.7
	Higher Education	6	2.1
Employment status	Employed	93	33.2
	Not employed	138	49.3
	Retired	49	17.5
Monthly income	<5000SR	134	47.9
	5000-10000SR	78	27.9
	>10000SR	68	24.3

Table 2: Participants' clinical characteristics.

Parameter	Category	Frequency	Percentage
Hypertension			
BP control	Controlled	151	53.9
	At least one uncontrolled	129	46.1
No. anti HTN medications	1	108	38.6
	2	121	43.2
	3	27	9.6
	4+	24	8.6
HTN complications	Yes	26	9.3
	No	254	90.7
Other clinical and lifestyle factors			
Associated comorbidity	None	154	55.0
	Yes	126	45.0
Smoking	No	258	92.1
	Yes	22	7.9
Physical activity	Yes some times	137	48.9
	Yes regular	41	14.6
	No	102	36.4
Family history of depression	Yes	15	5.4
	No	235	83.9
	Do not know	30	10.7
Personal history of depression	Yes	12	4.3
	No	252	90.0
	Do not know	16	5.7
Loss of close relative	Yes	11	3.9
	No	269	96.1

Table 3: Patient Heath Questionnaire PHQ-9.

Item	Level	N	%	Mean
Little interest or pleasure in doing things?	Not at all	168	60.0	0.50
	Severaldays	86	30.7	
	More than half the days	24	8.6	
	Nearly every day	2	0.7	
Feeling down, depressed, or hopeless?	Not at all	135	48.2	0.70
	Severaldays	104	37.1	
	More than half the days	32	11.4	
	Nearly every day	9	3.2	
Trouble falling or staying asleep, or sleeping too much?	Not at all	121	43.2	.069
	Severaldays	130	46.4	
	More than half the days	25	8.9	
	Nearly every day	4	1.4	
Feeling tired or having little energy?	Not at all	112	40.0	0.77
	Severaldays	130	46.4	
	More than half the days	29	10.4	
	Nearly every day	9	3.2	
Poor appetite or overeating?	Not at all	145	51.8	0.60
	Severaldays	107	38.2	
	More than half the days	23	8.2	
	Nearly every day	5	1.8	
Feeling bad about yourself — or that you are a failure or have let yourself or your family down?	Not at all	201	71.8	0.36
	Severaldays	60	21.4	
	More than half the days	16	5.7	
	Nearly every day	3	1.1	
Trouble concentrating on things, such as reading the newspaper or watching television?	Not at all	194	69.3	0.41
	Severaldays	64	22.9	
	More than half the days	14	5.0	
	Nearly every day	8	2.9	
Moving or speaking so slowly that other people could have noticed? Or sofidgety or restless that you have been moving a lot more than usual?	Not at all	228	81.4	0.26
	Severaldays	36	12.9	
	More than half the days	10	3.6	
	Nearly every day	6	2.1	
Thoughts that you would be better off dead, or thoughts of hurting yourself in some way?	Not at all	261	93.2	0.09
	Severaldays	14	5.0	
	More than half the days	5	1.8	
	Nearly every day	0	0.0	

Table 4: Sociodemographic factors associated with depression.

Parameter	Category	No depression (n=176)		Depression (n=104)		p-value
		N	%	N	%	
Gender	Male	92	66.2	47	33.8	
	Female	84	59.6	57	40.4	.252
Nationality	Saudi	172	63.0	101	37.0	
	Non-Saudi	4	57.1	3	42.9	.713[F]
Marital status	Single	0	0.0	3	100.0	
	Married	159	66.3	81	33.8	
	Divorced	4	36.4	7	63.6	
	Widowed	13	50.0	13	50.0	.010*
Marital status	Married	159	66.3	81	33.8	
	Other	17	42.5	23	57.5	.007*
No. children	0	2	33.3	4	66.7	
	1	5	46.2	2	28.6	
	2	6	55.0	7	53.8	
	3	22	65.9	18	45.0	
	4+	141	33.3	73	34.1	.206
Educational level	Illiterate	43	51.2	41	48.8	
	Primary	26	66.7	13	33.3	
	Secondary	15	88.2	2	11.8	
	High school	41	66.1	21	33.9	
	University degree	48	66.7	24	33.3	
	Higher Education	3	50.0	3	50.0	.052
Employment status	Employed	68	73.1	25	26.9	
	Not employed	74	53.6	64	46.4	
	Retired	34	69.4	15	30.6	.006*
Monthly income	<5000SR	74	55.2	60	44.8	
	5000-10000SR	53	67.9	25	32.1	
	>10000SR	49	72.1	19	27.9	.036*

Values are frequency/percentage, except if otherwise specified. * Statistically significant result ($p<0.05$); test used: [t] independent t-test, [F] Fisher's exact test, chi-square test was used otherwise.

Table 5: Clinical and lifestyle factors associated with depression.

Parameter	Category	No depression (n=176)		Depression (n=104)		p-value
		N	%	N	%	
BP control	Controlled	90	59.6	61	40.4	
	Uncontrolled	86	66.7	43	33.3	.223
Number of anti HTN medications	1	82	75.9	26	24.1	
	2	68	56.2	53	43.8	
	3	15	55.6	12	44.4	
	4+	11	45.8	13	54.2	.003*
HTN	Yes	14	53.8	12	46.2	

complications						
	No	162	63.8	92	36.2	.318
Associated comorbidity	None	103	66.9	51	33.1	
	Yes	73	57.9	53	42.1	.123
Smoking	No	163	63.2	95	36.8	
	Yes	13	59.1	9	40.9	.703
Physical activity	Yes some times	84	61.3	53	38.7	
	Yes regular	28	68.3	13	31.7	
	No	64	62.7	38	37.3	.719
Family history of depression	Yes	4	26.7	11	73.3	
	No	159	67.7	76	32.3	
	Do not know	13	43.3	17	56.7	<.001*
Personal history of depression	Yes	3	25.0	9	75.0	
	No	166	65.9	86	34.1	
	Do not know	7	43.8	9	56.3	.004*
Loss of close relative	Yes	6	54.5	5	45.5	
	No	170	63.2	99	36.8	.544[F]
ADL limitation	None	161	71.6	64	28.4	
	Mild or severe	15	27.3	40	72.7	<.001*

Values are frequency/percentage, except if otherwise specified. ADL: activities of daily life; * statistically significant result ($p<0.05$); test used: [t] independent t-test, [F] Fisher's exact test, chi-square test was used otherwise

DISCUSSION

Our hypertensive sample was mostly of middle aged Saudis who were generally of low income and low literacy level. More than one third of the sample were depressed, but severe depression was infrequent. As we lack depression prevalence studies in the Saudi community, we could not compare our values to the background community. Depression prevalence among PHCCs adult attendees was reported at variable frequencies ranging from 16% to 39.[4-6] This wide range is likely due to more utilization of PHCCs by sick and older individuals who are more liable to depression. Studies on depression prevalence among Saudi elderly PHCC attendees had been reported to be high.[5,6] largely exceeding WHO estimated depression prevalence among older adults; 3.6% for males and 5.1% for females.[1]

Depression among hypertensive patients had been found high, both locally and internationally.[12-22] This consistent finding was reported regardless of depression screening tool used or facility setting, PHCC or hospital. This was further consolidated by a meta-analysis of 41 studies, 31 form china and 10 outside china, revealed a pooled prevalence of 26.8% for depression among hypertensive patients.[17] Two local studies by Alhamidah at a

university hospital and by *Al-Lugmani* at one PHCC in Makkah. Both of these studies assessed depression prevalence among hypertensive patients using Beck depression scale. Our finding was higher than the hospital study, 20%, but much lower than that of the sole PHCC study, 66.7%. The latter had a very small number of participants, 54 subjects only. Similarly, the prevalence of depression among hypertensive patients was reported in the international studies at a wide range, 14.3%- 58.1%, including a major meta-analysis of 41 studies which got a pooled prevalence of 26.8%. the most frequent depression scale used was self depression scale, but few other different scales were used as well.

The present study aims to estimate the prevalence of depression and determine its associated factors among hypertensive patients in Buraydah, KSA.

Prevalence of depression among hypertensive patients

In the present study, the prevalence of depression among hypertensive patients was 37.1%, mainly mild (26.4) whereas moderately severe and severe forms were reported among 2.5% and 0.7% of patients, respectively. Different results were observed among various studies carried out either in KSA or outside it. In jeddah (KSA), Alhamidah et al utilized Arabic version of Beck Depression Inventory (BDI) scale revealed a prevalence of 20.7%,[12] which is lower than our figure. AlKhathami AD, et al reported in AlKhobar an overall prevalence of depression using the PHQ-9 tool as 48.7%; 39.8% mild, 7.1% moderate, and 1.8% severe,[13] which is higher than our figure. In Makkah Al-Mukarramah, Al-Lugmani EB reported a prevalence of 66.7% utilized BDI; it was severe among 37% of hypertensive patients,[14] which is also higher than our figure. Comparison of these figures with that reported in the present study is not practical as a result of using different tools to assess depression as well as different demographic characteristics and disease-related characteristics of the participants.

Concerning studies carried out outside KSA, in India, Prathibha et al reported a prevalence of 33.3% using the PHQ-9.[15] In Afghanistan, Hamrah MS, et al utilized the Hospital Anxiety and Depression Scale (HADS) questionnaire a reported a depression prevalence of 58.1% among hypertensive patients compared to 22.1% among general population.[16] A systematic review and meta-analysis revealed a pooled prevalence of 26.8% for depression among hypertensive patients in China.[17] In Pakistan, Mahmood S used the PHQ-9 found a prevalence rate for depression of 40.1% among hypertensives.[19] In Nepal, the prevalence was 15% using BDI.[18] In Brazil, using BDI, a prevalence of 20% was reported for depression among hypertensive patients.[22] Again, Comparison of these figures with ours

should be taken with caution as a result of using different tools to assess depression as well as different demographic characteristics and disease-related characteristics of the participants, in addition to cultural and norms variation between Saudi Arabia and these countries.

Associated Socio-demographic factors

In the current study, among socio-demographic predictors, depression was more reported among younger, unmarried, illiterate, and low-income hypertensive patients. In another study carried out in jeddah, Saudi Arabia, being female, of older age and being illiterate were the significant predictors of depression among hypertensive patients.[12] In AlKhobar,[13] low income had an independent significant effect on depression. Quite similar to findings of the present study, Al-Lugmani observed in a study carried out in Makkah Al-Mukarramah that not married patients, illiterate, with low income, being female, working as housewives or governmental employees were more prone to depression.[14] In India,[15] significant socio-demographic predictors of depression among hypertensive patients were gender, socio economic status, marital status, and low educational status. A systematic review and metaanalysis carried out by Li et al[17] revealed that the prevalence of depression was slightly higher among males than females (24.6% versus 24.4%). In Nepal,[18] socio-demographic determinants of depression were advancing in age, being female, and being illiterate. In Pakistan,[19] patient`s gender, age group, educational status, employment status, and socioeconomic status were the significant socio-demographic predictors of depression.[19] In India,[20] the prevalence of depression was higher among female patients and among those of upper socio-economic class.

Associated medical and hypertension-related factors

In accordance with others,[12,19] family history of depression was a significant predictor for depression among hypertensive patients in the current survey.

In studies carried out in Makkah Al-Mukarramah (KSA),[14] India,[15] and Pakistan,[19] lack physical activity was significantly associated with depression. However, in the present study, practicing physical exercise was not related to depression. In the current study, physical activity was assessed by a simple question, therefore, more details assessment of physical activity is recommended in further study.

In the current study, history of taking two or more anti-hypertensive medications was associated with depression. In another Saudi study, it was found that taking anti-hypertensive

medications regularly was significantly associated with low risk of depression.[12] In the present study, we did not investigate the impact of adherence to anti-hypertensive medications on depression. In Nepal, depression was more reported among hypertensive patients with no hypertensive medication.[18] Number of taking medications could reflect the control status of the disease. However, in accordance with others,[11,18] depression was not associated with blood pressure control status in this study. In disagreement with that, some others,[14,12] observed that patients with uncontrolled blood pressure were more likely to develop depression.

In accordance with numerous studies,[25-29] the present study reported that depression was associated with limited activities among hypertensive patients.

Depression prevalence among hypertensive patients studies, including ours, are not good to assess such relationships as these are health care based studies; usually of small size samples that were calculated to measure the prevalence not the relationships.

Study strengths and limitations

Among strengths of the present study, it is unique of its nature in Buraidah, included a good sample of hypertentensive patients and utilized a valid Arabic tool to assess depression. However, some important limitations of the present study should be mentioned. First, the cross-sectional design of the study limits our ability to make causal inference among studied associated factors. Second, elderly patients were less represented in our sample, as only those who presented to PHCCs could be included. Similarly, home-bound patients had no chance for inclusion in this study. These patients may have characteristics that distinguished them from our sample in relation to prevalence and determinants of depression among hypertensive patients, which consequently impacts the generalizability of results. Finally, some important independent factors were not investigated such as compliance to treatment and duration of hypertension.

CONCLUSION

Depression is common among hypertensive patients attended PHC centers in Buraydah as it affects more than a third of them. unmarried, illiterate, and low-income hypertensive patients were more likely to develop depression compared to their counterparts. Patients with family history of depression, and those treated by two or more anti-hypertensive medications were

more associated with depression. Depression was associated with limited activities among hypertensive patients.

RECOMMENDATIONS

Based on results of the present study, the following are recommended:

- Screening for depression among hypertensive patients.
- Effective and early management of depression among hypertensive patients as it may cause deterioration of the disease.
- Further longitudinal study included patients from other disciplines is highly recommended to have more clear profile about the situation in Buraidah

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