

## International Journal of Medical Science and Clinical Inventions

Volume 1 issue 9 2014 page no. 469-488 ISSN: 2348-991X

Available Online At: <http://valleyinternational.net/index.php/our-jou/iimsci>

### Depression Among Hypertensive Patients At Al-Hejrah PHC Center Makkah Al-Mukarramah

*Ebtesam Bakheet Al-Lugmani*

Alsharayaa Primary Health Care Center, Makkah, KSA

#### Correspondence to

*Dr. Ebtesam Bakheet Al-Lugmani*

Family Medicine Specialist

Alsharayaa Primary Health Care Center, Makkah, KSA

Mobile: 00966555733400

e-mail: [dr.allugmani@hotmail.com](mailto:dr.allugmani@hotmail.com)

#### ABSTRACT:

**Background:** Increased prevalence of depression has been described in hypertensive patients.

**Objectives:** To estimate the percentage of depression identified by Becks Depression Inventory scale (BDI) as screening tool among hypertensive patients and its associated factors at AL-Hejrah primary health care center (PHCC) Makkah Al-Mukarramah city, 2012.

**Subjects and Methods:** It was a cross-sectional analytic study included a representative sample of hypertensive patients attending chronic disease clinic at Al-Hejrah PHCC in Makkah Al-Mukarramah. Interviewing questionnaire consists of three parts was used for data collection. It included demographic data (nine items), associated factors (fifteen items) and BDI (valid in Arabic version).

**Results:** The study included 54 hypertensive patients attended and registered at Al-Hejrah PHCC. Their age ranged between 30 and 80 years with a mean of 53.8 years and standard deviation of 12.7 years. Slightly more than half of them were females (53.7%). Depression with various degrees of severity was reported among two thirds of hypertensive patients (66.7%). It was severe among 37% of them. Its prevalence was significantly higher among females, not-married, illiterate, low income, house wives or governmental

employee patients. In addition depression was significantly associated with lack of physical activity, family history of depression, low frequency of BP monitoring, uncontrolled BP and hypertension complications.

**Conclusions:** Depression was a highly prevalent disorder among hypertensive patients in Al-Hejrah PHCC, Makkah, Saudi Arabia. It is a complex clinical and social problem, influenced in part with patient characteristics as gender, level of education, income, job status, marital status, family history of depression and physical activity as well as factors related to the hypertension such as presence of complications and low rate of blood pressure follow-up.**Keywords:** *Hypertension; Depression; Becks Depression Inventory scale; Saudi Arabia*

## Introduction

Hypertension is a leading risk factor for mortality and morbidity worldwide, accounting for approximately 6% of global deaths.<sup>[1-3]</sup>

Hypertension affects between 20% to 50% of adults in most countries.<sup>[4]</sup> Hypertension affects approximately 72 million adults in the United

States<sup>[5, 6]</sup> and nearly one in three adults have the condition.<sup>[7]</sup> Poorly controlled hypertension results in end-organ damage and plays a major role in the development of myocardial infarction, stroke and end-stage kidney disease.<sup>[8]</sup>

Mental illnesses are a common problem in primary health care (PHC).<sup>[9]</sup> According to various authors, these disorders account for 24%-36% of all PHC patients.<sup>[10-12]</sup> Most of these are minor psychiatric disorders, presenting with depression, anxiety or somatization.<sup>[13]</sup>

The lifetime prevalence of major depression in adults is estimated to be 7 to 12

percent in men and 20 to 25 percent in women. The prevalence of depression in patients in primary care settings ranges from 5 to 10 percent. The rates are significantly higher in persons with certain medical conditions, including obesity, diabetes mellitus, hypertension, cancer, and a history of myocardial infarction.<sup>[14]</sup>

Depressive symptoms have been associated with incident hypertension in multiple epidemiological studies.<sup>[15]</sup> Increased prevalence of depression has been described in hypertensive patients. Rabkin et al. found a 3- fold higher frequency of major depression in patients treated for hypertension.<sup>[16]</sup>

Nevertheless, interactions between blood pressure (BP) and psychic factors have been observed. O'Hare observed that by asking hypertensive patients to talk about health problems or other life stresses, he could induce substantial increases in their BP, and while after resting quietly for 20 to 40 minutes, they had large drops in BP.<sup>[17]</sup>

Several longitudinal studies have supported an association between depressive symptoms and hypertension. <sup>[18]</sup> These studies have been in multiple populations and all show an approximately 2-fold increase in the odds of hypertension among adults with baseline depressive symptoms. <sup>[19-22]</sup>

A cross-sectional association of depression with high blood pressure has been reported in a representative national Canadian sample (age- and sex-adjusted prevalence odds ratio (OR)=1.2). <sup>[23]</sup> However, the clinical significance of cross-sectional associations are obscure: they may be due to an effect of high blood pressure on MD incidence, an effect of MD on high blood pressure incidence, or effects of one condition on the prognosis of the other. <sup>[24]</sup>

The current study aimed to estimate the percentage of depression identify by Becks Inventory as screening tool and its associated factors among hypertensive patients at AL-Hejrah primary health care center (PHCC) Makkah Al-Mukarramah city.

## Subjects and methods

Cross-sectional analytic study based on hypertensive patients attending AL-Hejrah PHCC, Makkah Al-Mukarramah was adopted. Makkah Al-Mukarramah is the holy capital located in the western part of the Kingdom of Saudi Arabia (KSA). Total population in Makkah Al-Mukarramah city in the last statistics at 2010 was around 1,675,368. <sup>[3725]</sup> Makkah Al-Mukarramah

has all governmental facilities and services; these include education, municipality, electricity and health. It has 7 governmental hospitals and 76 PHC centers. Al-Hejrah PHCC is one of the training centers for the researcher. It is one out of 76 PHC centers in Makkah Al-Mukarramah city. <sup>[3826]</sup> Total population covered by this center at 2012 is 22,577 peoples. This center provides a variety of services via different clinics including chronic disease clinic.

The total number of hypertensive patients is 340: 128 male and 212 female. The sample size was calculated to be 54 by using Raosoft website, with expected distribution of 20%, <sup>[3127]</sup> worst acceptable error of 10%, and a confidence level of 95%. The chronic disease clinics at Al-Hejrah PHCC were designed to be three days for female patients and the remaining two days for male patients. All eligible patients for this study were recruited from both female and male clinic five days per week for four weeks till the required sample size was obtained.

Hypertension was considered by the diagnosis and registration of AL-Hejrah PHCC. Interviewing questionnaire consists of three parts: demographic data (nine items), associated factors (twenty one items) and Becks Depression Inventory (twenty one items, valid in Arabic version). <sup>[3928]</sup>

Beck Depression Inventory (BDI) is a common popular tool to diagnose depression through designed 21 set of questions in which each question includes 4 item ranging from 0 to 3

, the BDI scale do not diagnose depression on clinical basis, but it assess depression severity in a given period of time (the past 7 to 14 days).<sup>[4029]</sup> The cut point to consider depression is score 10 or above.<sup>[4130]</sup> The Beck's Depression Inventory (BDI) questionnaire was found to have 100% sensitivity and 89% specificity when evaluated against diagnostic criteria.<sup>[4231]</sup>

The data were collected by interviewing hypertensive patients in their health care center by the researcher herself who interviewed all the eligible patients and filled the questionnaire over 1 month period till she obtained the required sample size. Each questionnaire took 5 to 7 minutes to be filled. Majority of patients were interviewed in the triage area after they finished measuring their vital signs and before they enter to the clinic. However, others were interviewed in the waiting area after they finished the clinic.

The researcher carried out a pilot study on 10 hypertensive patients who were attending and registered in Al-Rusifah PHCC by interviewing them to test the tool and the methodology of the study. Furthermore, necessary changes were made accordingly. These changes included modification and rephrasing in some demographic data and questions related to factors associated with depression.

Approval of the Joint Program of Family Medicine (JPFM) in Makkah was obtained. Permissions of the health director in Makkah city and Al-Hejrah PHCC director were obtained. Verbal consents were obtained from all patients

Data were entered to a personal computer and then analyzed by using Statistical Package for the Social sciences program version 20 (SPSS 20). Arithmetic mean, standard deviation, range, frequency and percentage were used for data description. Chi-square test was adopted to explore the association between depression with its severity and risk factors (as categorical variables). Fisher exact test was applied whenever indicated. Student's t-test was applied to compare the means of continuous variables (Age and number of children) among those with and without depression or with severity of depression. A p - value of less than 0.05 was adopted for statistical significance.

## Results

All hypertensive patients invited to participate in the study completed the questionnaire giving a response rate of 100%. However, some information were not obtained because of unavailability in the files or not reported by hypertensive patients. These were not representing more than 10%.

The study included 54 hypertensive patients attended and registered at Al- Hejrah PHCC. Table 1 presents their socio-demographic characteristics. Their age ranged between 30 and 80 years with a mean of 53.8 years and standard deviation of  $\pm 12.7$  years. Slightly more than half of them were females 29 (53.7%). The majority were Saudi 52 (96.3%). Thirty-two (59.3%) were married and number of children was over 3 in 29

(53.7%) of the hypertensive patients. Almost one-third of them were illiterate 17 (31.5%) and 15 (27.8%) were at least university graduated. Thirteen patients were governmental employee (24.1%). The salary was less than 3000 SR/month in 21 (38.9%) and above 10000 SR/month in 5 (9.3%) of hypertensive patients.

Table 2 illustrates the details of hypertension history of the hypertensive patients. Blood pressure was uncontrolled ( $\geq 140/90$  mmHg), as indicated from the figure of last measurement, among almost half of the hypertensive patients 26 (49.1%). Number of blood pressure follow-up over the last year was 6 times or less in 15 (30%) of them. Hypertension complications were reported by 14 (25.9%) of the participants. Number of antihypertensive drugs was more than three in more than one-third of hypertensive patients 20 (37%). ACEI 32 (61.5%), diuretics 26 (50%) and Beta-blockers 23 (44.2%) were the commonest antihypertensive used by patients.

Exactly one-third of the hypertensive patients 18 (33.3%) were current smokers. Twenty-three patients (42.6%) reported regular practice of physical exercise. As illustrated in figure 1, family history of depression was reported by 9 (16.7%) of hypertensive patients enrolled in the study while personal past-history of depression was reported by 8 (14.8%) of them. History of psychiatric therapy was cited by 5 (9.3%) of the hypertensive patients. Almost one-

third of the hypertensive patients 17 (31.5%) reported loss of a close relative recently.

As obvious from figure 2, depression with various degrees of severity was reported among two thirds of hypertensive patients 36 (66.7%). It was severe among 20 (37.0%) of them.

#### **Socio-demographic factors associated with depression among hypertensives:**

As shown in table 3, there was no significant association between age of the hypertensive patients and depression. Depression was significantly reported more among female hypertensive patients,  $p$ -value  $< 0.01$ . Fifteen (46.9%) of married hypertensive patients had depression compared to 21 (95.5%) of unmarried patients. This difference was statistically significant,  $p < 0.001$ . Also 15 (88.2%) of illiterate hypertensive patients had depression compared to 8 (53.3%) of university or above graduated patients. However, this difference was statistically not significant. Majority (90.5%) of house wives hypertensive patients and all of not working patients had depression while one of the 4 business men (25%) had depression,  $p$ -value  $< 0.01$ . Eighteen (85.7%) of low-salary hypertensive patients ( $< 3000$  SR/month) had depression compared to one (20%) of high salary patients ( $> 10000$  SR/month). This difference was statistically significant,  $p < 0.03$ .

#### **Habitual factors associated with depression among hypertensives:**

Although depression was more among non smoking hypertensive patients, however, this difference was statistically not significant as shown in table 4. Most patients not practicing physical exercise 25 (80.6%) had depression compared to only 11 (47.8%) of those practicing physical exercise had depression. This difference was statistically significant, p-value <0.02.

#### **Hypertension-related factors associated with depression among hypertensives:**

As illustrated in table 5, 17 (63%) of those having controlled blood pressure values compared to 19 (73.1%) of those having uncontrolled blood pressure values had no depression. However, this difference was statistically not significant. Hypertensive patients who followed up their blood pressure more frequently (>6 times/year) to have less depression 21 (60.0%) compared to 13 (86.7%) among those followed up their blood pressure less frequently ( $\leq 6$  times/year). However, this difference was statistically not significant. Ten (two-thirds) of patients who less frequently followed their blood pressure compared to 10 (28.7%) of those who more frequently followed their blood pressure showed severe depression, This difference was statistically significant, p-value <0.03. It was clearly evident from table 5 that there was no significant association between number of antihypertensive drugs taken by patients and their depression. Thirteen (71.4%) of patients with history of hypertension complications compared to 23 (62.5%) of those

without history of complications had depression. This difference was statistically significant, p-value <0.02.

#### **Psychiatric factors associated with depression among hypertensives:**

From table 6, 8 (88.9%) of patients with family history of depression compared to 13 (48.1%) of those without that history had depression. This difference was statistically significant, p-value <0.05. There was no significant association between personal history of depression and depression. This study failed to diagnose depression among only 2 (25%) of hypertensive patient with past history of depression. However, depression was discovered among 27 (64.9%) of hypertensive patient without past history of depression. There was no significant association between history of psychiatric therapy and depression. Although depression was more among hypertensive patients with positive history of recent loss of a close relative, however, this difference was statistically not significant.

#### **Discussion**

Increased prevalence of depression has been described in hypertensive patients in many studies. Rabkin et al. found a 3- fold higher frequency of major depression in patients treated for hypertension. <sup>[16]</sup> In An Indian study, a random sample of subjects attending hypertension clinic was clinically assessed for depression by



psychiatric examination and the depression rated using Beck Scale. 25% of the subjects attending hypertension clinic were found depressed and their mean score on Beck Scale was 21.76<sup>[4433]</sup>

An increased prevalence of depressive symptoms in hypertensive patients has been described by Adamis and Ball.<sup>[4534]</sup> They studied the co-morbidity between psychiatric and physical diseases in 75 elderly psychiatric inpatients, and found that cardiovascular and hypertensive patients had more depression than other chronically ill patients. Nakagawara et al<sup>[4635]</sup> also found an increased frequency of depression in hypertensive patients. Depressive mood has been associated with higher BP levels,<sup>[47, 48 36, 37]</sup> being positively associated with higher levels of systolic BP (SBP) and diastolic BP (DBP) in 24-hour BP monitoring of 54 subjects over 7 days.<sup>[36]</sup>

In Nigeria, Coker et al conducted a study to determine the pattern the levels of anxiety and depression among patients attending the hypertensive clinic of the department of medicine, Lagos State University Teaching Hospital, Ikeja, Lagos, Nigeria. Two hundred consecutive patients receiving treatment at the hypertensive clinic of the medical department of Lagos State University Teaching Hospital were administered with the hospital anxiety and depressive scale (HADS) to assess their levels of psychopathology. The findings showed that (4%) of the respondents suffered from anxiety and (2%) were diagnosed as suffering from depression. There was no

significant correlation between the ages of the patients and the incidences of anxiety and depression respectively. Also there was no significant relationship between gender and anxiety and depression. They concluded that, although the prevalence rates of depression were found to be low in their study, however, it has also demonstrated that hypertension and depression can co-morbid.<sup>[4938]</sup>

In accordance with aforementioned studies and others,<sup>[18-22]</sup> severe and extremely severe depression were reported among 37% of hypertensive patients. Epidemiologic data cannot definitely confirm a causal role, and the association may be due to shared etiologic factors. However, the increased risk may warrant screening for depressive symptoms among hypertensive subjects.<sup>[24]</sup>

The high prevalence of depression reported in the current study could be attributed to the fact that our sample was attendee of PHC with a relatively high rate of hypertension complications (14/54=25.9%).

Because of the high prevalence of depression among hypertensive patients, and its potential association with adverse outcomes, clinicians should have a high index of suspicion for depression in their patients.<sup>[2939]</sup>

In the current study, the BDI was used to detect the prevalence of depressive symptomatology and its expression in hypertensive patients. Although it was not

designed for diagnostic purposes, its epidemiologic utility has been evaluated in several studies, which concluded that it is a reliable and valid instrument for detecting depressive disorders in adolescents and adult populations. Several studies support the BDI's usefulness in measuring and predicting depression in adult samples. <sup>[50, 5140, 41]</sup> The scale's format is clear; it is simple to administer; and it is easily understood by this population. <sup>[5242]</sup>

In general, women hypertensive patients experience depression at a higher rate than men. <sup>[4635]</sup> In the present study, the prevalence of depression among female patients was significantly higher than male patients. Females were more likely to be depressed than males because the extensive gender and generational asymmetries in a joint family system are likely to put females at a particular risk of non-support, especially in the face of changes that degrade the family's traditional system of care. <sup>[4635]</sup>

Findings of the current study with respect to hypertensive patients' characteristics further demonstrated that depression was a complex interplay of medical, social, and economic factors. Unmarried patients as well as house wives had higher levels of depression. The health (as measured by frequency of blood pressure follow-up and complications), economic resources (as measured by income) and social status (as measured by level of education) were associated with depression.

An epidemiological study analyzed the longitudinal association between depressive symptomatology and BP control, stroke, and cardiovascular-related mortality in the elderly. This study demonstrated an increased risk of stroke among older patients with hypertension and high levels of depressive symptoms, and the association appeared to be a function of BP control, particularly in women. <sup>[5343]</sup> In the present study depression was significantly associated with low frequency of blood pressure follow-up and development of hypertension complications.

Although some researchers found an association between antihypertensive drugs and development of depression, <sup>[54, 5544, 45]</sup> in the present study, due to complexity of antihypertensive therapy as most of the patients were treated by more than one drug (74.1%) and a small sample size (n=54), such an association was not evident.

Among strengths of the present study, a diverse array was considered for patient characteristics that could possibly influence depression. However, this study also had some limitations. First, the generalizability of findings is uncertain because we studied only patients attended one primary health care center in Mahhak (Al-Hejrah). However, this impact on generalizability is balanced by diversity of patients (age, gender and disease status). Second, relatively small sample size. Third, measure of depression was the BDI and not a DSM-IV diagnosis of depression. Fourth, the cross-



sectional nature of the study, makes it difficult to differentiate whether some variables influence depression among hypertensive patients versus whether patient's depression influences the reporting of these variables. Finally, many of predictor variables were based on patient reports and it is possible that these reports may have been influenced by depression.

In conclusion, depression was highly prevalent disorder among hypertensive patients in (Al-Hejrah PHCC) Makkah, Saudi Arabia. It is a complex clinical and social problem, influenced in part by patient characteristics as gender, level of education, income, job status, marital status, family history of depression and physical activity. Moreover, it was associated with factors related to the hypertension such as presence of complications and low rate of blood pressure follow-up.

### Acknowledgments

I would like to express my sincere thanks and deepest gratitude to Dr. Bakr Bakr Kalo for his fruitful directions, useful advice, professional cooperation and endless support during the conduction of this work. Special thank goes to the academic supervisor Dr. Hanan Bin Gabous for her continuous support and advice.

### References

1. Murray CJL, Lopez AD. Alternative projections of mortality and disability by cause 1990–2020: Global Burden of

Disease Study. *The Lancet* 1997; 349: 1498–504.

2. Lopez AD, Mathers CD, Ezzati M, Jamison DT, Murray CJL. Global and regional burden of disease and risk factors, 2001: systematic analysis of population health data. *The Lancet* 1997; 367: 1747–57.
3. Department of Health South Africa. South Africa Demographic and Health Survey – 1998, South Africa.
4. Hajjar I, Kotchen J, Kothcen T. Hypertension: trends in prevalence, incidence and control. *Annu Rev Public Health*. 2006; 27:465-490.
5. Cutler JA, Sorlie PD, Wolz M, Thom T, Fields LE, Roccella EJ. Trends in hypertension prevalence, awareness, treatment, and control rates in united states adults between 1988–1994 and 1999–2004. *Hypertension* 2008; 52:818–827.
6. Rosamond W, Flegal K, Friday G, Furie K, Go A, Greenlund K, Haase N, et al. American Heart Association Statistics Committee and Stroke Statistics

- Subcommittee. Heart disease and stroke statistics 2007 update. A report from the American heart association statistics committee and stroke statistics subcommittee. *Circulation* 2007; 115:e69–171.
7. Fields LE, Burt VL, Cutler JA, Hughes J, Roccella EJ, Sorlie P. The burden of adult hypertension in the United States 1999 to 2000: A rising tide. *Hypertension* 2004; 44:398–404.
8. Wolf-Maier K, Cooper RS, Banegas JR, Giampaoli S, Hense HW, Joffres M, Kasterinen M, et al. Hypertension prevalence and blood pressure levels in 6 european countries, canada, and the united states. *JAMA* 2003; 289:2363–2369.
9. World Health Organization (WHO). Recognition and management of patients with functional complaints. Regional Office for South-East Asia. New Delhi; 1989.
10. Sartorius N, Ustun B, Silva J, Goldberg D, Lecrubier Y, Ormel J, et al. An International Study of Psychological Problems in Primary Care: Preliminary Report From the WHO Collaborative Project on ‘Psychological Problems in General Health Care’. *Arch Gen Psychiatry* 1993; 50: 819-824.
11. Joukamaa M, Lehtinen V, Karlsson H. The ability of general practitioners to detect mental disorders in primary health care. *Acta Psychiatrica Scand* 1995; 91; 52-56.
12. Ormel J, Maarten W, Koeter J, Brink W, Willige G. Recognition, Management, and Course of Anxiety and Depression in General Practice. *Arch Gen Psychiatry* 1991; 48: 700-706.
13. Sen B, Williams P. The extent and nature of depressive phenomena in PHC. *Br J Psychiatry* 1987; 151: 486-493.
14. Sharp LK, Lipsky MS. Screening for Depression across the lifespan: a review of measures for use in primary care settings. *Am Fam Physician*. 2002 Sep 15; 66(6): 1001-1009.
15. Rutledge T, Hogan BE. A quantitative review of prospective evidence linking psychological factors with hypertension

- development. *Psychosom Med.* 2002; 64:758–766.
16. Rabkin J, Charles E, Kass F. Hypertension and DSM-III depression in psychiatric outpatients. *Am J Psychiatry.* 1983; 140(8):1072-4.
17. Light KC. Psychosocial precursors of hypertension: Experimental evidence. *Circulation.* 1987; 76(SupplI):67-76.
18. Delaney JAC, Oddson BE, Kramer H, Shea S, Psaty BM, McClelland RL. Baseline depressive symptoms are not associated with clinically important levels of incident hypertension during two years of follow-up: The Multi-Ethnic Study of Atherosclerosis. the multi-ethnic study of atherosclerosis. *Hypertension* 2010;55(2):408-14
19. Jonas BS, Franks P, Ingram DD. Are symptoms of anxiety and depression risk factors for hypertension? Longitudinal evidence from the National Health and Nutrition Examination Survey I Epidemiologic Follow-up Study. *Arch Fam Med.* 1997; 6:43– 49.
20. Davidson K, Jonas BS, Dixon KE, Markovitz JH. Do depression symptoms predict early hypertension incidence in young adults in CARDIA study? *Arch Intern Med.* 2000; 160:1495–1500.
21. Meyer CM, Armenian HK, Eaton WW, Ford DE. Incident hypertension associated with depression in the Baltimore Epidemiologic Catchment area follow-up study. *J Affect Disord.* 2004; 83:127–133.
22. Patten SB, Williams JV, Lavorato DH, Modgill G, Jette´ N, Eliasziw M. Major depression as a risk factor for chronic disease incidence: longitudinal analyses in a general population cohort. *Gen Hosp Psychiatry.* 2008; 30:407– 413.
23. Patten SB, Beck CA, Kassam A, Williams JVA, Barbui C, Metz LM. Long-term medical conditions and major depression: strength of association in the general population. *Can J Psychiatry* 2005; 50:195–202.
24. Patten SB, Williams JVA, Lavorato DH, Campbell NRC, Eliasziw M, Campbell TS. Major Depression as a Risk

- Factor for High Blood Pressure: Epidemiologic Evidence From a National Longitudinal Study. Psychosomatic Medicine.2009; 71:273–279.
25. Holy Makkah Municipality website, Makkah statistics, available at: <http://www.holymakkah.gov.sa/Makka/Statistics.aspx>.
26. Ministry of health official website at 2010 – 1431, available at [http://www.moh.gov.sa/statistics/indi\\_phc.html](http://www.moh.gov.sa/statistics/indi_phc.html)
27. Amaral GFI; Jardim PCBV, Brasil MAA, Souza ALL, Freitas HF, Taniguchi LM, et al. Prevalence of major depressive disorders in a reference center for the treatment of hypertension. Rev. psiquiatr. Rio Gd. Sul 2007; 29 (2): 101-118
28. Abdel-Khalek A. Internal consistancy of an Arabic Adaptation of the Becks Depression Inventory in four Arab countries. Psychol Rep 1998; 82(1): 264-6.
29. Beck AT, Steer RA, Brown GK. BDI-II, Beck depression inventory: mannual. 2nd ed. Boston: Harcourt Brace, 1996.
30. Sadock J, Sadock V. Comprehensive textbook of psychiatry, 8th Edition, 2005 Volum I chapter7, Psychiatric Rating Scales.
31. Sharp LK, and Lipsky MS. Screening for Depression Across the lifespan: A Review of Measures for Use in Primary Care. Am Fam Physician. 2002 Sep 15;66(6):1001-8.
32. Mancia G. Blood pressure and heart rate variabilities in normotensive and hypertensive human beings. Circ Res 1983; 53:96-104.
33. Ramachandran V, Parikh GJ, Srinivasan V. Depression in hypertensive subjects. Indian J. Psychiat 1983; 25(4):260-267
34. Adamis D, Ball C. Physical morbidity in elderly psychiatric inptients: Prevalence and possible relations between the major mental disorders and physical illness. Int J Geriatr Psychiatry. 2000;15(3):248-53.
35. Nakagawara M, Witzke W, Matussek N. Hypertension in depression. Psychol Res. 1987;21(1):85-6.
36. Shinagawa M, Otsuda K, Murakami S, Kubo Y, Cornelissen G, Matsubayashi K

- et al. Seven-day (24-h) ambulatory blood pressure monitoring, self-reported depression and quality of life scores. *Blood Press Monit.* 2002;7(1):69-76.
37. Hughes JW, Stoney CM. Depressed mood is related high frequency heart-rate variability during stressors. *Psychosom Med.* 2000;62(6):796-803.
38. Coker AO, Adebola AP, Adewuya AO, Ola BO. Short Report: Anxiety and Depression in Hypertensive Patients Receiving Treatment in a Lagos State University Teaching Hospital. *Nigerian Journal of Clinical Medicine* 2010; 3(2): 1123-1126.
39. Reiff M, Schwartz S, Northridge M. Relationship of Depressive Symptoms to Hypertension in a Household Survey in Harlem. *Psychosomatic Medicine.* 2001; 63:711–721.
40. Barrera M Jr, Garrison-Jones CV. Properties of the Beck Depression Inventory as a screening instrument for adolescent depression. *J Abnorm Child Psychol* 1988; 16: 263-773.
41. Bennett DS, Ambrosini PJ, Bianchi M, Barnett D, Metz C, Rabinovich H. Relationship of Beck Depression Inventory factors to depression among adolescents. *J Affect Disord* 1997; 45: 127-134.
42. Teri L. The use of the Beck Depression Inventory with adolescents. *J Abnorm Child Psychol* 1982; 10: 277-284.
43. Simonsick E, Wallace R, Blazer D, Berkman L. Depressive symptomatology and hypertension-associated morbidity and mortality in older adults. *Psychosom Med.* 1995;57(5):427-35.
44. Bogner HR, de Vries HF. Integration of Depression and Hypertension Treatment: A Pilot, Randomized Controlled Trial. *Ann Fam Med.* 2008 July; 6(4): 295–301.
45. Ried LD, Tueth MJ, Handberg E, Kupfer S, Pepine CJ, INVEST Study Group. A Study of Antihypertensive Drugs and Depressive Symptoms (SADD-Sx) in patients treated with a calcium antagonist versus an atenolol hypertension Treatment Strategy in the International Verapamil

SR-Trandolapril Study (INVEST). Jun;67(3):398-406.  
Psychosom Med. 2005 May-

**Table (1): Distribution of hypertensive patients participated in the study according to their socio-demographic characteristics.**

<b>Socio-demographic characteristics</b>	<b>No.</b>	<b>%</b>
<b>Mean age in years</b> 30 – 80 years $\pm$ 12.7	-	-
<b>Gender</b>		
Male	25	46.3
Female	29	53.7
<b>Nationality</b>		
Saudi	52	96.3
Non-Saudi	2	3.7
<b>Marital status</b>		
Single	3	5.6
Married	32	59.3
Divorced	5	9.3
Widowed	14	25.8
<b>Number of children</b>		
None	6	11.1
1-3	19	35.2
>3	29	53.7
<b>Educational level</b>		
Illiterate	17	31.5
Primary	12	22.2
Intermediate	4	7.4
Secondary	6	11.1
University/postgraduate	15	27.8
<b>Type of job</b>		
Governmental	13	24.1
Business	4	7.4
House wife	21	38.9
Not working	6	11.1
Retired	10	18.5
<b>Salary</b>		
<3000 SR	21	38.9
3000-5000 SR	13	24.1
5000-10000 SR	15	27.8
>10000	5	9.3



**Table (2): Description of hypertension history among hypertensive patients.**

Variables	No.	%
<b>Last measured Blood pressure (53)</b>		
Controlled	27	50.9
Uncontrolled*	26	49.1
<b>Number of BP follow-up over the last year (50)</b>		
≤6	15	30.0
>6	35	70.0
<b>Number of anti-hypertensive drugs/day (54)</b>		
One	14	25.9
Two	8	14.9
Three	12	22.2
More than three	20	37.0
<b>Types of anti-hypertensive drugs (52)**</b>		
Beta-blockers	23	44.2
Diuretics	26	50.0
ACEI	32	61.5
ARB	2	3.8
Calcium channel blockers	6	11.5
<b>Complications</b>		
Yes	14	25.9
No	40	74.1

\*  $\geq 140/90$  mmHg<sup>[4332]</sup> \*\* the sum is more than 52 due to combinations

**Table (3): Distribution of the hypertensive patients participated in the study according to demographic characteristics and depression.**

	Depression		P-value
	NO n=18 N (%)	YES n=36 N (%)	
<b>Age in years</b> Mean (SD)	49.2 (12.3)	53.3 (13.4)	<b>0.730</b>
<b>Gender</b> male (25) Female (29)	13 (52.0) 5 (17.2)	12 (48.0) 24 (82.8)	<b>0.007</b>
<b>Marries status</b> Married (32) Unmarried (22)	17 (53.1) 1 (4.5)	15 (46.9) 21 (95.5)	<b>&lt;0.001</b>
<b>Education</b> Illiterate (17) <university (22) ≥University (15)	2 (11.8) 9 (40.9) 7 (46.7)	15 (88.2) 13 (59.1) 8 (53.3)	<b>0.070</b>
<b>Job status</b> Governmenta 1 (13) Business (4) Not working (6) Retired (10) House wife (21)	6 (46.2) 3 (75.0) 0 (0.0) 7 (70.0) 2 (9.5)	7 (53.8) 1 (25.0) 6 (100.0) 3 (30.0) 19 (90.5)	<b>(0.001)</b>
<b>Income SR/month</b> <3000 (21) 3000-5000 (13) 5001-1000 (15) >10000 (5)	3 (14.3) 4 (30.8) 7 (46.6) 4 (80.0)	18 (85.7) 9 (69.2) 8 (53.3) 1 (20.0)	<b>(0.021)</b>

**Table (4): Distribution of the hypertensive patients participated in the study according to habitual characteristics and depression.**

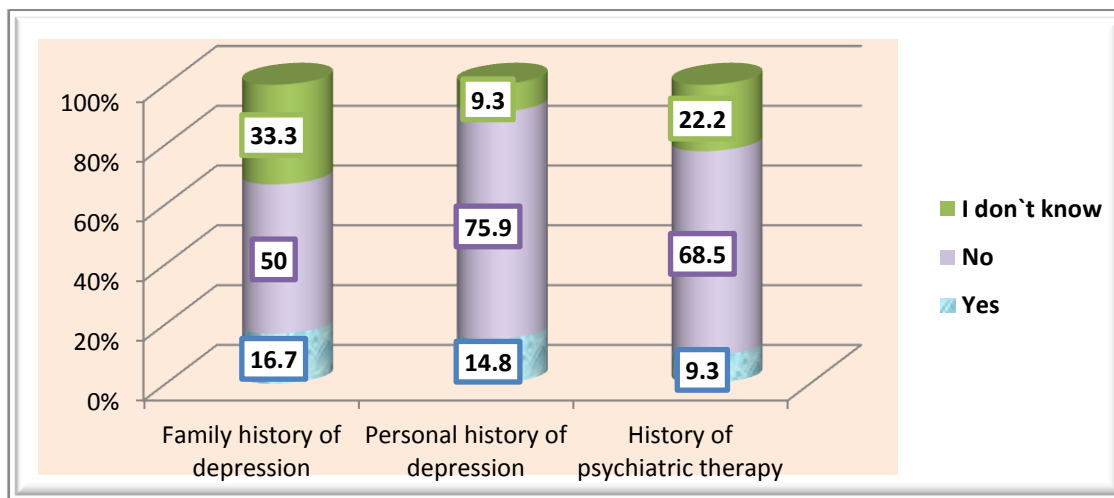
	Depression		P-value
	NO n=18	YES n=36	
<b>Smoking</b>			
Yes (18)	8 (44.4)	10	<b>0.221</b>
No (36)	10 (27.8)	(55.6) 26 (72.2)	
<b>Regular exercise</b>			
Yes (23)	12 (52.2)	11 (47.8)	<b>0.013</b>
No (31)	6 (19.4)	25 (80.6)	

**Table (5): Distribution of the hypertensive patients participated in the study according to their history of blood pressure control and depression.**

	Depression		P-value
	NO n=17	YES n=36	
<b>Blood pressure control</b>			
Controlled BP (27)	10 (37.0)	17 (63.0)	<b>0.311</b>
Uncontrolled BP (26)	7 (26.9)	19 (73.1)	
<b>Blood pressure follow-up</b>			
≤ 6 (15)	2 (13.3)	13 (86.7)	<b>0.060</b>
>6 (35)	14 (40.0)	21 (60.0)	
<b>Number of anti-hypertensives</b>			
One (14)	4 (28.6)	10 (71.4)	<b>0.402</b>
Two (8)	3 (37.5)	5 (62.5)	
Three (12)	2 (16.7)	10 (83.3)	
>Three (20)	9 (45.0)	11 (55.0)	
<b>Complications</b>			
Yes (14)	1 (7.1)	13 (71.4)	<b>0.014</b>
No (40)	17 (42.5)	23 (62.5)	

**Table (6): Distribution of the hypertensive patients participated in the study according to psychiatric history and depression.**

	Depression		P-value
	NO	YES	
<b>Family history (n=36)</b>			
Yes (9)	1 (11.1)	8 (88.9)	<b>0.015</b>
No (27)	14 (51.9)	13 (48.1)	
<b>Personal history (n=49)</b>			
Yes (8)	2 (25.0)	6 (75.0)	<b>0.477</b>
No (41)	14 (34.1)	27 (64.9)	
<b>History of psychiatric therapy</b>			
Yes (5)	2 (40.0)	3 (60.0)	<b>0.547</b>
No (37)	12 (32.4)	25 (67.6)	
<b>Relative loss</b>			
Yes (17)	3 (17.6)	14 (82.4)	<b>0.097</b>
No (37)	15 (40.5)	22 (59.5)	



**Figure (1): Psychiatric history of hypertensive patients.**

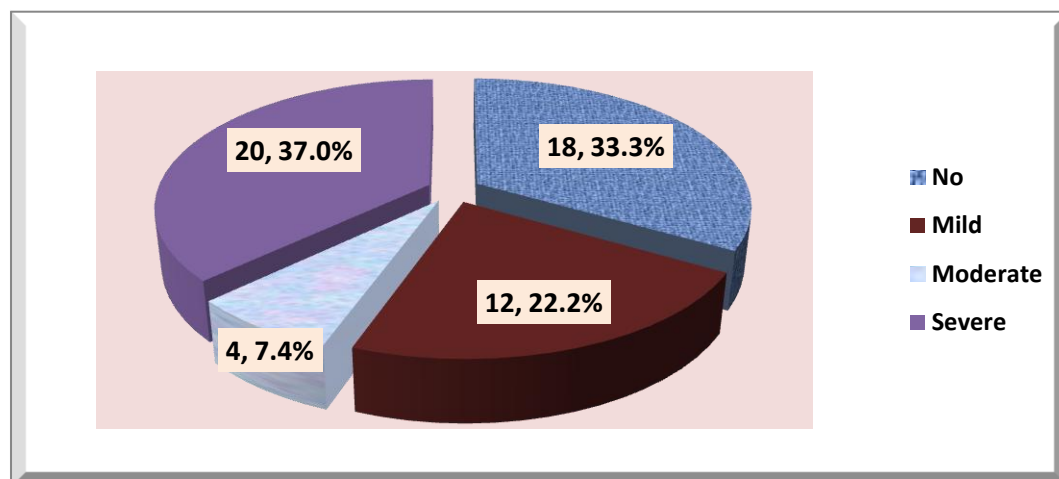


Figure (2): Prevalence of depression based on Beck inventory scale among hypertensive patients.