

Association of Deepression and Anxiety With Uncontrolled Hypertension: a Cross-sectional Study in Southwest Nigeria

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Abstract

Background

Hypertension is a medical condition of public health concern that increases the risk for chronic non-communicable diseases and mortalities. In recent years, understanding its co-existence with other comorbidities have been the focus of better management. However, the relationship between hypertension and depression or anxiety has been contentious with diverse findings reported by different studies. Understanding the relationship between depressive and anxiety disorders and hypertension control will be crucial for reducing the mortality associated with hypertension. Therefore, this study was conducted to determine the association between depression or anxiety and hypertension control.

Methods

A cross-sectional study was conducted among 321 hypertensive patients accessing care in two hospitals. Depression and anxiety symptoms were assessed using the Hospital Anxiety and Depression Scale. Relationship between uncontrolled hypertension and depression or anxiety was assessed using binary logistics regression.

Results

The prevalence of depression and anxiety was 12.1% and 23.1% respectively. Total of 60 and 261 of the participants had controlled and uncontrolled blood pressure respectively. Out of the 261 participants with uncontrolled blood pressure, 14.2% and 23.4% had depression and anxiety respectively. Depression (OR=7.751, 95% CI=1.79-43.4, P=0.011) was associated with an increased risk for uncontrolled blood pressure after adjusting for sex, smoking of cigarette, age, marital status, and exercise.

Conclusion

There is a statistically significant relationship between depression and uncontrolled blood pressure. It is therefore relevant for healthcare providers to assess for depression in patients with hypertension and provide treatment to achieve hypertension control.

Background

Hypertension is a medical condition of public health concern that increases the risk for cardiac, brain, kidney, and other diseases affecting other organs of the body. It is a major cause of premature death worldwide, and a leading cause of morbidity and mortality. Globally, about 1.28 billion adults between the ages of 30 and 79 years are living with hypertension and about two-thirds of these live in low- and middle-income countries (LMICs). Some of the risk factors for Hypertension include unhealthy diet, physical inactivity, overweight, alcohol consumption, use of cigarettes, and other co-existing disease conditions like diabetes and kidney diseases.(1)

About 46% of adults with hypertension are not aware that they have this health challenge while only about 42% of adults with hypertension are diagnosed and treated, with about 79% of those on treatment failing to achieve blood pressure control.(1) Factors such as eating healthy diet, engaging in physical activities, reduction of weight, and avoiding alcohol and use of cigarettes have been shown to be important factors in achieving blood pressure control.

Psychological variations among individuals are also known to play important role in the etiology of essential hypertension. However, the exact mechanism through which these variations act or the specific conditions that may be implicated still remains unclear (2, 3) Globally, depressive and anxiety disorders are the commonest psychiatric diseases. (4) It is a leading cause of disability globally and contributes significantly to the overall global burden of disease.(5, 6) The picture is also similar in outpatient clinics and community settings wherein these twin conditions are common psychiatric manifestations often encountered. (7–9) Reports from studies in Nigeria have also documented that the commonest psychiatric disorders were depressive and anxiety disorder. (10–12) Thus, it makes sense to examine the association between these twin conditions and hypertension control.

Some studies have demonstrated an association between mental health disorders and some established cardiovascular disease risk factors.(13–16) However the relationship between hypertension and psychological disorders has been quite a contentious issue with diverse findings being reported by different studies.(17) Furthermore, identifying comorbid psychiatric situations is very important because the morbidity and mortality resulting from depression are higher when it coexists with other medical illnesses.(18, 19) Although, depression is associated with mortality in chronic heart failure patients, the pathway always appears to be multifactorial and still unclear.(20) In hypertensive patients, the relationship is quite unclear as some medications may also potentiate depression while patients in a depressed state may also lose interest in taking medications.(21) Notwithstanding, understanding the relationship between depressive and anxiety disorders and the management of hypertension will be crucial for reducing the mortality associated with the comorbidities.

Therefore, this study was conducted to determine the association between depression or anxiety and hypertension control.

Methods

Study setting.

The study was carried out in two health centres in Mainland Local Government Area (LGA) in Lagos State, Southwest Nigeria. The two health centres are the Ebutte Meta Health Centre, Oyingbo and the Harvey Road Health Centre and Maternity, Yaba. The Ebutte Meta Health Centre operates on a 24-hour basis per day and it is mainly run as an out-patient health facility at the general out-patient department (GOPD). The average daily clinic attendance at this GOPD. clinic is 200 patients. The Harvey Road Health Centre and Maternity, Yaba open to the public 24 hours a day and every day of the week including public holidays, and the average daily patient attendance ranges between 40 and 50 patients.

Study Population

A total of 321 patients participated in this study with the study population consisting of hypertensive patients attending the GOPD at both health facilities stated above.

Study design

The study was a cross-sectional study conducted at two health facilities in Lagos, southwest Nigeria among adult patients who are living with hypertension.

Inclusion and exclusion criteria

Confirmed hypertensive patients (i.e., blood pressure above 140/90 millimeter of mercury-mmHg at the first visit and subsequently confirmed according to standard protocol) on antihypertensive medications were included in the study. Hypertensive patients who were suffering from other chronic medical conditions such as diabetes, bronchial asthma, arthritis and peptic ulcer disease were excluded. Also, hypertensive patients with history of psychiatric illness or the use of psychotropic medications such as anxiolytics, antidepressants and antipsychotics in the last 6 months were excluded from the study. All pregnant hypertensive women attending the health centres were also excluded.

Sampling technique

Hypertensive patients attending the GOPD clinic of the two health centres were recruited consecutively on every clinic day over a period of six weeks until the minimum sample size of 321 was attained.

Hypertensive patients were defined as those with a blood pressure of above 140 mmHg systolic and/or above 90 mmHg diastolic or patients on antihypertensive medications.

Data collection instruments

Patients at the two study locations completed a comprehensive set of questionnaires that included sections on sociodemographic characteristics, risk factors for hypertension such as smoking, alcohol drinking habits, sedentary lifestyle, obesity and family history of hypertension. The Hospital Anxiety and Depression (HAD) scale was used to identify Psychiatric morbidity (anxiety and depression). (22)

Blood pressure and Anthropometric variables

Two measures of systolic and diastolic blood pressure were taken after the patient have rested for at least 10 minutes after coming into the consulting room. The time interval between the two measurements was at least 10 minutes with the first measurement being taken at the beginning of the interview and the second in the end. The weight and the height of each participant were measured, and the body mass index (BMI) was computed from the figure obtained. The abdominal girth was also measured at the level of the umbilicus using a non-expandable measuring tape.

Screening for Depression and Anxiety

Screening for psychiatric morbidity was carried out with the aid of a self-rated questionnaire using the Hospital Anxiety and Depression (HAD) scale which has been validated in this environment.(23)

The hospital anxiety depression scale (HAD)

The HAD is a 14-item scale designed by Zigmond and Snaith in 1983 to detect anxiety and depression in general medical outpatient populations. Seven questions in HAD scale measure anxiety symptoms and seven measure depression symptoms. The answer to each question was scored on a scale of 0-3 and the total for the anxiety and depression scale was computed separately. A cut-off point of 8 and above on the HAD sub-scales was used to identify subjects with the presence of anxiety and depression among participants in this study. The HAD score was categorized into two groups based on the cutoff score of 8. Patients scoring 8 and above were considered as likely to have the disorder.(22,23)

Data management

Data was processed and analysed using IBM SPSS version 23.0. The participants were grouped into controlled blood pressure and uncontrolled blood pressure groups (controlled blood pressure defined as 90-140mmHg systolic and/ 60-90mmHg diastolic). First, bivariate analysis was done to determine factors associated with uncontrolled blood pressure. All factors at the 20% level of statistical significance were then included in a logistic regression model to explore the association. In addition, other factors from previous studies (24–26) that are related to blood pressure control and depression or anxiety were included in the model and adjusted for. Such factors included exercise, level of education, alcohol use, employment status, weight and gender.

Ethical consideration

Ethical approval was obtained from the Ethical and Research Committee of the Federal Neuropsychiatric Hospital, Yaba, Lagos. All methods in this study were performed in accordance with the guidelines and regulations of the approving institution. Informed consent was obtained from all the study participants in writing.

Results

A total of 321 persons living with hypertension participated in this study. Most of the respondents 234 (72.9%) were females. The ages of the respondents ranged from 35 to 65 years with most (67%) from the middle-aged group. About three-quarters (76.3%) of the respondents were married, Table 1.

A total of 60 (18.7%) and 261 (81.3%) of the participants had controlled blood pressure and uncontrolled blood pressure respectively. Among the participants, 39 (12.1%) and 74 (23.1%) had symptoms of depression and anxiety respectively. Among the respondents with depression 31(79.5%) were females and among those with anxiety 59(79.3%) were also females. Out of the 261 respondents with uncontrolled blood pressure, 37 (14.2%) had depression while 61 (23.4%) had anxiety.

Also, 133 (41.4%) of the participants were obese, 128 (39.9%) had close relatives with hypertension, 216 (67.3%) did not engage in physical exercise, 12 (3.7%) smoked cigarette, while 67 (20.9%) used alcohol, table 2.

Uncontrolled blood pressure was found more among 82.9% of those physically inactive, all those who smoke cigarettes, 82.1% of those who used alcohol and 82.7% of those who were obese, Table 3.

Among the participants who had depression, 94.9% had uncontrolled blood pressure and this was statistically significant $P = 0.02$. Also, in the participants who had anxiety, 82.4% had uncontrolled blood pressure, but this was however not statistically significant $P = 0.78$, table 3.

Only those with depression (OR=7.751, 95% CI=1.79-43.4, $P=0.011$) had increased odds of having uncontrolled blood pressure compared to those without depression on logistic regression. This association remained after adjusting for sex, smoking of cigarettes, age, marital status, and exercise, table 4.

Discussion

Different studies have reported diverse findings on the relationship between hypertension and depression or anxiety making the relationship between hypertension and depression or anxiety contentious. (17) In this study we assessed the relationship between the presence of the symptoms of depression or anxiety and uncontrolled hypertension. More females (72.9%) compared to males participated in this study, this may be because women seek healthcare more when within the age group that participated in this study. (27–29) We found that cigarette smoking, marital status, depression and age were associated with uncontrolled hypertension. Furthermore, depression was found to be associated with uncontrolled hypertension even after adjusting for confounders.

Depression was found more among the women as greater than three-quarters of those with depression were women. This is similar to other hospital-based studies in Nigeria and LMICs. (7, 12, 27, 30, 31). Higher prevalence of depression among women has been attributed to factors, such as hormonal fluctuations, higher rates of illness, and a more severe mental burden with regards to women's cultural role and relationships, especially in LMICs. (32) Although these attributes were not the focus of this study, they may serve as future areas of research.

Depression and anxiety are common mental disorders and they are among the leading causes of disability globally and contributes significantly to the overall global burden of disease. (5, 6, 33) In

Nigeria, various studies have found different prevalence for depression (10, 11, 27, 28, 34) and anxiety (10, 34) in the various regions of the country.

About one-quarter and one-eighth of the study participants had anxiety and depression scores respectively above the cutoffs.(22, 23) The proportion of respondents with symptoms of anxiety or depression in this study is similar to that in a study in India.(13) reaffirming that anxiety and depression are common comorbidities among patients who have hypertension.(13, 35) In addition depression and anxiety were found more among the middle aged adults and the elderly and this was consistent with findings of a study in Afghanistan among adults with hypertension. (36) The study attributed this finding to the poor level of mental health services and facilities and the delay in accessing healthcare due to cost especially in LMICs resulting in the challenge of diagnosing depression and anxiety at their onset among the younger age. (35, 36)

The factors found to be related to uncontrolled blood pressure in this study were cigarette smoking, marital status, depression and age. Uncontrolled blood pressure was found more among the participants who were cigarette smokers, those who were single, those depressed and those that were in the elderly aged group. Similar hospital-based studies also found these factors to be associated with uncontrolled blood pressure.(24, 26). There was however no relationship between anxiety and blood pressure control in this study and this was similar to the finding of a study done in Pakistan (16) where anxiety was found not to be associated with blood pressure control among the study participants.

Furthermore, after adjusting for sex, cigarette smoking, age, marital status and exercise, which are confounders for uncontrolled hypertension, only the association of depression with uncontrolled hypertension remained. This finding was similar to studies done in Pakistan and Mexico (16, 37) but this was however not consistent with a study conducted in the United States of America (USA) where study participants with depression were found to have good blood pressure. (14) The difference of the USA-based study was explained by the fact that the participants with symptoms of depression and anxiety utilized the health facilities more frequently, hence the good blood pressure control found among them. This may also be due to the high level of economic development and the availability of advanced healthcare in the USA when compared to what is obtainable in the setting where our study was done.

The cross-sectional nature of the study makes it difficult to clearly demonstrate causality.

Nonetheless, the internal validity of the study was strengthened by excluding participants who had other chronic medical morbidities and those with history of psychiatric disorders. If not excluded, these could have distorted the findings of the study.(1) Furthermore, confounders related to depression and uncontrolled hypertension which could have confounded the true picture were adjusted for in the logistic regression model.

Conclusion

Depression and anxiety are common morbidities associated with hypertension, however, most patients living with hypertension are not assessed for these mental morbidities, so these health conditions are mostly unrecognized and therefore untreated in patients with hypertension especially in LMICs. Our study showed a statistically significant relationship between depression and uncontrolled hypertension. Thus, it becomes important for healthcare providers who manage patients with hypertension to also assess them for depression and anxiety and treat accordingly where such exists. This will contribute to optimizing blood pressure control and reduction of complications and mortalities associated with poor blood pressure control.

Abbreviations

BMI - body mass index

CI- Confidence interval

GOPD - general out-patient department

HAD- Hospital Anxiety and Depression

IBM SPSS- International Business Machines Statistical Packages for the Social Sciences

LGA- Local Government Area

LMIC- low- and middle-income countries

mmHg- millimeter of mercury

OR- Odds Ratio

P – P-value

USA- United States of America

Declarations

Ethical approval and consent to participate

Ethical approval was obtained from the Ethical and Research Committee of the Federal Neuropsychiatric Hospital, Yaba. In addition, approval to conduct the study in the two health centres was obtained from Lagos State Health Service Commission. The selected patients also signed a consent form after the details of the study were explained to them.

Consent for publication

Not applicable

Availability of data and materials

The data generated and analysed in this study are available from the corresponding author on reasonable request.

Competing Interest

Chikwendu Amaike, Olabisi Titilayo Bamidele, and Omotayo Felicia Salami were supported for the manuscript writing through a short manuscript writing fellowship offered by the Centre for Research Innovation and Development, Babcock University Teaching Hospital, Ilishan-Remo. All other authors do not have any competing interest.

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Author's contributions

CA was involved in the design of the work, analysis and interpretation of data, and drafting of the work. OFS was involved in the design of the work, analysis and interpretation of data, and drafting of the work. OTB was involved in the design of the work, analysis and interpretation of data, and drafting of the work. AMO was involved in conception and design and satisfactorily revised the work. IO was involved in interpretation of data and satisfactorily revised the work. OA was involved in analysis, interpretation of data and satisfactorily revised the work. AO was involved in interpretation of data and satisfactorily revised the work. AOA was involved in conception, interpretation of data and satisfactorily revised the work. All the authors read and approved the final manuscript.

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References

1. World Health Organization. Hypertension.2022. <https://www.who.int/news-room/fact-sheets/detail/hypertension>. Accessed 17 Aug 2022.
2. Ojike N, Sowers JR, Seixas A, Ravenell J, Rodriguez-Figueroa G, Awadallah M, et. al. Psychological Distress and Hypertension: Results from the National Health Interview Survey for 2004-2013. *Cardiorenal Med.* 2016;6(3):198-208. doi: 10.1159/000443933.

3. Cuevas AG, Williams DR, Albert MA. Psychosocial Factors and Hypertension: A Review of the Literature. *Cardiol Clin*. 2017 ;35(2):223-230. doi: 10.1016/j.ccl.2016.12.004
4. Global Burden of Disease (GBD) 2019 Mental Disorders Collaborators. Global, regional, and national burden of 12 mental disorders in 204 countries and territories, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. *Lancet Psychiatry*. 2022 ;9(2):137-50. doi: 10.1016/S2215-0366(21)00395-3.
5. World Health Organization. Depression. 2022. <https://www.who.int/news-room/fact-sheets/detail/depression>. Accessed 17 Aug 2022.
6. National Institute of Mental Health. Depression. 2018. <https://www.nimh.nih.gov/health/topics/depression>. Accessed 17 Aug 2022.
7. Malla DP, Basnet RS, Pokharel AM. Patterns of psychiatry morbidity in referred patients attending psychiatry out patient department in a tertiary centre. *Journal of Kathmandu Medical College*, 2017;4(3), 88–94. <https://doi.org/10.3126/jkmc.v4i3.18243>
8. Kwobah E, Epstein S, Mwangi A, Litzelman D, Atwoli L. Prevalence of psychiatric morbidity in a community sample in Western Kenya. *BMC Psychiatry*. 2017 Jan 18;17(1):30. doi: 10.1186/s12888-017-1202-9.
9. Hamad AH, Ramazan SH, Farag TA. Prevalence of Anxiety and Depression among Patients Attending Outpatient Clinics in Hawler Teaching Hospital - JZS-A _ University of Sulaimani. 2013;15(2). doi: <https://doi.org/10.17656/jzs.10254>.
10. Ajiboye PO, Abiodun OA, Sanya EO, Wahab KW, Buhari OIN, Ayanda KA, et al. Psychiatric morbidity in a Nigerian neurology clinic. *East Afr Med J*. 2012;89(2):64–70.
11. Salihu AS, and Udofia O. Prevalence and Associated Factors of Depression among General Outpatients in a Tertiary Institution in Kano, North-Western Nigeria. *Open Journal of Psychiatry*. 2016; 6(3):228–36. doi: 10.4236/ojpsych.2016.63028
12. Abiodun OA. A study of mental morbidity among primary care patients in Nigeria. *Compr Psychiatry*. 1993; 34(1): 10-3. [https://doi.org/10.1016/0010-440X\(93\)90030-8](https://doi.org/10.1016/0010-440X(93)90030-8).
13. Ranjan R, Nath S, Sarkar S. Association between depression, anxiety and quality of life among patients with diabetes mellitus and/or hypertension in a tertiary care railway hospital in India: A cross-sectional study. *Indian J Psychiatry*. 2020;62(5):555-8. doi: 10.4103/psychiatry.IndianJPsychiatry_794_19.
14. Ho AK, Thorpe CT, Pandhi N, Palta M, Smith MA, Johnson HM. Association of anxiety and depression with hypertension control. *J Hypertens*. 2015;33(11):2215-22. doi: 10.1097/HJH.0000000000000693.
15. Rozario SS, Masho SW. The Associations between Mental Health Status, Hypertension, and Hospital Inpatient Visits in Women in the United States. *Am J Hypertens*. 2018; 31(7):804-10. doi: 10.1093/ajh/hpy065.
16. Almas A, Patel J, Ghori U, Ali A, Edhi AI, Khan MA. Depression is linked to uncontrolled hypertension: A case-control study from Karachi, Pakistan. *J Ment Health*. 2014;23(6):292-6. doi:

10.3109/09638237.2014.924047.

17. Hamer M, Batty GD, Stamatakis E, Kivimaki M. Hypertension awareness and psychological distress. *Hypertension*. 2010;56(3):547-50. doi: 10.1161/HYPERTENSIONAHA.110.153775.
18. Id AS, Sharpe M, Larsson H, Id AW, Lichtenstein P, Id SF. Psychiatric comorbidity and risk of premature mortality and suicide among those with chronic respiratory diseases, cardiovascular diseases, and diabetes in Sweden: A nationwide matched cohort study of over 1 million patients and their unaffected siblings. *PLoS Med*. 2022;19(1): e1003864. doi: 10.1371/journal.pmed.1003864
19. Jackson JL, Kay C. Capsule Commentary on Gallo et al., Multimorbidity, Depression, and Mortality in Primary Care: Randomized Clinical Trial of an Evidence-Based Depression Care Management Program on Mortality Risk. *J Gen Intern Med*. 2016 Apr;31(4):412. doi: 10.1007/s11606-016-3589-2.
20. Jiang W, Alexander J, Christopher E, Kuchibhatla M, Gauden LH, Cuffe MS, et al. Relationship of depression to increased risk of mortality and rehospitalization in patients with congestive heart failure. *Arch Intern Med*. 2001 Aug 13-27;161(15):1849-56. doi: 10.1001/archinte.161.15.1849.
21. DiMatteo MR, Lepper HS, Croghan TW. Depression is a risk factor for noncompliance with medical treatment meta-analysis of the effects of anxiety and depression on patient adherence. *Arch Intern Med*. 2000 Jul 24;160(14):2101-7. doi: 10.1001/archinte.160.14.2101.
22. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand*. 1983 Jun;67(6):361-70. doi: 10.1111/j.1600-0447. 1983.tb09716. x.
23. Abiodun OA. A validity study of the Hospital Anxiety and Depression Scale in general hospital units and a community sample in Nigeria. *Br J Psychiatry*. 1994 Nov;165(5):669-72. doi: 10.1192/bjp.165.5.669
24. Kotruchin P; Khamphukaew T; Mitsungnern T; Im-Oun S. Factors associated with a successful blood pressure control. *Journal of Hypertension*: 2021;39(p e321). doi: 10.1097/01.hjh.0000748196.05385.a8
25. Edmealem A, Olis CS. Factors Associated with Anxiety and Depression among Diabetes, Hypertension, and Heart Failure Patients at Dessie Referral Hospital, Northeast Ethiopia. *Behav Neurol*. 2020; 2020:3609873. doi: 10.1155/2020/3609873.
26. Riaz M, Shah G, Asif M, Shah A, Adhikari K, Abu-Shaheen A (2021) Factors associated with hypertension in Pakistan: A systematic review and meta-analysis. *PLoS ONE* 16(1): e0246085. <https://doi.org/10.1371/journal.pone.0246085>.
27. Iloh GU, Aguocha GU, Amadi AN CM. Depression among ambulatory adult patients in a primary care clinic in southeastern Nigeria. *Niger Postgrad Med J*. 2018; 25(4):204–12. doi: 10.4103/npmj.npmj_107_18.
28. Obadeji A, Oluwole L, Dada M, Ajiboye A, Kumolalo B, Solomon O. Assessment of depression in a primary care setting in Nigeria using the PHQ-9. *J Family Med Prim Care*. 2015 ;4(1):30-4. doi: 10.4103/2249-4863.152246.
29. Okojie PW and Lane R. View of Healthcare options and factors influencing health-seeking behavior in a rural community in Nigeria: A cross-sectional study. *Christian Journal for Global Health*. June 2020;

- 7(2):doi- <https://doi.org/10.15566/cjgh.v7i2.335>.
30. Shimada F, Ohira Y, Hirota Y, Ikegami A, Kondo T, Shikino K, et al. Anxiety and depression in general practice outpatients: The long-term change process. *Int J Gen Med*. 2018; 11:55-63. <https://doi.org/10.2147/IJGM.S130025>
 31. Qin X, Phillips MR, Wang W, Li Y, Jin Q, Ai L, et al. Prevalence and rates of recognition of anxiety disorders in internal medicine outpatient departments of 23 general hospitals in Shenyang, China. *Gen Hosp Psychiatry*. 2010;32(2):192-200. doi: 10.1016/j.genhosppsy.2009.12.001.
 32. Mahmood S, Hassan SZ, Tabraze M, Khan MO, Javed I, Ahmed A, et al. Prevalence and Predictors of Depression Amongst Hypertensive Individuals in Karachi, Pakistan. *Cureus*. 2017;9(6): e1397. doi: 10.7759/cureus.1397.
 33. World Health Organization. Depression and other common Mental Disorders. Global Health Estimates. 2017. <https://apps.who.int/iris/bitstream/handle/10665/254610/WHO-MSD-MER-2017.2-eng.pdf>. Accessed 17 Aug 2022.
 34. Adewuya AO, Atilola O, Ola BA, Coker OA, Zachariah MP, Olugbile O, et al. Current prevalence, comorbidity and associated factors for symptoms of depression and generalised anxiety in the Lagos State Mental Health Survey (LSMHS), Nigeria. *Compr Psychiatry*. 2018; 81:60-65. doi: 10.1016/j.comppsy.2017.11.010.
 35. Shah S, Adhikari S, Aryal S, Adhikari TB, Sah SK, Paudel BS, et al. Anxiety and Depression among Hypertensive Adults in Tertiary Care Hospitals of Nepal. *Psychiatry J*. 2022; 2022:1098625. doi: 10.1155/2022/1098625.
 36. Hamrah MS, Hamrah MH, Ishii H, Suzuki S, Hamrah MH, Hamrah AE, et al. Anxiety and Depression among Hypertensive Outpatients in Afghanistan: A Cross-Sectional Study in Andkhoy City. *Int J Hypertens*. 2018; 2018:8560835. doi: 10.1155/2018/8560835.
 37. Rubio-Guerra AF, Rodriguez-Lopez L, Vargas-Ayala G, Huerta-Ramirez S, Serna DC, Lozano-Nuevo JJ. Depression increases the risk for uncontrolled hypertension. *Exp Clin Cardiol*. 2013;18(1):10-2. PMID: 24294029; PMCID: PMC3716493.

Tables

Table 1- Socio-demographics

Characteristic	Frequency	%
Gender		
Male	87	27.1
Female	234	72.9
Age Group (years)		
Young adults (35-39)	22	6.9
Middle aged adults (40-59)	215	67.0
Elderly (≥ 60)	84	26.1
Religion		
Christianity	205	63.9
Islam	113	35.2
Traditional worshipper	3	0.9
Marital status		
Not married	16	5.0
Married	245	76.3
Widowed	60	18.7
Educational level		
No formal education	61	19.0
Primary school	117	36.5
Secondary school	98	30.5
Post-secondary school	45	14.0
Employment status		
Employed	268	83.5

Unemployed

53

16.5

Table 2 -Health Status of the participants and their NCD risk factors

Variables	Frequency	Percentage
Blood pressure		
Controlled	60	18.7
Uncontrolled	261	81.3
Depression		
Present	39	12.1
Absent	282	87.9
Anxiety		
Present	74	23.1
Absent	247	76.9
BMI		
Obese (≥ 30)	133	41.4
Overweight (25-29)	118	36.8
Normal (≤ 24.9)	70	21.8
Abdominal girth		
67-89.9	79	24.6
90-98.9	81	25.2
99-106.9	73	22.8
107-128	88	27.4
Close relative with Hypertension		
Yes	128	39.9
No	144	44.9
Don't know	49	15.9

Engage in physical exercise		
Yes	105	32.7
No	216	67.3

Current smoker		
Yes	12	3.7
No	309	96.3

Alcohol Use		
Yes	67	20.9
No	254	79.1

Table 3- - Socio-demographic factors, mental health status and NCD risk factors associated with hypertension control.

Variables	Blood Pressure				P-value
	Controlled n (%)	Uncontrolled n (%)			
Age group					
35-39	1 (4.5)	21 (95.5)	2	3.38	0.18
40-59	44 (20.5)	171 (79.5)			
60-65	15 (17.9)	69 (82.1)			
Sex					
Male	14 (16.1)	73 (83.9)	1	0.53	0.47
Female	46 (19.7)	188 (80.3)			
Religion					
Christian	38 (18.5)	167 (81.5)	2	0.74	0.69
Islam	22 (19.5)	91 (80.5)			
Others	0 (0.0)	3 (100.0)			
Marital Status					
Not married	0 (0.0)	6 (100.0)	3	4.86	0.18
Married	52 (21.2)	193 (78.8)			
Divorced	1 (10.0)	9 (90.0)			
Widowed	7 (11.7)	53 (88.3)			
Educational Status					
No formal Education	11 (18.0)	50 (82.0)	3	1.20	0.75
Primary School	20 (17.1)	97 (82.9)			
Secondary school	18 (18.4)	80 (81.6)			

Post-secondary school	11 (24.4)	34 (75.6)			
Employment Status					
Employed	52 (19.4)	216 (80.6)	1	0.54	0.46
Unemployed	8 (15.1)	45 (84.9)			
Depression					
Present	2 (5.1)	37 (94.9)	1	5.37	0.02
Absent	58 (20.6)	224 (79.4)			
Anxiety					
Present	13 (17.6)	61 (82.4)	1	0.08	0.78
Absent	47 (19.0)	200 (81.0)			
Physical Exercise					
Yes	12 (17.9)	55 (82.1)	1	0.34	0.85
No	48 (18.9)	206 (81.1)			
BMI					
Obese	23 (17.3)	110 (82.7)	2	0.30	0.96
Overweight	23 (19.5)	95 (80.5)			
Normal	14 (20.0)	56 (80.0)			

*Fisher's exact test

TABLE 4- Adjusted Odds of having uncontrolled blood pressure

Variables	Odd Ratio	95% Confidence Interval	P-value
Depression			
Present	7.75.	1.79-43.4	0.011
Absent	1.00		
Anxiety			
Present	0.52	0.24-1.17	0.116
Absent	1.00		

**adjusted for age, sex, physical exercise, cigarette smoking and marital status*