Journal for Research in Applied Sciences and Biotechnology

www.jrasb.com

ISSN: 2583-4053

Volume-3 Issue-4 || August 2024 || PP. 126-131

https://doi.org/10.55544/jrasb.3.4.15

Prevalence and Risk Factors of Hypertension Among Diabetic Patients

Haidari Said Rahatullah[1] and Said Qamber Ali Haidary[2]

[1]Internal Medicine Specialist, Gastroenterologist, Lecturer at Rokhan Institute of Higher Education, Medical Faculty, Jalalabad City, Nangarhar, AFGHANISTAN.

[2]Professor, Senior Lecturer at Rokhan Institute of Higher Education, Medical Faculty, Jalalabad City, Nangarhar, AFGHANISTAN.

[1]Corresponding Author: saidrahatullahhaidary@gmail.com

www.jrasb.com || Vol. 3 No. 4 (2024): August Issue

Received: 28-07-2024	**Revised:** 16-08-2024	**Accepted:** 31-08-2024

ABSTRACT

Hypertension poses a significant public health concern, leading to increased morbidity and mortality rates. Its coexistence with diabetes often worsens the complications associated with both conditions. The aim of this study was to examine the prevalence of hypertension and the factors influencing its occurrence among diabetic patients receiving follow-up care at the Haidari Internal Medicine, Gastrointestinal Diseases, GI Endoscopy, and Colonoscopy Center in Jalalabad city, Nangarhar Province, Afghanistan. The study was carried out from November 1, 2023, to January 30, 2024. We utilized a cross-sectional design and conducted statistical analysis using SPSS software version 25.0. Categorical data were expressed as frequencies and percentages. The associations between hypertension and various variables in diabetes mellitus (DM) were evaluated using chi-square tests for trend. The findings demonstrated that age ≥ 50 years, higher BMI, and type 2 DM were significant predictors of hypertension among the studied population. Additionally, illiteracy, active smoking, a family history of hypertension, physical inactivity, having diabetes for 5 or more years, and using both non-insulin and insulin treatments were linked to a higher prevalence of hypertension. These findings highlight the need to address these risk factors in the management and prevention of hypertension among individuals with diabetes.

Keywords- Prevalence, Risk factors, Hypertension, Diabetes.

I. INTRODUCTION

Diabetes mellitus is a major worldwide health issue that affects a significant proportion of adults, with an approximate diagnosis rate of 9% among the adult population. Alarmingly, diabetes is associated with an estimated 1.5 million global deaths each year. The World Health Organization (WHO) has raised concerns that if current trends persist, diabetes could become the seventh leading cause of death by 2030 [1].

Hypertension (HTN), commonly known as high blood pressure, refers to the persistent elevation of arterial blood pressure within the body. Although the boundary between normal blood pressure and hypertension is not clearly defined, clinical guidelines generally classify it as having a systolic blood pressure (SBP) of 140 millimeters of mercury (mmHg) or higher and/or a diastolic blood pressure (DBP) of 90 mmHg or higher. Alternatively, a previous diagnosis of hypertension by a healthcare professional or the use of antihypertensive medications are also considered indicative of the condition [2, 3]. Hypertension presents a notable public health challenge worldwide, especially in individuals with diabetes. This coexistence of conditions places a substantial health burden and requires focused attention and intervention [4]. The prevalence of hypertension among individuals with diabetes is nearly twice as high as that among individuals without diabetes [5]. Among cardiovascular disorders, hypertension is the most prevalent comorbid condition in individuals with diabetes. If left uncontrolled, the consequences of hypertension can be devastating [6]. Hypertension is the cause of approximately 7.5 million deaths annually, leading to a total of 57 million disability-adjusted life years (DALYs) worldwide. It represents approximately 6% of all global

ISSN: 2583-4053
Volume-3 Issue-4 || August 2024 || PP. 126-131
https://doi.org/10.55544/jrasb.3.4.15

deaths [3, 7]. Worldwide, approximately one billion people are affected by hypertension, with about two-thirds of these cases occurring in developing countries [8].

The presence of both hypertension and diabetes mellitus (DM) significantly contributes to the occurrence and progression of complications affecting both microvascular and macrovascular systems [9].This combination also complicates treatment strategies and leads to increased healthcare costs [10]. Studies have shown that up to 80% of individuals with diabetes will eventually succumb to cardiovascular diseases, with hypertension and stroke being particularly prevalent [9]. The coexistence of hypertension in individuals with diabetes is associated with a 44% higher risk of death and a 41% higher risk of cardiovascular events, compared to individuals with diabetes alone, where the risks are 7% and 9% respectively [11].

The United Kingdom Prospective Diabetes Study has provided evidence of the importance of blood pressure (BP) control in preventing cardiovascular complications among individuals with diabetes. A reduction of 10 mmHg in mean systolic blood pressure (SBP) is associated with a 12% decrease in the risk of any diabetes-related complication and a 15% decrease in diabetes-related deaths. Multiple risk factors contribute to the development of hypertension [12], including factors such as older age, overweight/obesity, unhealthy diet, physical inactivity, smoking, and a family history of hypertension [13, 14].

Currently, diabetes affects around one million individuals in Afghanistan, with an estimated prevalence of 5-9% in the general population. This indicates that there may be one to two million undiagnosed cases of diabetes in the country. Afghanistan encounters several factors that contribute to the development of diabetes, including population aging, rapid urbanization, a diet reliant on carbohydrates, obesity, and a lack of physical activity [11]. However, there is limited available data on the prevalence of hypertension among individuals with diabetes in Afghanistan. Thus, the objective of this study was to evaluate the occurrence of hypertension specifically among diabetic patients in Jalalabad city, Nangarhar Province, Afghanistan.

II. MATERIALS AND METHODS

2.1. Study place, Design and Period

We conducted a cross-sectional study involving 266 diabetic patients who were attending their follow-up at Haidari Internal Medicine, Gastrointestinal Diseases, GI Endoscopy, and Colonoscopy Center in Jalalabad city, Nangarhar Province, Afghanistan. The data collection period spanned from November 1, 2023, to January 30, 2024.

2.2. Eligibility Criteria

We included individuals aged 18 years or older who had a minimum follow-up period of one month. Participants who were critically ill, had incomplete medical records, were newly diagnosed with diabetes but not registered, had hearing difficulties, or were pregnant women were excluded from the study.

2.3. Data Collection Tool and Procedure

We gathered data by employing a structured interviewer-administered questionnaire during face-to-face interviews, patient record reviews, and physical examinations. The assessment of behavioral variables was conducted following the WHO STEPwise approach for chronic disease risk factor surveillance [15]. Patient record reviews provided the clinical variables, while physical measurements were conducted to obtain specific data. Body weight was accurately measured to the nearest 0.1 kg using a portable weight scale machine.

The subjects were barefoot and wearing light indoor clothing during the measurements. Height was measured in meters. Body mass index (BMI) was calculated as the weight in kilograms (kg) divided by the square of height in meters (m2). Systolic blood pressure (SBP) and diastolic blood pressure (DBP) were measured on the left arm at heart level using a mercury-based sphygmomanometer. The measurements were taken after the subjects had rested for at least 10 minutes, and for those who consumed hot drinks like tea, the rest period was extended to 30 minutes. If the study subjects had SBP $\geq$ 140 mmHg or DBP $\geq$ 90 mmHg, blood pressure was remeasured, and the average value was recorded.

2.4. Statistical Analysis

The statistical analysis was performed using SPSS software version 25.0. Categorical data were presented as frequencies and percentages. To examine the associations between study variables and hypertension, chi-square tests for trend were utilized. Variables with a significance level of $P = 0.05$ were considered to have a significant association with hypertension.

III. RESULTS

3.1. Socio-Demographic Characteristics of Participants

A total of 266 participants were enrolled in this study. Among the respondents, 60.90% (162) were female. Regarding age, 48.87% (130) of the participants were aged 50 years or older. In terms of marital status, 71.05% (189) were married, whereas 28.94% (77) were single. Regarding educational background, 63.90% (170) were illiterate, 11.65% (31) had completed primary education, 7.89% (21) had finished secondary education, and 16.54% (44) held a university degree or higher. In relation to residency, 54.13% (144) lived in rural areas, while 45.86% (122) resided in urban areas. About family history of hypertension, 67.66% (180) responded positively. Furthermore, in terms of average monthly income, 56.39% (150) reported earning less than 10,000 Afghani per month **(Table 1).**

ISSN: 2583-4053
Volume-3 Issue-4 || August 2024 || PP. 126-131
https://doi.org/10.55544/jrasb.3.4.15

Table 1: Socio-Demographic Characteristics of Patients with Diabetes Mellitus

Variables	Category	Number	Prevalence (%)
Sex	Male	104	39.09
	Female	162	60.90
Age	<30 years	40	15.03
	30 to 39 years	26	9.77
	40 to 49 years	70	26.31
	≥50 years	130	48.87
Marital status	Married	189	71.05
	Single	77	28.94
Educational status	Illiterate	170	63.90
	Primary	31	11.65
	Secondary	21	7.89
	University and above	44	16.54
Residence	Urban	122	45.86
	Rural	144	54.13
Family history hypertension	Yes	86	32.33
	No	180	67.66
Average monthly income	<10000	150	56.39
	10000 to 20000	45	16.91
	21000 to 30000	35	13.15
	>30000	36	13.53

3.2. Clinical and Behavioral Characteristics of Participants

This study included a total of 266 participants. The majority (74.43%) of the respondents were diagnosed with type 2 diabetes mellitus (DM-II). Moreover, more than half (67.66%) of the study participants had received a diabetes diagnosis within the past 5 years. Among the participants, a total of 165 (62.03%) fell within the Overweight category of body mass index (BMI). Eighty participants (30.07%) were identified as active smokers, while 186 participants (69.92%) had never smoked. Furthermore, 189 participants (71.05%) were diagnosed with hypertension (HTN). In terms of diabetes treatment, 170 participants (63.90%) used non-insulin medications, 60 participants (22.55%) used insulin, and 36 participants (13.53%) used both non-insulin and insulin. Regarding physical activity, more than half (81.20%) of the study participants were not engaged in any regular exercise. One hundred nine participants (59.77%) had other comorbid diseases, whereas 107 participants (40.22%) did not have any other comorbid conditions **(Table 2).**

Table 2. Presents the clinical and behavioral characteristics of patients diagnosed with diabetes mellitus

Variables	Category	Number	Prevalence (%)
Type of DM	1	68	15.90
	2	198	84.10
Duration of DM	<5 years	180	67.66
	≥5 years	86	32.33
Hypertension	Yes	189	71.05
	No	77	29.94
Treatment regimen	Noninsulin	170	63.90
	Insulin	60	22.55
	Both	36	13.53
BMI	Under weight	29	10.90
	Normal weight	16	6.01
	Over weight	165	62.03
	Obese	56	21.05
Smoking	Yes	80	30.07
	No	186	69.92
Physical exercise	Yes	50	18.79

ISSN: 2583-4053
Volume-3 Issue-4 || August 2024 || PP. 126-131
https://doi.org/10.55544/jrasb.3.4.15

Other comorbid disease	No	216	81.20
	Yes	159	59.77
	No	107	40.22
Fasting blood sugar (mg/dl)	<130	192	72.18
	≥130	74	27.81

3.3. Factors Independently Associated with Hypertension

A chi-square test for trend was conducted to examine the factors independently associated with hypertension among patients diagnosed with diabetes mellitus (DM) at a significance level of $P < 0.05$. The analysis included variables such as age, educational level, types of DM, smoking status, family history of hypertension, physical inactivity, body mass index (BMI), duration of diabetes, and treatment regimen. Among these variables, age was identified as an independent factor in predicting hypertension. Participants aged 50 years or older had a significantly higher prevalence of hypertension compared to those younger than 30 years. BMI also emerged as a significant factor, with patients in the obesity or underweight BMI categories showing a significantly higher tendency to develop hypertension compared to those with a normal BMI. Patients diagnosed with type 2 DM were found to have a significantly higher likelihood of developing hypertension compared to those with type 1 DM. Furthermore, the prevalence of hypertension was significantly higher among participants who were illiterate, active smokers, had a family history of hypertension, engaged in inactive physical exercise, had a duration of diabetes mellitus (DM) of five years or more, and used both non-insulin and insulin treatments. Table 3 provides a summary of these findings.

Table 3: Analysis of Factors Associated with Hypertension among Diabetes Patients

Variables	Category	Hypertension		P-value
		Yes	No	
Age	<30 years	6	34	1.3
	30 to 39 years	7	19	0.168
	40 to 49 years	41	29	0.024
	≥50 years	80	50	0.001
Education level	Illiterate	79	91	0.063
	Primary	9	22	0.532
	Secondary	6	15	0.752
	College and above	11	33	1.4
Type of DM	1	10	58	1.2
	2	114	84	0.001
Smoking	Yes	44	36	0.00
	No	55	135	2.1
Family history hypertension	Yes	46	40	0.001
	No	89	91	1.23
Physical inactivity	Yes	124	92	2.31
	No	35	15	0.00
BMI	Under weight	91	74	0.05
	Normal weight	13	32	1.52
	Obese	31	25	0.00
Duration of DM	<5 years	98	82	1.32
	≥5 years	49	37	0.01
Treatment regimen	Noninsulin	91	79	2.12
	Insulin	35	25	1.24
	Both	22	15	0.05

IV. DISCUSSION

In our study, we found that the prevalence of hypertension among diabetic patients was 71.05%. This finding aligns with previous research conducted in various regions. For example, studies conducted in Botswana reported a prevalence of 61.2%, while Benghazi, Libya reported 85.6%. In Morocco, the prevalence was found to be 70.4%, whereas in Jordan it was 76%. Another study conducted in Iraq reported an

ISSN: 2583-4053
Volume-3 Issue-4 || August 2024 || PP. 126-131
https://doi.org/10.55544/jrasb.3.4.15

even higher prevalence of 89.6% [16-19]. These studies further corroborate the observed prevalence of hypertension in our study, providing additional support to our findings.

Our study findings demonstrated a significant independent association between age ≥ 50 years and hypertension (HTN) among diabetic patients, which is consistent with previous research studies [16, 17]. This association can be attributed to the natural aging process, characterized by a decline in various physiological functions and an increased vulnerability to non-communicable diseases, including HTN. Moreover, advancing age has consistently been linked to a higher incidence of disease [1, 20]. Additionally, our study revealed that diabetic patients who were current cigarette smokers were more likely to develop HTN compared to non-smokers, which aligns with findings from other studies [21, 22].

Furthermore, our study revealed a positive association between higher BMI and an increased risk of developing hypertension, which is consistent with previous research findings [16, 18]. This relationship can be attributed to the detrimental effects of excessive weight gain on cardiovascular health, including endothelial dysfunction, inflammation, hemodynamic alterations, and the progression of atherosclerosis [23]. Moreover, overweight individuals often experience insulin resistance and elevated LDL cholesterol levels, leading to narrowed blood vessels and the gradual onset of hypertension. Additionally, as BMI levels increase, the risk of various chronic diseases, including hypertension, escalates [24, 25]. Additionally, our study found that diabetic patients who used non-insulin and insulin treatments were more likely to develop HTN compared to those who did not, which is consistent with findings from other studies [26, 27].

The Chi-square analysis conducted in our study revealed a significant relationship between physical inactivity and a longer duration of diabetes with hypertension among individuals with type 2 diabetes mellitus (T2DM). Consistent with previous evidence, our findings demonstrated that being physically inactive was associated with a higher prevalence of hypertension [28, 29], and insufficient physical activity was prevalent among individuals with T2DM in Bangladesh [30]. These findings emphasize the importance of directing efforts and resources towards increasing physical activity levels among individuals with T2DM in Bangladesh. Additionally, our study confirmed previous research indicating that a longer duration of diabetes is significantly associated with hypertension [18]. Several studies have shown that as educational status decreases, the prevalence of hypertension increases [31, 32]. A meta-analysis by Leng et al. found that individuals with the lowest education level had a twofold higher risk of hypertension compared to those with the highest education level [33]. In our study, we also observed a higher percentage of patients with low education levels in the hypertensive group. Low education levels may influence patients' knowledge of hypertension and health behaviors, such as diet, exercise, stress management, and healthcare visits [34, 35].

V. CONCLUSION

The study findings revealed a substantial prevalence of hypertension among individuals with diabetes, highlighting the significance of actively screening for hypertension and related cardiovascular risk factors during diabetes follow-up. Furthermore, the results indicated a significant association between higher body mass index (BMI) and advanced age with the coexistence of hypertension and diabetes mellitus (DM).

REFERENCES

[1] Colosia, A.D., R. Palencia, and S. Khan, *Prevalence of hypertension and obesity in patients with type 2 diabetes mellitus in observational studies: a systematic literature review.* Diabetes, metabolic syndrome and obesity: targets and therapy, 2013: p. 327-338.

[2] WHO, W., *A global brief on hypertension: silent killer, global public health crisis.* 2013.

[3] Kotchen, T.A., *Hypertension control: trends, approaches, and goals*. 2007, Am Heart Assoc. p. 19-20.

[4] Lopez-Jaramillo, P., et al., *The goal of blood pressure in the hypertensive patient with diabetes is defined: now the challenge is go from recommendations to practice.* Diabetology & metabolic syndrome, 2014. **6**(1): p. 1-10.

[5] Paul, B., et al., *Role of losartan therapy in the management of diabetic hypertension.* The Journal of the Association of Physicians of India, 2000. **48**(5): p. 514-518.

[6] Eren, N.K., et al., *Rate of blood pressure control and antihypertensive treatment approaches in diabetic patients with hypertension.* Türk Kardiyoloji Derneği Arşivi, 2014. **42**(8).

[7] Organization, W.H., *Global health risks: mortality and burden of disease attributable to selected major risks*. 2009: World Health Organization.

[8] Organization, W.H., *Regional Office for Southeast Asia. Hypertension fact sheet*. 2012.

[9] Katon, W.J., et al., *The association of comorbid depression with mortality in patients with type 2 diabetes.* Diabetes care, 2005. **28**(11): p. 2668-2672.

[10] Aroda, V.R., et al., *Metformin for diabetes prevention: insights gained from the diabetes prevention program/diabetes prevention program outcomes study.* Diabetologia, 2017. **60**(9): p. 1601-1611.

ISSN: 2583-4053

Volume-3 Issue-4 || August 2024 || PP. 126-131

https://doi.org/10.55544/jrasb.3.4.15

[11] Emdin, C.A., et al., *Blood pressure lowering in type 2 diabetes: a systematic review and meta-analysis.* Jama, 2015. **313**(6): p. 603-615.

[12] Group, U.P.D.S., *Tight blood pressure control and risk of macrovascular and microvascular complications in type 2 diabetes: UKPDS 38.* Bmj, 1998. **317**(7160): p. 703-713.

[13] Alwan, A., *Global status report on noncommunicable diseases 2010*. 2011: World Health Organization.

[14] Koly, K.N., T. Biswas, and A. Islam, *Increasing prevalence of hypertension in Bangladesh: a review.* Cardiovascular Journal, 2015. **8**(1): p. 59-64.

[15] Riley, L., et al., *The World Health Organization STEPwise approach to noncommunicable disease risk-factor surveillance: methods, challenges, and opportunities.* American journal of public health, 2016. **106**(1): p. 74-78.

[16] Mengesha, A.Y., *Hypertension and related risk factors in type 2 diabetes mellitus (DM) patients in Gaborone City Council (GCC) clinics, Gaborone, Botswana.* African health sciences, 2007. **7**(4).

[17] Nouh, F., M. Omar, and M. Younis, *Prevalence of hypertension among diabetic patients in Benghazi: a study of associated factors.* Asian Journal of Medicine and Health, 2017. **6**(4): p. 1-11.

[18] Berraho, M., et al., *Hypertension and type 2 diabetes: a cross-sectional study in Morocco (EPIDIAM Study).* Pan African Medical Journal, 2012. **11**(1).

[19] Abdissa, D. and K. Kene, *Prevalence and determinants of hypertension among diabetic patients in Jimma University Medical Center, Southwest Ethiopia, 2019.* Diabetes, Metabolic Syndrome and Obesity, 2020: p. 2317-2325.

[20] Satman, I., et al., *Twelve-year trends in the prevalence and risk factors of diabetes and prediabetes in Turkish adults.* European journal of epidemiology, 2013. **28**: p. 169-180.

[21] Wu, J., et al., *Prevalence and distribution of hypertension and related risk factors in Jilin Province, China 2015: a cross-sectional study.* BMJ open, 2018. **8**(3): p. e020126.

[22] Khader, Y., et al., *Hypertension in Jordan: prevalence, awareness, control, and its associated factors.* International journal of hypertension, 2019. **2019**.

[23] Csige, I., et al., *The impact of obesity on the cardiovascular system.* Journal of diabetes research, 2018. **2018**.

[24] Brown, C.D., et al., *Body mass index and the prevalence of hypertension and dyslipidemia.* Obesity research, 2000. **8**(9): p. 605-619.

[25] Velásquez-Rodríguez, C.-M., et al., *Abdominal obesity and low physical activity are associated with insulin resistance in overweight adolescents: a cross-sectional study.* BMC pediatrics, 2014. **14**: p. 1-9.

[26] Salvetti, A., et al., *The inter-relationship between insulin resistance and hypertension.* Drugs, 1993. **46 Suppl 2**: p. 149-59.

[27] Lastra, G., et al., *Type 2 diabetes mellitus and hypertension: an update.* Endocrinol Metab Clin North Am, 2014. **43**(1): p. 103-22.

[28] Giri, B.R., et al., *Diabetes and hypertension in urban bhutanese men and women.* Indian Journal of Community Medicine, 2013. **38**(3): p. 138-143.

[29] Arambewela, M.H., et al., *Prevalence of depression and associated factors among patients with type 2 diabetes attending the diabetic clinic at a tertiary care hospital in Sri Lanka: a descriptive study.* Psychiatry journal, 2019. **2019**.

[30] Moniruzzaman, M., et al., *Physical activity levels in Bangladeshi adults: results from STEPS survey 2010.* Public health, 2016. **137**: p. 131-138.

[31] Cutler, D.M. and A. Lleras-Muney, *Understanding differences in health behaviors by education.* Journal of health economics, 2010. **29**(1): p. 1-28.

[32] Kautzky-Willer, A., et al., *Women show a closer association between educational level and hypertension or diabetes mellitus than males: a secondary analysis from the Austrian HIS.* BMC Public Health, 2012. **12**: p. 1-9.

[33] Leng, B., et al., *Socioeconomic status and hypertension: a meta-analysis.* Journal of hypertension, 2015. **33**(2): p. 221-229.

[34] Cha, S.H., H.S. Park, and H.J. Cho, *Socioeconomic disparities in prevalence, treatment, and control of hypertension in middle-aged Koreans.* Journal of epidemiology, 2012. **22**(5): p. 425-432.

[35] Brunello, G., et al., *The causal effect of education on health: What is the role of health behaviors?* Health economics, 2016. **25**(3): p. 314-336.