

Prevalence of Hypertension among Diabetic Patients Attending to Ibn Sina General Hospital Authority in Mukalla City

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ABSTRACT

Background: Diabetes mellitus is a group of heterogeneous metabolic disorders characterized by chronic hyperglycemia, resulting from defects in insulin secretion, insulin action, or both. Hypertension is common among diabetic patients, and both conditions are major risk factors for coronary artery disease, cerebrovascular disease, kidney failure, and congestive heart failure. Therefore, effective management of both conditions is essential.

Objectives: To assess the prevalence of coexisting hypertension among patients with diabetes mellitus attending Ibn Sina General Hospital Authority in Mukalla city during 2023–2024.

Methodology: A descriptive cross-sectional study was conducted among diabetic patients attending Ibn Sina General Hospital Authority in Mukalla, Hadhramout, Yemen, during 2023–2024. The study sample was selected using a comprehensive sampling method. Data were collected using a structured closed-ended questionnaire covering sociodemographic variables. Data were analyzed using SPSS version 23, and results were expressed as proportions.

Results: The prevalence of hypertension among diabetic patients was 46.4% (n = 422). The most common factors associated with hypertension were family history (29.4%), older age (>60 years) (25.4%), and stressful lifestyle (19%). Among hypertensive diabetic patients, 31.1% developed cardiovascular diseases. The majority (86.7%) were receiving regular antihypertensive treatment.

Conclusion: The prevalence of hypertension among diabetic patients attending Ibn Sina General Hospital Authority in Mukalla city is high. Greater emphasis should be placed on early detection, regular monitoring, and promoting healthy lifestyle practices to reduce associated complications.

Keywords: *Diabetes mellitus, Hypertension, Patients, Ibn Sina General Hospital Authority.*

INTRODUCTION

Diabetes mellitus (DM) is a general term for heterogeneous metabolic disorders in which there is chronic hyperglycemia. The cause is a disorder of insulin secretion or a disorder of insulin action, or often both (Petersmann et al., 2019). Hypertension is known as high or elevated blood pressure (BP), it is a condition in which the blood vessels are constantly under high pressure (World Health Organization, 2019).

Hypertension is common in diabetes and affects more than (50%) of diabetics (Kahya et al., 2014; Jansson et al., 2009). Hypertension is twice as common in diabetics as in non-diabetics. It is clear that the co-existence of these two diseases in one patient carries an excessive risk for both micro and macro-vascular complications and mortalities. Both are considered risk factors for coronary artery disease, cerebrovascular disease, kidney failure, and congestive heart failure, so treating both conditions is essential (Fox et al., 2015). A study in patients with DM showed that the co-existence of hypertension in DM patients is attributed to the risk of death and cardiovascular events in (44%) and (41%) compared with (7%) and (9%) of the risks in people with DM alone (Emdin et al., 2015). Hypertension with DM increases the risk of death by 7.2 times with a higher risk of death in developing countries (Vargas-Uricoechea & Cáceres-Acosta, 2018). The method of controlling high blood pressure, whether pharmacological or non-pharmacological, is also controversial and has been extensively studied. In recent years new drugs have been introduced to treat DM, some of which also affect blood pressure, and the physician treating patients of both hypertension and DM must be familiar with such drugs (Grossman & Grossman, 2017).

There was (85.6%), (54.2%), (54.7%) and (56.3%) prevalence of hypertension in patients with DM in Benghazi, Nigeria, Tanzania and Ethiopia, respectively (Mwita et al., 2020; Williams et al., 2018). In a study by the Diabetes Clinic of the University Hospital Sains Malaysia in Kelantan, a total of 1077 DM patients were included. The prevalence of hypertension (BP> 130/80 or with medication for high blood pressure) was (92.7%). A total of 471 patients, (47.2%) of the study sample, had achieved blood pressure targets $\leq 130/80$ mmHg (Abougambou & Abougambou, 2013). A cross-sectional study was carried out on 525 DM patients in three regions of Morocco. The prevalence of hypertension was (70.4%). The logistic regression showed that hypertension was positively associated with age, Body mass index and duration of DM (Berraho et al., 2012). A study in Iraq revealed (89.6%) prevalence of hypertension in patients with DM that was related to age, body mass index, insulin use, and duration of DM (Mansour, 2012). Compared to the Arab population, the overall prevalence of DM in the adult population of Qatar was high (16.7%) of patients with (10.7%) of diagnosed DM patients and (5, 9%) of newly diagnosed DM patients (Bener et al., 2009). A study in Jordan confirms that the risk of developing high blood pressure is more than 2 times among patients suffering from DM for over than 5 years, 51 (7%) of 724 hypertensive patients did not know at the time of the study that they had high blood pressure, About one half (50.4%) of patients who knew they had high blood pressure had failed to keep their blood pressure under control (Mubarak et al., 2008).

To our knowledge, no local studies have been conducted on a population of DM patients and there is a lack of data on hypertension and associated factors in patients with DM. Therefore, this study was designed to assess the frequency of the co-existing hypertension and its associated risk factors in a group of DM patients and to examine the level of awareness and control of hypertension and diabetes.

RESEARCH QUESTIONS

1. What is the prevalence of co-existing hypertension among diabetes mellitus patients?
2. What are the co-existing hypertension causes among diabetes mellitus patients?
3. What is the prevalence of the developing of cardiovascular diseases of co-existing hypertension among diabetes mellitus patients?

4. What is the level of control of co-existing hypertension among diabetes mellitus patients?

RESEARCH OBJECTIVES

General objectives:

- To assess the prevalence of co-existing hypertension, to determine the co-existing hypertension causes, to evaluate the prevalence of the developing of cardiovascular diseases and to assess the level of control of co-existing hypertension among diabetes mellitus patients attending to Ibn Sina General Hospital Authority in Mukalla City 2023-2024.

Specific objectives:

1. To assess the prevalence of co-existing hypertension among diabetes mellitus patients attending to Ibn Sina General Hospital Authority in Mukalla City 2023-2024.
2. To determine the co-existing hypertension causes among diabetes mellitus patients.
3. To evaluate the prevalence of the developing of cardiovascular diseases of co-existing hypertension among diabetes mellitus patients.
4. To assess the level of control of co-existing hypertension among diabetes mellitus patients.

METHODOLOGY

Study design:

This is a descriptive cross sectional study, which was conducted by group (1) of fifth year medical students, aimed to provide better knowledge of prevalence of hypertension among diabetic patients attending to Ibn Sina General Hospital Authority in Al-Mukalla City - Hadhramout - Yemen 2023- 2024.

Study area and time:

The study was performed at Ibn Sina General Hospital Authority in Al-Mukalla City - Hadhramout - Yemen 2023- 2024.

Study population:

The study population was all diabetes mellitus patients attending to Ibn Sina General Hospital Authority during the study period.

Inclusion criteria:

All diabetic patients attending to Ibn Sina General Hospital Authority during the study period.

Pilot of study:

A pilot study was conducted among 10 diabetic patients on the beginning of October 2023 after explaining the purposes of the study and assuring them that the collected data will be kept in strict confidentiality and privacy. The patients included in this pre-test have excluded from the large scale study to avoid the duplication. However, the participants have been asked if they have filled a questionnaire with a similar topic.

Sample size:

We calculated the sample size using the following formula (Pourhoseingholi et al., 2013):

$$n = \frac{PQ(Z)^2}{(D)^2}$$

Whereas:

n : sample size.

P = proportion in the characteristics of the population ($p=50\%$) [3,4].

$Q = 1-p$ ($1-0.5=0.5$)

Z = confidence and certainty level (for 95% we use 1.96)

D = precession or error allowable, which equals (5%)

$N = 0.5 \times 0.5 \times (1.96)^2 / (0.05)^2 = 384$

The sample size required was (384), although we added 10% (38) as a drop out to avoid any missing among the sample during data collection, so the sample eventually will be (422).

Sample method:

Comprehensive method was used for identifying the study sample among diabetic hypertensive patients attending to Ibn Sina General Hospital Authority in Al-Mukalla City.

Data collection

Data was collected by using a close ended questionnaire by interviewing with patients who visited Ibn Sena General Hospital Authority in their routine visit to the outpatient department, the samples were taken in the study period from 8th of October 2023 to 20th of February 2024. The questionnaire was designed after reviewed multiple similar studies and developed under the guidance of expert medical faculty members. The questions were written in a simple and clear form that is suitable for all age groups. The questionnaire was tested by selecting a random sample from the study population and distributing the questionnaire to them to identify any difficulties or questions that were not understood in the questionnaire. The questionnaire included the general and specific objectives of the research, and the objectives were arranged in a sequential manner. Under each objective, the questions related to it were placed. The questionnaire was composed of five parts. In the first part, we asked about the socio-demographic characteristics of the participants, then the clinical data related to the objectives of the study. In the second part, we assessed the co-existing hypertension among diabetes mellitus patients, in the third part we determined the co-existing hypertension causes among diabetes mellitus patients, in the fourth part we evaluated the developing of cardiovascular diseases of co-existing hypertension among diabetes mellitus patients, and in the fifth part we assessed the level of control of co-existing hypertension among diabetes mellitus patients.

Data processing and analysis:

The questionnaire was reviewed and coded. Obtained data was processed with Statistical Package for Social Sciences (SPSS) version 23.

Descriptive statistics was calculated including frequencies and proportions for numerical variables and means with standard deviations (SD) for continuous variables. The results were presented in tables and graphs.

Variables:

Dependent variables:

- Diabetes mellitus: is a general term for heterogeneous metabolic disorders in which there is chronic hyperglycemia [1].
- Hypertension: is a condition in which the blood vessels are constantly under high pressure [2].

- Cardiovascular disease: is a broad of term that encompasses a range of conditions affecting the heart and blood vessels, which include coronary artery disease, cerebrovascular disease, kidney failure, and congestive heart failure [5].

Independent variables:

- Age
- Gender

Ethical considerations

A written approval of this project was from research committee of collage of medicine and health sciences of Hadhramout University in June 2022 confirmed that the research proposal under the title of prevalence of hypertension among diabetes patients attending to Ibn Sena General Hospital in Mukalla City from 2023-2024 is ethically approved. A facilitating letter for field work was given to allow collection of data needed for this research. A verbal approval of using the collected data for research purposes was obtained from all targeted population after they were informed of the details of the study and its purpose. We guarantee that the information used in this study will remain strictly confidential and in complete privacy, and will only be used for the benefit of society.

No	Item	Description	QTY	Unit Cost (Y.R)	Total Cost (Y.R)
1	Transportation	Covers the round way cost of collecting data to the colleges	4	6000	24000
2	Snacks and beverages	This include all foods and snacks which will be provided to the data collectors	5	10000	50000
3	Stationary	These are consumables materials during field work like printing papers – pens ... etc.	8	5000	40000
4	Contingency	Include miscellaneous and accidental issues			12000
Total					<u>126000</u>

BUDGET

Table No. (1): Table of budget.

WORK PLAN

Table No. (2): Table of work plan.

Task name	Year									
	2023					2024				
	Apr	Ma y	Oct	Nov	Dec	Jan	Feb	Ma r	Apr	Ma y
PREPARE THE RESEARCH PROPOSAL										
RESEARCH PROPOSAL SUBMISSION										
DATA COLLECTION										
DATA ANALYSIS										
PREPARE THE RESULT										
PREPARE THE DISCUSSION										
PREPARE THE CONCLUSIONS										
PREPARE THE RECOMMENDATIONS										
REPORT ADJUSTMENT AND WRITING										
RESEARCH SUBMISSION										
PRESENTATION										

Result

A study to measure the prevalence of hypertension among DM patients was conducted among patients attending to Ibn Sina General Hospital Authority in Mukalla city, (422) participants answered the questionnaires. The percentage of males and females was (64.9%) and (35.1%) respectively, as shown in table No. (3).

Table No. (3): Socio-demographic characteristic of patients attending to Ibn Sina general Hospital Authority.

Variable	Frequency	%
Sex		
Male	274	64.9
Female	148	35.1
Age		
12 – <25	12	2.8
25 – <38	37	8.8
38 – <51	116	27.5
51 – <64	166	39.3
64 – <77	78	18.5
77 - 90	13	3.1

This study showed that the prevalence of co-existing hypertension among DM patients was found to be 196 (46.4%) as shown in figure No. (1).

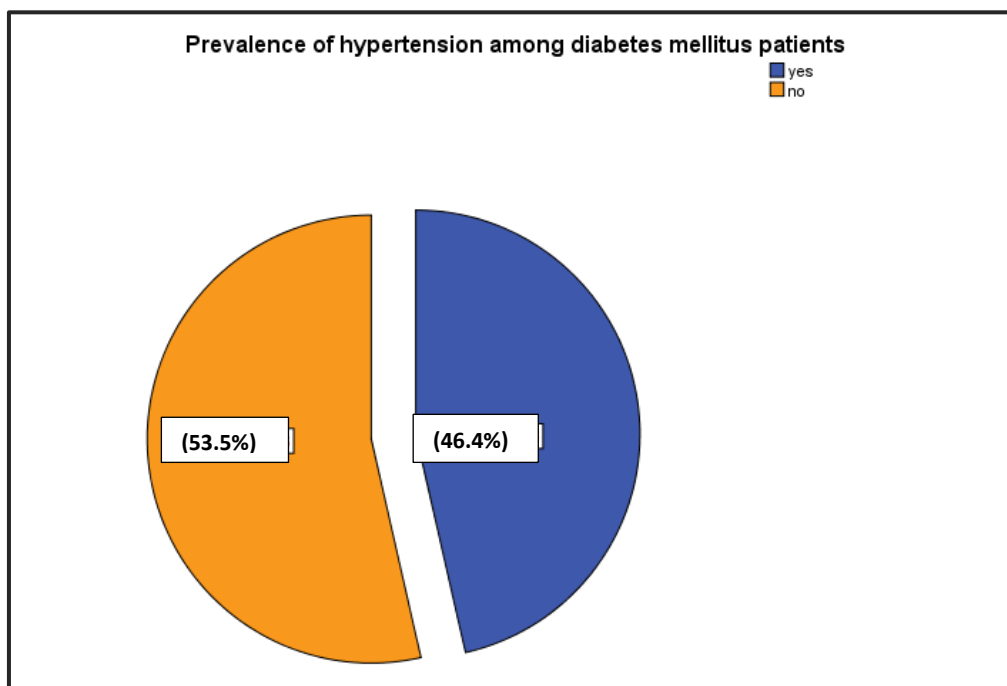


Figure No. (1): Prevalence of co-existing hypertension.

As it shows in table No. (4), the most common cause of co-existing hypertension among diabetes mellitus patients is positive family history, Its percentage is estimated about (29.4% ,n=101), followed by being an elder (25.4% ,n = 87) , and having a stressful lifestyle (19% ,n = 65) ,then tobacco users about (18.4%,n=63) and obesity (7.9%,n=27).

Table No. (4): Frequency of causes among diabetes mellitus patients with co-existing hypertension.

causes	Frequency	percent
Obesity	27	7.9%
Stressful life style	65	19.0%
Family history	101	29.4%
Elderly	87	25.4%
Tobacco use	63	18.4%
Total	343	100.0%

Table No. (5) shows existence of cardiovascular diseases among hypertensive diabetic patients in a total of (n=196) participants, there was a (31.1%, n=61) who had a cardiovascular disease, while the majority of (68.9%, n=135) did not.

Table No. (5): Frequency of cardiovascular disease among diabetes mellitus patients with co-existing hypertension.

Cardiovascular diseases	Frequency	Percent
Yes	61	31.1%
No	135	68.9%
Total	196	100.0%

Table No. (6) shows that (86.7% n=170) of diabetes mellitus patients were on regular treatment of co-existing hypertension while (13.3% n = 26) of diabetes mellitus patients were not on regular treatment of co-existing hypertension.

Table No. (6): Frequency of regular treatment among diabetes mellitus patients with co-existing hypertension.

Regular treatment	Frequency	Percent
Yes	170	86.7%
No	26	13.3%
Total	196	100.0%

Table No. (7) shows that the majority of the sample with co-existing hypertension (62.2% , n=122) under a regular checkup of blood pressure, while the rest (37.8% , n=74) were on an irregular checkup.

Table No. (7): Frequency of regular checkup of blood pressure among diabetes mellitus patients with co-existing hypertension.

Regular checkup of blood pressure	Frequency	Percent
Yes	122	62.2%
No	74	37.8%
Total	196	100.0%

Discussion

In this study, the prevalence of co-existing hypertension among DM patients was found to be (46.4%). A similar prevalence of (45.6%) in patients with co-existing hypertension with DM was reported in Northern Sudan (Abdelbagi et al., 2021). In contrast to a study conducted in Malaysia, which was quite high with (92.7%) and in Iraq found to be (89.6%) [11,13]. In other Arab populations, the prevalence rate of hypertension in DM patients was relatively high (70.4%) in Morocco and (72.4 %) in Jordan [12,15]. The explanation for differences in prevalence rate by each country could be due to different methods of surveillance, differences in socioeconomic status, population characteristics, varieties in diet and lifestyle.

The study showed that family history of hypertension is the main cause of developing co-existing hypertension among diabetic patients, and which found to be (29.4%), this is supported by other study to which had been found in Northern Sudan (46.1%) and Pakistan (34.1%), it is believed that several genetic factors are responsible for the development of hypertension, along with environmental factors [17,18]. Our study also revealed the second cause was elderly (over 60 years), was a high cause of hypertension by (25.4%), supported by study done in Ethiopia reported that cause of hypertension in DM patients was increased in age by (70.7%), it could be attributable to the vascular changes during aging and also the aging is linked to deterioration in different physiological systems (Akalu & Belsti, 2020). The third cause was stressful lifestyle due to low socio-economic status in our country. Also, we found the current tobacco users were more likely to develop hypertension by (18.4%). This finding is consistent with other studies in Pakistan by (28.03%), it could be as a result of the unscrupulous effect of nicotine on blood vessels that's leading to inflammation and abnormal vascular growth and narrow blood vessels and predispose to hypertension (Rupasinghe et al., 2022). The last cause was obesity (7.9%), which is a significant cause for developing hypertension which supported by findings of a study in Northern Sudan (39.9%) and Cameroon (33.0%) (Abdelbagi et al., 2021; Kingue et al., 2015). The vast difference in percentages between these countries is due to the poverty of our country.

We further evaluated whether hypertension would increase the prevalent cardiovascular diseases in diabetic patients. We found that (31.1%) of patients had cardiovascular diseases. This is similar to a study in Shenzhen Sun Yat-sen Cardiovascular Hospital, where the incidence of cardiovascular diseases in hypertensive diabetic patients was (31%) and in North Sudan (30.2%) (Abdelbagi et al., 2021; Zhao et al., 2017). The similarities in the results of the previous studies may be attributed to the high blood pressure leads to thickening of the blood vessel walls. When combined with cholesterol deposits in the blood vessels, the risk of heart attack and stroke increases, addition to the decreased amount of yearly checkups.

In this study, the majority of diabetic patients with co-existing hypertension were on regular treatment in Ibn Sena General Hospital Authority, and estimated by (86.7 %), while (13.3%) weren't on regular treatment, in similar study done in Sudan the diabetic patients with co-existing hypertension were on regular treatment is (76.8%), but in morocco is (88.6%), the reason for such variations may be due to differences in socioeconomic status, health care system (Abdelbagi et al., 2021; Berraho et al., 2012).

The prevalence of hypertension among patients with DM in Ibn Sena General Hospital Authority in a study of check ups of hypertension were the majority of cases by (62.2%), while in a study in Syria it was (19.3%) regularly checked up, on other hand the minority of cases were irregular by (38.8%), while in a study in Syria it was (63.7%) (Swed et al., 2023). Perhaps the reason for the large discrepancy in the percentages between our study and the study conducted in Syria is due to the security stability in our region, the absence of that in Syria due to the presence of war and the inability of patients to visit medical centers and hospitals.

conclusions

Hypertension co-existing with diabetic mellitus is a wide spread concern in Mukalla City. This study assess the prevalence of co-existing hypertension among diabetes mellitus patients attending Ibn-Sina General Hospital Authority in Mukalla City, which found to be common and relatively high.

The most common causes of co-existing hypertension among diabetes mellitus patients were mainly family history followed by being an elderly and having stressful life events.

The prevalence of developing cardiovascular diseases of co-existing hypertension among diabetes mellitus patients was quite low.

Also, we found out that more than half of the patients of co-existing hypertension in diabetes mellitus were taking regular treatment and regular checkup of the blood pressure.

Recommendation

- 1) For the Ministry of Health office, to reduce the development of hypertension in diabetic patients by implementing and reinforce awareness and anti-smoking campaigns. In addition, they can ensure regular cardiovascular screenings and appropriate treatments are provided for patients with both hypertension and diabetes mellitus.
- 2) For health care providers, to conduct regular screenings for hypertension and diabetes, especially for individuals with a family history of these conditions. They can also provide regular health check-ups for the elderly population.
- 3) For local organizations, to organize events and programs to promote lifestyle modifications. This includes stress management workshops, exercise classes, nutrition education sessions, as well as education about smoking.
- 4) For the media, to Spread awareness through health education programs.
- 5) For individuals and families, to take proactive steps to manage their health by participating in regular checkups, adopting healthy lifestyle habits, and avoiding the causes that lead to these conditions.

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