

Prevalence of Hypertension among Diabetic Patients and their Associated Factors in the Selected Diabetes Centers of Nepal

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Abstract

Introduction: The prevalence of hypertension and diabetes mellitus together has been increasing in developing countries like Nepal. A study conducted in France reported the prevalence of hypertension in almost one in every 4 diabetes cases and England shows the prevalence of Hypertension and Diabetes accounting for 46% of respondents. The prevalence of Diabetes and hypertension together account for approximately 4% in China and ranges from 2% to 32% in Nepal.

Objective: The objective of this study is to examine the prevalence of hypertension among diabetic patients and their associated factors in the selected diabetic centers within Kathmandu Valley.

Methodology: A cross-sectional analytical study design was conducted to interview the diabetic patients in the diabetic centers within Kathmandu Valley with a sample size of 218. A lottery method from Simple Random Sampling was used for the selection of the study area and purposive sampling was used to select sample units. All the patients 20 year and older seeking services from diabetic centers were taken for the study. The exclusion and inclusion criteria were properly determined before the data collection. A semi-structured questionnaire was used for data collection and a face-to-face interview was conducted as a data collection technique. KOBO Toolbox was used for the data collection while IBM SPSS was used for data entry and analysis. Relevant descriptive statistics were computed for all variables and the association between two categorical variables was computed using a non-parametric test (Chi-square test). Ethical approval was taken from the Institutional Review Committee (IRC) of the institution. Approval was taken from diabetic centers before conducting the research. Informed consent was taken from the respondents prior to collecting data.

Result: The mean age of the respondent was 50 years and S.D was 9.4. Among 219 respondents, males (55.7%) were found to be higher than females. A maximum of them (91.3%) were Hindu, and the majority (95.9%) of them were married. Most of the respondents (50.2%) had completed their secondary level of education and more than half of them lived in Kathmandu Valley (60.3%). The maximum number of respondents were housewives (27.9%). Alcohol consumption was found to be highest (25.1%) among respondents followed by tobacco and cigarette smoking. According to this study, the prevalence of hypertension among diabetic patients is 46.6% with the majority of them (18.7%) belonging to 60-65 years of age. Similarly, the prevalence of hypertension among diabetic patients was positively associated with age (p-value = 0.0001) family history of Diabetes (p-value = 0.002), family history of hypertension (p-value = 0.0001), family history of both Diabetes mellitus and Hypertension (p-value = 0.012), Smoking Cigarettes (p-value = 0.011) and duration of diabetes incidence (p-value = 0.0001).

Conclusion: According to this study, the prevalence of hypertension among diabetic patients was nearly half (46.6%) of the study population. Age, family history, smoking cigarettes, and duration of diabetes mellitus incidence were statistically associated with the prevalence of hypertension among diabetic patients. There is a critical need for awareness of hypertension and diabetes comorbidity and their common risk factors.

Keywords: Non-communicable Disease; Diabetes; Hypertension; Comorbidity

Abbreviations

BMI: Body Mass Index; BP: Blood Pressure; CAD: Coronary Artery Disease; CKD: Chronic Kidney Disease; COPD: Chronic Obstructive Pulmonary Disease; CVD: Cardiovascular Diseases; DM: Diabetes Mellitus; DoHS: Department of Health Science; HTN: Hypertension; LMIC: Low and Middle-Income Countries; NCDs: Non-Communicable Diseases; NDHS: National Demographic Health Survey

Introduction

Background

Hypertension and diabetes mellitus are two independent risk factors of various NCDs but their co-occurrence in the same individual exerts a double burden of NCDs. The prevalence of hypertension and diabetes mellitus together has been increasing in developing countries like Nepal.

Nepal is a low-middle income country having a population of more than 29 million as per the 2021 census with a population growth rate of 0.92% annually. Kathmandu district, the capital city of Nepal which is also named Kathmandu Metropolitan City has a population of more than 8 lakhs with a population density of more than 1700 [8,9].

Non-communicable diseases are those diseases that cannot be directly transmitted from one person to another and can cause long-term physical and mental dysfunction. In Nepal, NCD accounts for 60% of deaths annually. Four main types of NCDs are responsible for NCD-related deaths worldwide. They are cardiovascular diseases, cancers, chronic obstructive pulmonary diseases, and diabetes [10]. In addition to the single burden, multiple disease burdens of NCD have been an enormous challenge to the Globe. However, the changing patterns of morbidity are a bigger threat that has been arising over time.

Hypertension is a chronic condition where the blood pressure in the blood vessels becomes too high i.e. (systolic blood pressure reaches to 140 mm of Hg and above while diastolic blood pressure reaches to 90 mm of Hg and above). An analysis of NDHS-2016 in Nepal shows the prevalence of hypertension is approximately 21% and 19% in rural and urban areas respectively [11].

A community-based cross-sectional study suggests that KMC has many characteristics that can lead to increased cases or conditions like Hypertension. It shows alcohol consumption as one of the major risk factors associated with 5% to 30% of hypertension cases among the general population. Similarly, the study shows 20% of hypertension cases are associated with physical inactivity. It also shows a well-established relationship between hypertension with diabetes. The prevalence of hypertension usually affects the population aged 35 years and older [12]. Other socio-demographic factors such as gender, ethnicity, religion, marital status, educational level, and family history determine the prevalence of hypertension.

Other than hypertension, diabetes mellitus is another modifiable risk factor leading to morbidity and NCD-related premature mortality worldwide. It is a chronic condition resulting in an elevated blood sugar level in the body when the pancreas produces an insufficient insulin. A systematic review showed a pooled prevalence of diabetes mellitus of approximately 8% in Nepal [7]. Similarly, a hospital-based study conducted in the urban areas of eastern Nepal showed the prevalence of approximately 6% of diabetes mellitus which suggests a higher prevalence in the urban areas of Nepal [13].

The factors associated with the prevalence of diabetes mellitus are very similar to that of hypertension. A study shows a higher proportion of diabetes mellitus among smokers, alcohol consumers, and tobacco (smoked or smokeless) consumers in Nepal [7]. In addition to that, there are various socio-demographic factors such as age, gender, marital status, educational level, and family history associated with the prevalence of diabetes.

Comorbidity is defined as the co-occurrence of more than one disease or chronic condition in the same individual [14]. It increases the likelihood of acquiring chronic diseases or NCDs globally. A nationwide population survey study conducted in Nepal shows that participants with raised blood pressure had about 2 times higher odds of having DM in comparison to participants having normal blood pressure [7]. An epidemiological study on diabetes mellitus shows approximately 32% of participants had the prevalence of both DM and HTN [6].

There are various factors associated with the co-occurrence of HTN and DM in the same individual. Socio-demographic factors such as age, gender, ethnicity, religion, marital status, educational level, and family history, and lifestyle-related factors such as smoking, tobacco (smoked or smokeless) consumption, alcohol consumption, and physical inactivity and health seeking behavior such as diagnosis, treatment seeking and compliance with the treatment was studied to identify the association of these factors for the prevalence of hypertension among the diabetic patients.

Aim of the Study

This study aims to identify the prevalence of hypertension among diabetic patients and their associated factors in the selected diabetes centers of Nepal.

Problem statement

Global context

The prevalence of comorbidity and multi-morbidity is increasing globally at an alarming rate. The prevalence of comorbidities and multi-morbidities is higher among South American countries and is lowest among South African countries [15].

A national study conducted in England shows that 18 - 30% of adults live with two or more co-existing conditions. It shows the prevalence of hypertension and diabetes accounting for 46% of respondents. There exists a high frequency of co-occurrence of hypertension and DM all over the world resulting in functional abnormalities and disability associated with CVDs. They multiply the mortality and morbidity of CVDs. Other than CVDs, their co-occurrence is directly associated with decreased quality of life among affected individuals [2,16].

A systematic review has predicted a strong association between the numbers of co-occurrence with a functional decline in daily activities [17]. Similarly, a study conducted in France reported the prevalence of hypertension in almost one in every 4 diabetes cases [1]. Similarly, A study reported the prevalence of hypertension in over two-thirds of patients with type 2 diabetes [18].

Southeast Asia context

Hypertension and diabetes are one of the most common chronic non-communicable diseases and multifactorial disorders affecting both developed and developing countries, including India, China, Bangladesh, and Thailand. Indonesia and so on comorbidity and multi-morbidity have been associated with adverse effects on an individual's daily functioning and psychosocial well-being in India [19]. It not only affects physical functioning but also disturbs the mental and emotional well-being of an individual.

A cross-sectional study conducted in China showed a significant synergistic interaction that affects coronary heart disease. Participants with the co-occurrence of both DM and HTN significantly increase the risk of cardio-cerebrovascular diseases in comparison to participants having a single condition. The prevalence of diabetes and hypertension together accounted for approximately 4% in China [3].

According to the Bangladesh demographic health survey 2011, approximately 39% of diabetic patients had hypertension. Similarly, in another study conducted among the general population in Bangladesh, approximately 57% of patients with diabetes had hypertension

which is higher in comparison to other South Asian countries such as India 50%, Bhutan 54%, and Nepal 37%. However, the prevalence of hypertension among diabetic patients is higher in Pakistan with approximately 75% [20].

Furthermore, a study conducted in Indonesia has shown the prevalence of hypertension among the undiagnosed diabetic mellitus group was approximately 49% followed by diagnosed diabetes mellitus at approximately 41% [21].

Nepal context

The burden of co-occurrence of HTN and DM has been increasing in Nepal. The prevalence of NCDs in Nepal is found to be 31% in a hospital-based study conducted in non-specialist institutions. Among them, 12% of NCDs accounted for DM and 40% constituted for CVDs. Among the prevalence of CVDs, hypertension comprises a large number of cases i.e. 47% [22].

One in every five individuals is hypertensive and the prevalence of hypertension is expected to have a three-fold increment in the prevalence of HTN among the same population at the same location after 25 years [23,24]. The prevalence of diabetes mellitus accounts for approximately 8.5% as per the findings from a nationwide population-based survey [7].

Similarly, a secondary analysis of the national survey shows that hypertension and diabetes are one of the most common pairs of co-occurrence among NCDs. The prevalence of their co-occurrence is found to be higher in Nepal in comparison to other neighboring countries like India and Bangladesh. The overall prevalence of comorbidity DM and HTN ranges from 2% to 32% in Nepal [4- 7].

Furthermore, a study has shown that the participants with hypertension had a 2.2-fold risk of hyperglycemia compared to those without HTN [6]. Comorbid DM and HTN increase the likelihood of CVDs and other NCDs. Various other studies show their co-occurrence increases with the increase in age are most concentrated in urban areas in comparison to rural areas of Nepal. Similarly, a nationwide survey was conducted in Nepal in 2022 on the prevalence of diabetes mellitus and its associated risk factors. The result of the study shows that approximately 15% of participants had a prevalence of both hypertension and diabetes mellitus [7].

Rationale

- The prevalence of comorbidities is increasing every year which indicates that the patterns of disease morbidity are shifting from single burden to double burden.
- There are various literature and documents available on hypertension and diabetes separately. However, literature and articles about the co-occurrence of hypertension and diabetes are insufficient in Nepal.
- Many papers have not sufficiently presented the association of socio-demographic characteristics of the respondents on the prevalence of hypertension among diabetic patients.
- Furthermore, there exists a gap in studying the family history of the respondent and its association with the prevalence of hypertension and diabetes comorbidity.
- The result of this research will help the community to understand the prevalence of the HTN-DM comorbidities and the risk factors associated with it which will enable them to take necessary preventive measures in their life. In addition to that, necessary changes can be made at the policy level to control and prohibit individuals from being exposed to the risk factors.
- The findings of this study will help the community to understand the changing patterns of morbidities and will influence them to take appropriate preventive measures.

Conceptual framework

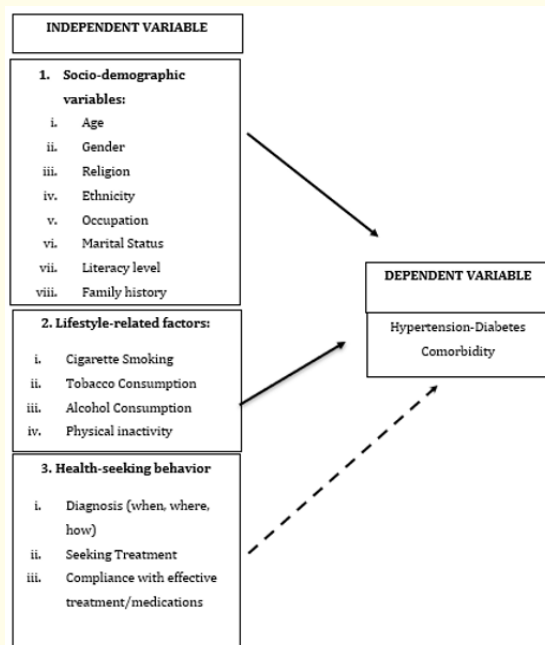


Figure 1: Conceptual framework of variables.

Materials and Methods

Study design

A cross-sectional analytical study design was conducted by measuring the research variables at a certain point in time among all individuals attending the OPD of selected diabetic centers within Kathmandu Valley. Quantitative non-experimental study methods were used for the study. A simple random sampling i.e. lottery method was performed to select the study area. The required sample for this study was calculated by using the formula given by Cochran i.e. $n_0 = Z^2 pq/d^2$ (Cochran, 1977). The sample size obtained was 218.

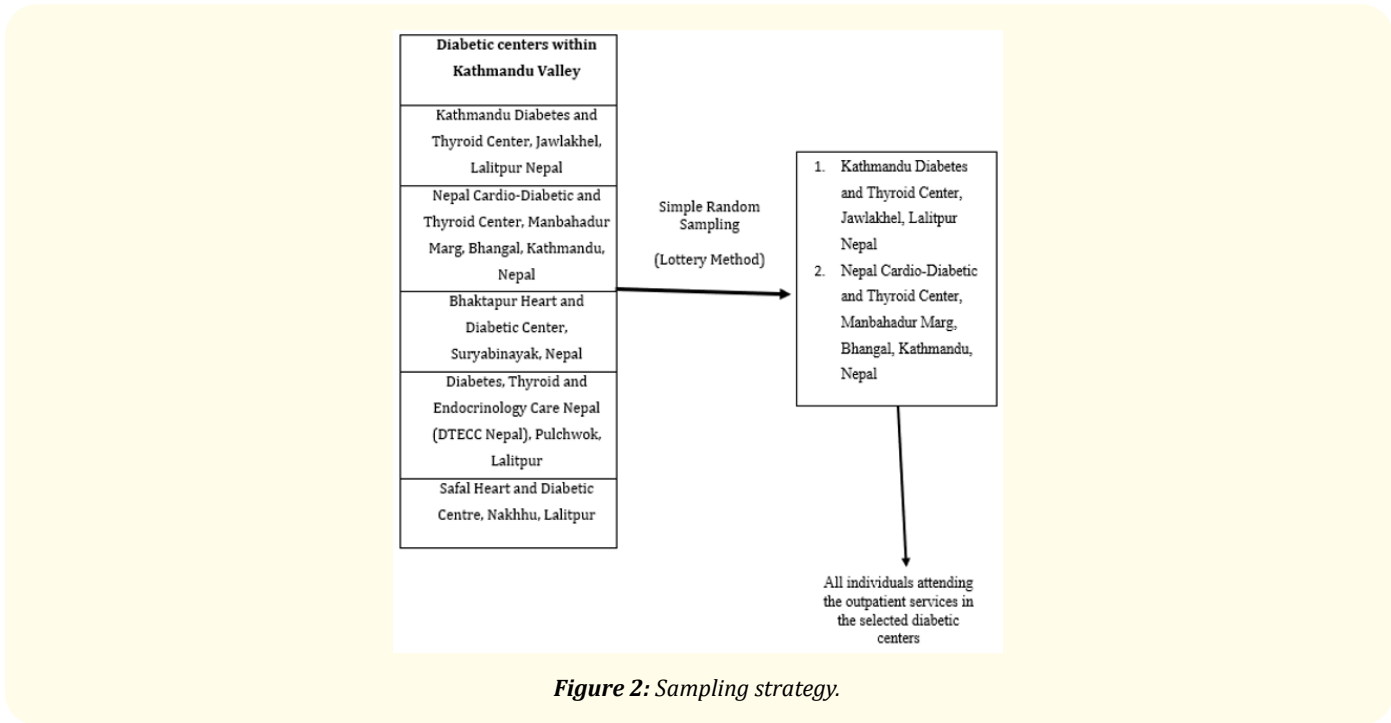
Sampling strategy

Sample size

The required sample for this study were calculated by using the formula:

$$n_0 = Z^2 pq/d^2 \text{ (Cochran, 1977)}$$

Here,



$z = 1.96$ (Z-score at a confidence interval of 95%)

$p = 15.2\%$ i.e. 0.152 (Prevalence from a population-based study conducted in Nepal. Out of 4080 participants, the prevalence of hypertension and diabetes comorbidity was 15% [7]).

$q = 1 - p = 0.85$

$d =$ Permissible error set at $\pm 5\%$ or 0.05

$n_0 =$ Desired sample size

Now, using the formula,

We have,

$$n_0 = \frac{z^2 pq}{d^2}$$

$$= \frac{1.96^2 \times 0.15 \times 0.85}{0.05^2}$$

$$= 195.84 \sim 196$$

Again, using the formula for non-responsive rate, we have,
 Non-responsive rate (10%) = $\frac{\text{Sample size}}{1 - \text{expectancy of non-response rate}}$

$$= \frac{196}{1-0.1} = \frac{196}{0.9} = 217.77 \sim 218$$

Therefore, the sample size for the study was 218.

Inclusion criteria

1. All the individuals aged 20 years and older and of all genders attending the service from the selected two diabetes centers were included in the study.
2. Respondents attending the OPD services from the selected two diabetes centers were only included in the study.

Exclusion criteria

1. Respondents with critical health conditions were excluded from the study population.
2. Respondents above 65 years of age were excluded from the study population.
3. Respondents with incomplete medical reports of hypertension and diabetes were excluded from the study population.
4. Newly diagnosed cases of diabetes i.e. below 1 week were excluded from the study population.
5. Pregnant and postpartum women (up to 6 weeks) were excluded from the study population.

Ethical considerations

The following are the ethical considerations that were taken into account while carrying out the study:

1. Both verbal and written consent of respondents were taken prior to asking questions.
2. The confidentiality, anonymity, privacy, and sentiments of all the respondents were upheld.
3. The liberty to resign from the study at any time or skip any question was guaranteed to the respondents.
4. Ethical approval was taken from the Institutional Review Committee (IRC) of the institution.
5. Permission was taken in each diabetic center before carrying out the data collection.

Data collection methods

Two diabetic centers: Kathmandu Diabetes and Thyroid Center and Nepal Cardio Diabetes and Thyroid Center were selected as the study area through simple random sampling using the lottery method. All the individuals diagnosed with diabetes aged 20 years and older attending the OPD services in the selected two diabetes centers were the study population for the research. The study unit for the study were Kathmandu Diabetes and Thyroid Center and Nepal Cardio Diabetes and Thyroid Center while the sampling unit for the study population were all the individuals attending OPD services from the selected two diabetic centers in the study.

Data collection tools

A semi-structured questionnaire was used as a tool for data collection. The questionnaire was classified into different sections including: demographic characteristics, current medical conditions, and lifestyle-related characteristics.

Data collection techniques

Formal consent was taken from the administration of both selected diabetes centers: Kathmandu Diabetes and Thyroid Center and Nepal Cardio Diabetes and Thyroid Center. Informed consent was taken from the respondents. An interview (face-to-face) was used as data data-collecting technique. Each interview required about 10 - 15 minutes per respondent to complete each questionnaire.

Data management

The data collection and data entry were done using Kobo Toolbox, followed by SPSS IBM Statistics version 25 software. All the collected data had its veracity evaluated, verified, and verified again. Coding was done at the time of tool preparations.

Pre-testing of the tools

The 10% of the total sample size i.e. 218 samples were taken for the pre-testing of the tool. The pre-testing was conducted in both of the selected diabetic centers. The final questionnaire was modified including the questions and terminologies after the pre-testing as needed.

Validity and reliability

The following measures were used to sustain the validity and reliability of the study:

1. An extensive literature review was done before the finalization of the study tools.
2. The study proposal preparation and questionnaire development were performed with the involvement and guidance of the supervisor.
3. The pre-testing of the study tool or the questionnaire were undertaken to ensure reliability after which relevant changes were made.
4. The respondents were clearly informed about the research topic and content prior to taking the consent.
5. Formal and polite language were used to solicit appropriate responses from each respondent.

Statistics

After the data were entered into Kobo Toolbox and SPSS, all the statistical analysis was performed using IBM SPSS 25. Univariate analysis was performed and presented in terms of frequency and percentage to show the distribution of socio-demographic characteristics, life-style related factors and health-seeking behaviors. Later, Bi-variate analysis was conducted through cross-tabulation using chi-square test to find associations between dependent variable (Hypertension-diabetes mellitus comorbidity) and independent variables (Socio-demographic characteristics, lifestyle-related factors, and health-seeking factors).

Independent Variable		Dependent Variable			Total	n = 219	
		Hypertension		P-value			
Yes	No						
Age (Completed years)	20 - 29	Frequency	1	1	2	0.0001***	
		Percentage	0.5%	0.5%	0.9%		
	30 - 39	Frequency	2	19	21		
		Percentage	0.9%	8.7%	9.6%		
	40 - 49	Frequency	22	32	54		
		Percentage	10.0%	14.6%	24.7%		
	50 - 59	Frequency	36	42	78		
		Percentage	16.4%	19.2%	35.6%		
	60 - 65	Frequency	41	23	64		
		Percentage	18.7%	10.5%	29.2%		
	Total		Frequency	102	117		219
	Percentage			46.6%	53.4%		100.0%

Table 1: Association between age group and prevalence of hypertension among diabetes patients.

***There is a strong association between the independent variable and the dependent variable.

Results and Discussion

Association between independent and dependent variables

Table 1 depicts the association between age and prevalence of hypertension among diabetic patients. The p-value for age group was 0.0001 which is less than 0.05 (p-value < 0.05), which makes the association between age group and prevalence of hypertension statistically significant.

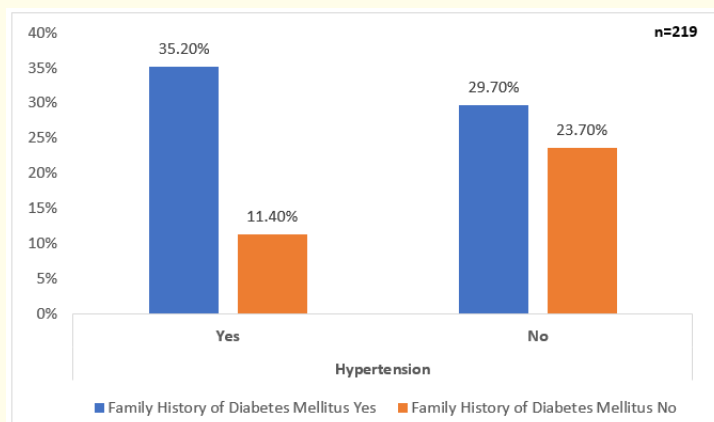


Figure 3: Association between the prevalence of hypertension and family history of diabetic mellitus among diabetic patients.

Figure 3 depicts the association between family history of diabetes mellitus and prevalence of hypertension among diabetic patients. The p-value for family history of diabetes mellitus was 0.002 which is less than 0.05 (p-value < 0.05), which makes the association between family history of diabetes mellitus and prevalence of hypertension statistically significant.

Independent Variable		Dependent Variable			Total	n = 219
		Hypertension		P-value		
Yes	No					
Family History of Hypertension	Yes	Frequency	53	32	85	0.0001***
		Percentage	24.2%	14.6%	38.8%	
	No	Frequency	49	85	134	
		Percentage	22.4%	38.8%	61.2%	
Total		Frequency	102	117	219	
Percentage			46.6%	53.4%	100.0%	

Table 2: Association between family history of hypertension and prevalence of hypertension among diabetes patients.

***There is a strong association between the independent variable and the dependent variable.

Table 2 depicts the association between family history of hypertension and prevalence of hypertension among diabetic patients. The p-value for family history of hypertension was 0.0001 which is less than 0.05 (p-value < 0.05), which makes the association between family history of hypertension and prevalence of hypertension statistically significant.

Independent Variable Yes No			Dependent Variable Hypertension		Total	n = 219
				P-value		
Family History of Diabetes Mellitus and Hypertension	Yes	Frequency	29	17	46	0.012*
		Percentage	13.2%	7.8%	21.0%	
	No	Frequency	73	100	173	
		Percentage	33.3%	45.7%	79.0%	
Total Percentage		Frequency	102	117	219	
			46.6%	53.4%	100.0%	

Table 3: Association between family history of both diabetes mellitus and hypertension (comorbidity) and prevalence of hypertension among diabetes patients.

*There is a positive association between the independent variable and the dependent variable.

Table 3 depicts the association between family history of diabetes mellitus and hypertension and prevalence of hypertension among diabetic patients. The p-value for family history of diabetes mellitus and hypertension was 0.012 which is less than 0.05 (p-value < 0.05), which makes the association between family history of diabetes mellitus and hypertension (Comorbidity) and prevalence of hypertension statistically significant.

Independent Variable Yes No			Dependent Variable Hypertension		Total	n=219
				P-value		
Cigarette Smoking (Past 6 months)	Yes	Frequency	6	20	26	0.011*
		Percentage	2.7%	9.1%	11.9%	
	No	Frequency	96	97	193	
		Percentage	43.8%	44.3%	88.1%	
Total Percentage		Frequency	102	117	219	
			46.6%	53.4%	100.0%	

Table 4: Association between cigarette smoking and prevalence of hypertension among diabetes patients.

*There is a positive association between the independent variable and the dependent variable.

Table 4 depicts the association between cigarette smoking and prevalence of hypertension among diabetic patients. The p-value for cigarette smoking was 0.011 which is less than 0.05 (p-value < 0.05), which makes the association between cigarette smoking and prevalence of hypertension statistically significant.

Independent Variable		Dependent Variable			Total	n = 219
		Hypertension		P-value		
Yes	No					
Duration of Diabetes Incidence	Below 10 years	Frequency	44	83	127	0.0001***
		Percentage	20.1%	37.9%	58.0%	
	10 years-20 years	Frequency	52	29	81	
		Percentage	23.7%	13.2%	37.0%	
	Above 20 years	Frequency	6	5	11	
		Percentage	2.7%	2.3%	5.0%	
Total Percentage		Frequency	102	117	219	
			46.6%	53.4%	100.0%	

Table 5: Association between duration of diabetes incidence and prevalence of hypertension among diabetes patients.

***There is a strong association between the independent variable and the dependent variable.

Table 5 depicts the association between duration of diabetes incidence and prevalence of hypertension among diabetic patients. The p-value for duration of diabetes incidence was 0.0001 which is less than 0.05 (p-value < 0.05), which makes the association between duration of diabetes incidence and prevalence of hypertension statistically significant.

Discussions

The objective of conducting this study was to find out the prevalence of hypertension among diabetic patients and their associated factors in the selected diabetic centers of Kathmandu Valley.

As per the present study, the prevalence of HTN among DM patients has been found to be 46.6%. Similarly, a nationwide survey titled, "Prevalence of diabetes mellitus and associated risk factors was conducted in Nepal with a sample size of 4080 showed 15% prevalence of hypertension [7]. Similarly, a community-based cross-sectional, observational study was conducted among the residents of Makalbari of Kathmandu district with a sample size of 800 households, 32% of respondents had both hypertension and diabetes [6]. Furthermore, a cross-sectional and retrospective study was conducted in 2017 in Bangladesh titled as, "The study aims to determine the prevalence, awareness, and control of hypertension and factors associated with HTN among people with type-2 diabetes" with the sample size of 1252 adults with type-2 diabetes mellitus. The prevalence of both hypertension and diabetes accounted for 61.5% of total study participants [20].

The present study shows a positive association between the age group of diabetic patients with the prevalence of hypertension among diabetic patients. 18.7% of diabetic patients having hypertension were from the age group 60 - 65 years followed by 50 - 59 years i.e. 16.4%, followed by 40 - 49 years i.e. 10%. The p-value for the age group was 0.0001 i.e. less than 0.05, which statistically signifies a strong association. A study conducted in Bangladesh has also shown a positive association between age and prevalence of hypertension among type-II diabetes patients with the p-value of < 0.001 [20].

In terms of gender, the present study shows a higher prevalence of hypertension among diabetic male i.e. 24.7% compared to diabetic females i.e. 21.9% which means that males have higher prevalence of diabetes-hypertension comorbidity. However, there is no association between gender and the prevalence of hypertension in this study. A study conducted in Manipur, India also shows males with higher prevalence of hypertension compared to females. The study also hasn't shown any association between gender and prevalence of hypertension [25].

In the present study, 50.2% of diabetic patients had completed their secondary level of studies. A similar finding was obtained from a study in Nepal where the majority of the respondents had completed their secondary level of education [7]. However, another study conducted in Nepal has shown a positive association between level of education and prevalence of hypertension [4] which is different from the finding of this study.

In present study, 35.2% of diabetic patients having hypertension had a family history of diabetes mellitus. The p-value for the family history of DM and prevalence of HTN was 0.002 i.e. less than 0.05 which indicates a positive association between the family history of DM and the prevalence of HTN among diabetic patients. A community based cross-sectional study conducted in municipalities of Kathmandu has shown a positive association between family history of hypertension and prevalence of hypertension with p value of < 0.001 [12] which is similar to the findings of this study.

In this study, 24.2% of diabetic patients having HTN had a family history of HTN with a P-value of 0.0001 i.e. less than 0.05 which shows a statistically significant association between family history of HTN and prevalence of DM in this study. Similarly, 13.2% of diabetic patients having hypertension had a family history of DM-HTN comorbidity with a P-value of 0.012 i.e. less than 0.05 which statistically signifies the association between family histories of DM-HTN comorbidity with the prevalence of HTN among diabetic patients. However, there aren't enough studies to show the association between family history of DM and the prevalence of HTN among diabetic patients.

In the present study, 2.7% of diabetic patients having hypertension had been smoking for at least 6 months and 43.8% didn't. The p-value for smoking cigarettes was 0.011 i.e. less than 0.05 which shows a positive association between cigarette smoking and prevalence of HTN among diabetic patients. In the present study, 10.5% of diabetic patients having hypertension had been drinking alcohol at least since 6 months and the rest of them didn't. The study doesn't show any association between alcohol consumption and prevalence of HTN among diabetic patients.

In the present study, 5.9% of diabetic patients having HTN had been consuming tobacco at least since 6 months and 40.6% of them didn't. The study doesn't show any association between tobacco consumption and prevalence of HTN among diabetic patients. In the present study, 26.9% of diabetic patients with HTN had been performing physical activities at least since 6 months of data collection while 19.6% of them didn't. No associations obtained between physical activities and prevalence of HTN. But, a community-based cross-sectional study was conducted in a newly established municipality outskirts of KMC where smoking, alcohol, physical inactivity, and diabetes were positively associated with the prevalence of HTN [12] which is different from this study.

In this study, 23.7% of diabetic patients with HTN had been diagnosed with DM for 10 - 20 years and 20.1% of them had been diagnosed for 10 years. The p-value for the duration of DM incidence was 0.0001 i.e. less than 0.05 which shows a statistical significance between the duration of DM incidence and the prevalence of HTN among diabetes patients. A study conducted in Bangladesh has also shown a positive association between the duration of diabetes incidence and the prevalence of hypertension among type-II diabetes patients with a p-value of < 0.001 [20] which is similar to the finding of this study.

Limitations of the Study

Although the findings are incredible, the study couldn't include the data and information on several other comorbidities associated with diabetes and hypertension which could act as a confounding factor. Data on dietary patterns of diabetic patients was not collected in this study which could be associated with the outcome.

Conclusion

This study was conducted to examine the prevalence of HTN among diabetes patients which was found to be nearly half. The highest percentage of diabetic patients having HTN belonged to the age group of 60 - 65 years followed by 50 - 59 years and 40 - 49 years. Males were found to have a moderately higher prevalence of HTN than females.

About one-third of diabetic patients having HTN had a family history of DM which was positively associated with the prevalence of HTN among diabetic patients. Similarly, almost all diabetic patients with HTN had a family history of DM-HTN combined. Study shows that people having a family history of DM or HTN or DM-HTN comorbid have a higher chance of getting either of them or both.

Diabetic people having HTN were found to be smoking cigarettes moderately which has been found to be positively associated with the prevalence of HTN among diabetic patients. The study didn't find any association of alcohol and tobacco consumption with the prevalence of HTN among diabetic patients. Majority of the diabetic patients performed physical activities every day and no associations were found in this study.

The prevalence of HTN is found to be influenced or determined by the duration of DM incidence. Longer the incidence period, more likely the prevalence of HTN. This finding also concludes that having either HTN or DM is itself a risk factor for both the disease.

In conclusion, DM and HTN are double burden NCDs which have shown very similar factors of determinants. Age, family history, smoking and presence of either DM or HTN. This study has further shown that DM and HTN are one of the most common pairs of comorbidity. Their existence is a challenge to the healthcare system and to public health. More in-depth research in a larger scale is required to understand this pair of comorbidity.

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Conflict of Interest

No conflict of interest exists.

Bibliography

1. Marre M., *et al.* "Hypertension and diabetes mellitus". *Biomedicine and Pharmacotherapy* 47.2-3 (1993): 61-66.
2. Mujica-Mota RE., *et al.* "Common patterns of morbidity and multi-morbidity and their impact on health-related quality of life: evidence from a national survey". *Quality of Life Research* 24.4 (2015): 909-918.
3. Wang Z., *et al.* "Prevalence of diabetes and hypertension and their interaction effects on cardio-cerebrovascular diseases: a cross-sectional study". *BMC Public Health* 21.1 (2021): 1224.
4. Pandey AR., *et al.* "Prevalence and determinants of comorbid diabetes and hypertension in Nepal: evidence from non communicable disease risk factors STEPS survey Nepal 2013". *Journal of Nepal Health Research Council* 13.29 (2015): 20-25.
5. Rr D., *et al.* "Prevalence, pattern and determinants of chronic disease multimorbidity in Nepal: secondary analysis of a national survey". *BMJ Open* 11.7 (2021): e047665.
6. Shakya B., *et al.* "An epidemiological study of diabetes mellitus in productive aged urban Nepalese of Makalbari Area of Gokarneshwor Municipality". *Nepal Medical College Journal* 22.3 (2020): 173-180.

7. Shrestha N, *et al.* "Prevalence of diabetes mellitus and associated risk factors in Nepal: findings from a nationwide population-based survey". *BMJ Open* 12.2 (2022): e060750.
8. Demographics of Nepal. In: Wikipedia (2023).
9. Population | National Population and Housing Census 2021 Results (2023).
10. Non-communicable diseases (2022).
11. Kibria GMA, *et al.* "Prevalence and associated factors of pre-hypertension and hypertension in Nepal: Analysis of the Nepal Demographic and Health Survey 2016". *Health Science Reports* 1.10 (2018): e83.
12. Dhungana RR, *et al.* "Prevalence and associated factors of hypertension: a community-based cross-sectional study in municipalities of Kathmandu, Nepal". *International Journal of Hypertension* (2016): e1656938.
13. Karki P, *et al.* "Prevalence of non-insulin dependent diabetes mellitus in urban areas of eastern Nepal: a hospital based study". *Southeast Asian Journal of Tropical Medicine and Public Health* 31.1 (2000): 163-166.
14. Comorbidity - an overview | ScienceDirect Topics (2023).
15. Chowdhury SR, *et al.* "Global and regional prevalence of multimorbidity in the adult population in community settings: a systematic review and meta-analysis". *EClinicalMedicine* 57 (2023): 101860.
16. Balogun WO and Salako BL. "Co-occurrence of diabetes and hypertension: pattern and factors associated with order of diagnosis among Nigerians". *Annals of Ibadan Postgraduate Medicine* 9.2 (2011): 89-93.
17. Ryan A, *et al.* "Multimorbidity and functional decline in community-dwelling adults: a systematic review". *Health and Quality of Life Outcomes* 13 (2015): 168.
18. Ferrannini E and Cushman WC. "Diabetes and hypertension: the bad companions". *The Lancet* 380.9841 (2012): 601-610.
19. Gupta P, *et al.* "Burden, patterns, and impact of multimorbidity in North India: findings from a rural population-based study". *BMC Public Health* 22.1 (2022): 1101.
20. Alsaadon H, *et al.* "Hypertension and its related factors among patients with type 2 diabetes mellitus - a multi-hospital study in Bangladesh". *BMC Public Health* 22.1 (2022): 198.
21. Mihardja L, *et al.* "Prevalence and clinical profile of diabetes mellitus in productive aged urban Indonesians". *Journal of Diabetes Investigation* 5.5 (2014): 507-512.
22. Bhandari GP, *et al.* "State of non-communicable diseases in Nepal". *BMC Public Health* 14.1 (2014): 23.
23. Vaidya A, *et al.* "Prevalence of hypertension in Nepalese community triples in 25 years: a repeat cross-sectional study in rural Kathmandu". *Indian Heart Journal* 64.2 (2012): 128-131.
24. Hasan M, *et al.* "Prevalence and determinants of hypertension among adult population in Nepal: Data from Nepal Demographic and Health Survey 2016". *PLOS ONE* 13.5 (2018): e0198028.
25. Shah A and Afzal M. "Prevalence of diabetes and hypertension and association with various risk factors among different Muslim populations of Manipur, India". *Journal of Diabetes and Metabolic Disorders* 12.1 (2013): 52.

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