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PREVALENCE OF HYPERTENSION IN DIABETIC PATIENTS IN PAKISTAN

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ABSTRACT

This study highlights the prevalence of diabetes and hypertension as well as the risk factors that are linked to them. Those with diabetes are as much as four times greater likely than non-diabetics to experience hypertension. In diabetics, hypertension is substantially correlated with both obesity and dyslipidemia. Because it rarely causes symptoms, hypertension is referred to as the "silent killer" and is a serious health risk. Stress, excessive sodium intake, alcohol consumption, and physiological variables are among the factors contributing to hypertension in diabetics; genetic susceptibility, obesity, and sedentary lifestyles are all significant factors. These elements have contributed to a rise in the prevalence of hypertension in Pakistani society. Severe consequences such as congestive heart failure, renal failure, strokes, and cardiovascular disorders might result from the condition. Genetic predisposition, obesity, sedentary lifestyles, stress, high in sodium consumption, drinking alcohol, and physical characteristics are some of the factors that cause hypertension in diabetics. In Pakistani society, the incidence of hypertension has increased as a result of several factors. The condition may have severe effects, including strokes, cardiovascular illnesses, congestive heart failure, and renal failure.

Keywords: Diabetes, Hypertension, Obesity, Dyslipidemia, Risk factors

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INTRODUCTION

Diabetes is a metabolic disorder that is fairly widespread yet is linked with poverty **[1]**. Among the top ten not transmissible illnesses in the world, diabetes is defined by high blood sugar levels, which can be brought on by a failure to produce insulin **[2]**. Diabetes induces dyslipidemia, which raises triglycerides, total cholesterol, and lower-density lipoproteins whilst lowering health-promoting high-density lipoproteins **[3]**.

Diabetes mellitus (DM), an illness with multiple effects and rising prevalence, is an issue of public health **[4]**. As stated by the World Health Organization (WHO), By the year 2030, diabetes will be listed as the 6th most common cause of death **[2]**. It is estimated that 347 million individuals worldwide experience diabetes **[5]**. According to the International Diabetes Federation (IDA), diabetes is an international health problem impacting over four hundred fifteen million people and is projected to escalate to a total of 642 million by the year 2040 **[6]**. A further investigation revealed that diabetes is the fourth biggest cause of death in a majority of developed nations **[7]**. To reduce the prevalence of the illness, the country's national health policy includes diabetes prevention applications **[4]**. Sharp rise in the prevalence of diabetes still requires a deeper comprehension of risk variables **[8]**.

Diabetes is a significant risk factor for the development of several other health conditions, including hypertension (high blood pressure). The relationship between diabetes and these conditions is often complex and multifaceted **(Fig. 1)**. Insulin resistance, a hallmark of type 2 diabetes, can lead to an increase in blood pressure. Insulin has vasodilatory effects, and resistance to its effects can cause blood vessels to constrict, raising blood pressure. Diabetes can cause damage to the kidneys (diabetic nephropathy), reducing their ability to regulate sodium and fluid balance, which can lead to increased blood pressure. Diabetes accelerates the process of atherosclerosis (hardening of the arteries), which can lead to hypertension.

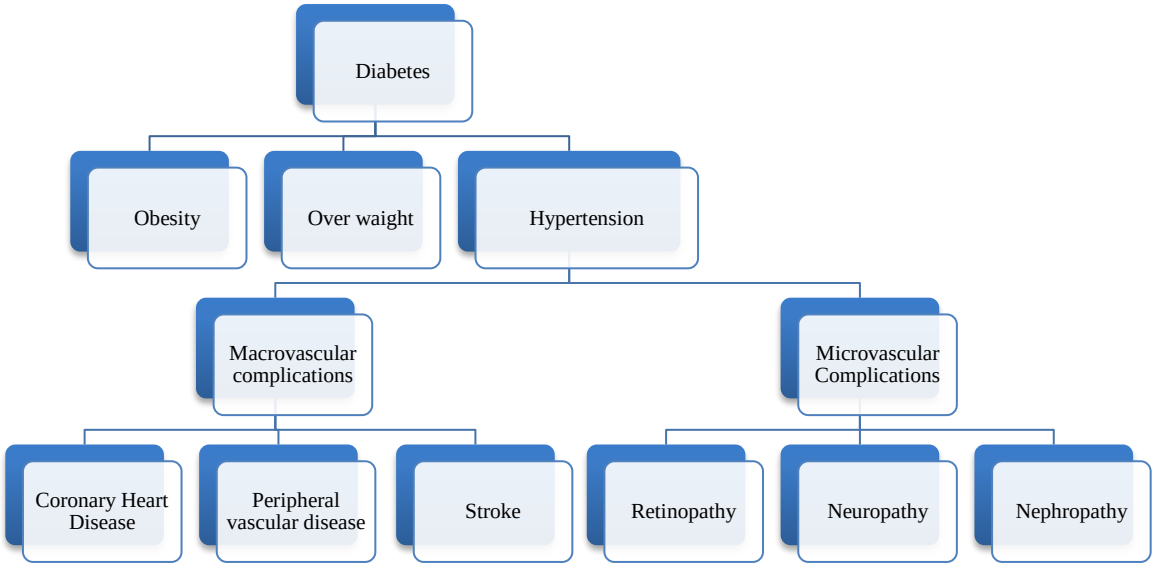

Figure 1. Diabetes as the main cause of many diseases including hypertension.

RELEVANCE OF DIABETES WITH HIGH BLOOD PRESSURE

In the majority of instances, hypertension and type 2 diabetes are interlinked with each other. Individuals who have diabetes have four times more risk of having hypertension compared to those not having diabetes **[9]**. Centrally obese individuals and lipids were significantly associated with hypertension in individuals who had diabetes **[10]**. Hypertension, often known as high blood pressure (BP), is a long-term medical condition characterized by high blood pressure against the artery wall. Blood pressure is created when the heart pumps blood into the arteries and veins, thereby obstructing blood flow **[9]**. The JNC 7 recommendations define hypertension as having a systolic blood pressure level of at least 140 mmHg or having a diastolic blood pressure of at least 90 mmHg **[11]**. Average blood pressure is between 60 to 90 mmHg diastolic and 100 to 130 mmHg systolic. For a majority of adults, a pulse reading of 140/90 millimeters mercury (mmHg) or higher signifies being hypertensive **[12]**. Around ninety-five percent of patients have additional hypertension brought on by drugs, adrenal diseases, kidney problems, and lifestyle variables such as overweight, poor diet, and stress. (Colbert, 2013The maximum (highest pressure) and temporal (lowest pressure) in the arterial system are the two terms used to assess the level of blood pressure. Systolic blood pressure refers to the left ventricle's greatest contraction; diastolic pressure refers to the left ventricle's maximum relaxation before its next contraction **[9]**.

Bloody in the stool, migraines, pain in the chest, and a nosebleed are all signs of high blood pressure **[13]**. A different moniker for hypertension is "the silent killer," and it has been linked to illnesses that are not transmissible and organ damage among other medical conditions **[14]**. Lower body mass index and less nutritious diets have led to an alarming rise in the incidence of vital hypertension in Pakistani society **[15]**. Impaired fasting glucose was closely linked to rising BMI and higher diastolic and systolic blood pressure readings **[9]**. Stress, excessive sodium intake, physiological factors, and alcohol usage are the main causes of hypertension **[16]**. Increased genetic fragility, external factors like gender, developmental history, obesity, and sedentary lifestyles, especially in middle age, in addition to social norms that encourage sedentary behavior in women, are the leads in Pakistan **[15]**.

Applying Ohm's Law in the following ways:

$$R = \Delta P/F,\ MAP = C.O \times SVR,$$

$$C.O = SV \times HR$$

SVR stands for Systemic Vascular Resistance, C.O. for Cardiac Output, and MAP for Mean Arterial Blood Pressure, which is calculated by adding SBP to DBP. Heart rate is equal to HR, and stroke volume is determined by contractility, after-load, and pre-load **[9]**.

RISK ELEMENTS

Cardiovascular disease, strokes, kidney failure in its final stages, congestive heart failure (CHF), and other hazards and illnesses are linked to high blood pressure **[17]**. If high blood pressure is not properly handled, it can lead to other difficulties such as various cardiovascular diseases (CVD) and left ventricular hypertrophy. One prevalent comorbidity of diabetes mellitus and cardiac disease is hypertension. The three biggest risk factors for diabetes that were found were a history of

hypertension, obesity, and overweight **[9]**. Diabetes-related chronic hyperglycemia causes several microvascular (retinopathy, neuropathy, and nephropathy) and macrovascular (coronary heart disease, peripheral vascular disease, and stroke) problems **[18]**. The analysis of diabetic risk factors includes older age, body mass index (BMI), high blood pressure, monthly income, cigarette smoking, and geography (rural vs. urban)**[8]**. Both the health of individuals and the healthcare systems are greatly impacted by the significant and prevalent chronic diseases of diabetes and hypertension **[10]**. Diabetes raises the possibility of numerous consequences that can lower one's standard of life **[19]**. The risk factors for hypertension are not well known.

PREVALENCE OF DIABETES MELLITUS IN DIFFERENT AREAS OF PAKISTAN

In Pakistan, 11.77% of people have diabetes mellitus at this time. The incidence is 11.20% in men and 9.19% in women. According to Khan et al. (2016), the prevalence of diabetes in southern Punjab is 17.4 percent in men and 15.38 in women. The prevalence of diabetes in the province of Pakhtunkhwa is 11.6 percent in women and 9.2 percent in men. In the province of Baluchistan, the prevalence of diabetes is 8.9 percent in women and thirteen percent in men. In the province of Punjab, 12.14 percent of men and 9.83% of women have diabetes. In the province of Sindh, the prevalence of diabetes is 16.2% in men and 11.7 in women **[4]**.

According to reports, 26% of Pakistanis have hypertension, with differences of 34% in males and 24% in females **[20]**. In Pakistan, hypertension is a serious health concern; among those over the age of 18, 24.3% had hypertension (WHO, 2013). Estimates from the World Health Organization indicate that elevated blood pressure (BP) accounts for 7.5 million deaths globally or 12.8% of all fatalities. (WHO, 2010). because as populations age, so does the incidence of diabetes and hypertension, it appears that In wealthy nations, the frequency of diabetes and hypertension coexisting is increasing **[21]**. High blood pressure (HBP) impacts at least 970 million individuals globally, with 330 million living in affluent nations and 640 million in developing ones (World Heart Federation). Compared to diabetic females (46%), guys with diabetes (35%) were more likely to develop hypertension **[22]**. Pakistan has little information on the prevalence of hypertension in both the general population and diabetic patients **[23]**.The results of the national diabetes survey indicate that while women are more likely than males to have impaired glucose tolerance (IGT), the incidence of diabetes is higher in men **[24]**.

In Pakistan, the overall incidence of diabetes is 10.34% in rural areas and 14.8% in urban areas **[4]**. According to the national diabetic survey, there were 17.1% of people in rural areas and 22% of people in urban areas with impaired glucose intolerance (IGT) **[25]**.

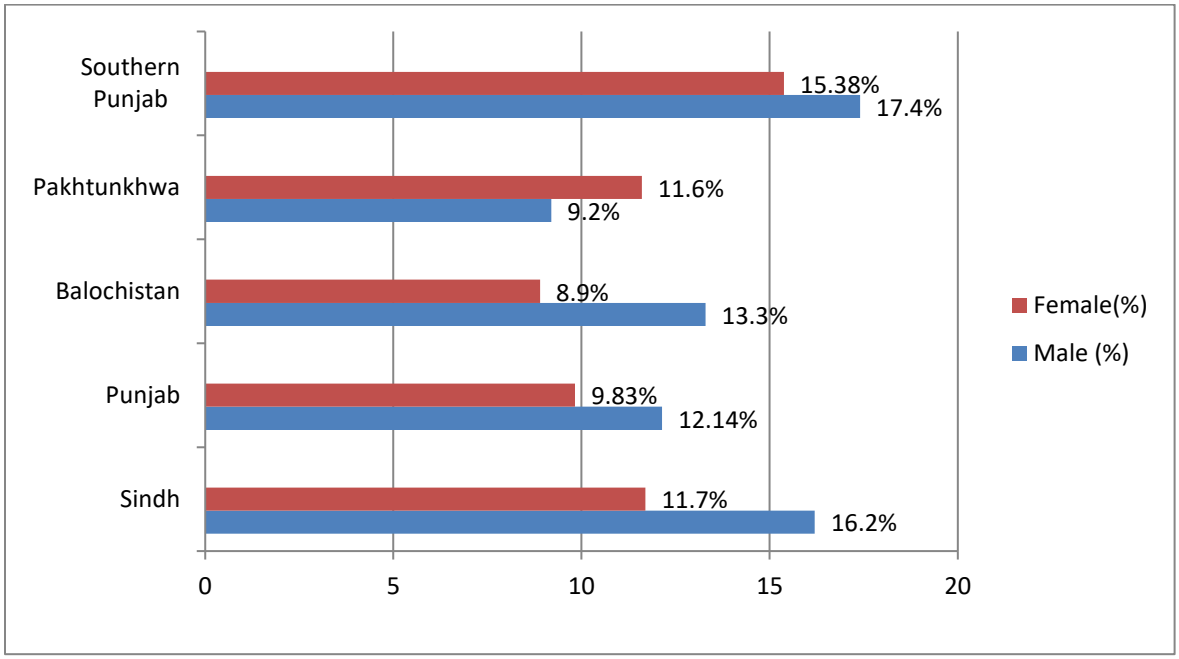

Figure 2. The incidence of diabetes in Pakistan.

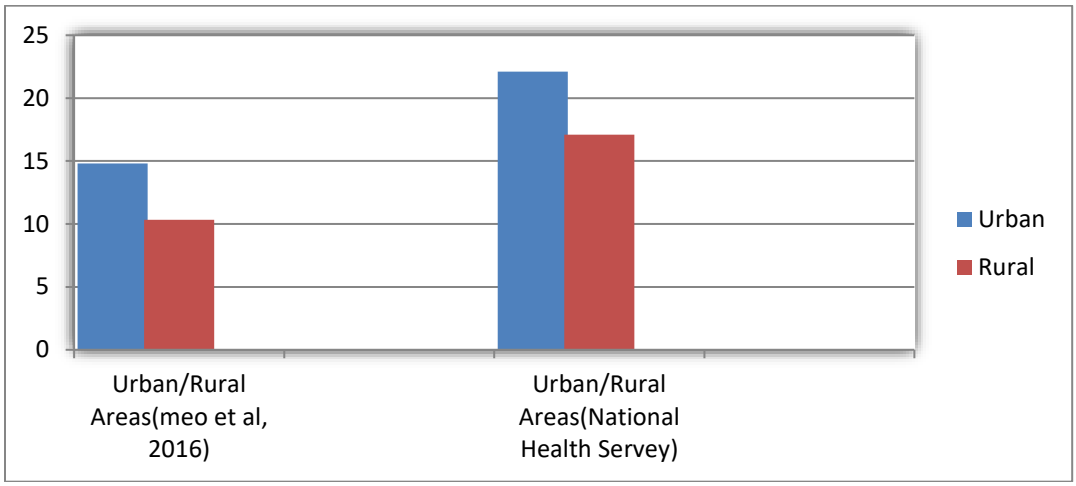

Figure 3. Diabetes prevalence in Pakistan's rural and urban areas.

Table 1. Prevalence of hypertension in diabetic patients in major cities of Pakistan.

Area (location)	Hospital (clinic)	Age	Total individuals	Prevalence of Diabetes (%)	Prevalence of high blood pressure (%)	Reference
Rawalpindi	Village	13-56	404	38.3	32.9	**[9]**
Peshawar	Pak International Medical College (teaching hospital)	20-70	500	25.6	25.6	**[26]**
Karachi	Jinnah Postgraduate Medical Centre	18-80	262	72.5	75.7	**[10]**
Southern Punjab (lower Punjab)	BVH, SZH, NH, CPIEH	25-84	200	38.3	52	**[27]**
Islamabad	Pakistan Institute of Medical Sciences (PIMS)	21-81	456	67	59.2	**[27]**
North Punjab (upper Punjab)	Cardiology wards	41-61	505	19.4	37	**[28]**

KEY: SZH (Sheikh Zaid Hospital), NH (Nishtar Hospital), CPIH (Chouhdry Parvaiz Ilahi Institute of Cardiology), and BVH (Bahawal Victoria Hospital) are among the hospitals.

According to a study conducted in the Rawalpindi union councils, the incidence of diabetes (38.3 percent) is linked to the prevalence of hypertension (32.9%). There are 404 people in the study population **[9]**. According to a study done at the Pak International Medical College in Peshawar, the prevalence of diabetes (25.6%) is linked to hypertension (25.6%). There are 500 participants in the trial **[26]**. According to a study done at Karachi's Jinnah Postgraduate Medical Center, the prevalence of diabetes (72.5%) is linked to that of hypertension (75.7%). There are 262 people in the study population **[10]**. According to the Chaudhary Pervez Elahi Institute of Cardiology, Nishtar Hospital in Multan, Bahawal Victoria Hospital in Bahawalpur, Sheikh Zaid Hospital in Rahim Yar Khan, and the prevalence of hypertension, 38.3% of people in southern Punjab have diabetes. There are 200 participants in all in this study **[27]**. According to a study done in many cardiology wards in North Punjab, diabetes (19.4%) and hypertension (37%) are related among 505 participants **[28]**.

Diabetes mellitus requires concentrated efforts and proactive steps to prevent the condition and surely lessen its burden **[28]**. To raise public awareness and educate the community, various seminars, conferences, print and electronic media articles, and programs on the prevention, detection, evaluation, and management of high blood pressure should be established **[9]**.

CONCLUSION

In this review, people with diabetes had a significant prevalence of hypertension. Compared to the general public, diabetic patients have a much greater prevalence of hypertension. A need for diabetic care has been actively highlighted by medical specialists. The most effective ways to address this illness are still early identification and management of the risk variables associated with the emergence of complications from diabetes. It is important to

acknowledge the importance of community-based screening initiatives and awareness activities in the battle against diabetes. The disease's burden will undoubtedly be lessened by these measures. A prompt national prevention effort is required, as is addressing the modifiable risk factors and reducing the socioeconomic cost of the disease through early detection. Their comprehension of the impact of the local diabetes risk factors will be aided by the findings. The relationship between these risk factors has to be investigated further.

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