

# “An analytic study of the fatness Patients index with high blood pressure in Type 2 Diabetes Mellitus”

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## ABSTRACT

To investigate the relationship between hypertension and body mass index (BMI), waist circumference (WC), and waist to hip ratio (WHR) in patients with type 2 diabetes mellitus (DM) in a tertiary care hospital. From 2013 to 2018, the anthropometric measurements of patients were taken in the Diabetic Outdoor with the Institutional Ethical Review Committee's consent. After gaining fully informed consent, each patient underwent a thorough evaluation. SPSS 20 was used to enter and evaluate the data (IBM Corp., Armonk, NY, USA). Data from 4556 type 2 DM patients were evaluated, including 2549 (55.9%) females and 2007 (44.1%) males. The study's participants were 47.72 years old on average. Males had a mean age of 48.23 years compared to females' 47.32 years. The average hip measurement was 100.33 cm. Weight on average was 66.93 kg. 1.59 m was the average height. WHR average was 1.02. BMI averaged 26.37 kg/m<sup>2</sup>. 1,891 (41.5%) of the patients had obesity (BMI > 27 kg/m<sup>2</sup>). According to the WC and WHR cutoffs, central obesity was present in 80.7% and 94.7% of type 2 DM patients, respectively. Likewise, obese type 2 DM patients with a BMI >27 kg/m<sup>2</sup> had a higher likelihood of having hypertension than those with a BMI in the normal range (18.5 to 22.9 kg/m<sup>2</sup>) (83.1 versus 64.4%, OR 2.7, p0.001). Females and persons in their middle years are more likely to have diabetes. Diabetes often coexists with other conditions including hypertension and obesity. All of the obesity-related indicators (WC, WHR, and BMI) have a substantial correlation with hypertension.

**Keyword: - Hypertension, Measurements, Hypertension, Substantial correlation.**

## INTRODUCTION

In recent years, diabetes mellitus (DM) has become one of the major global health concerns. According to reports, 8% of people have it, and that number is predicted to increase to 10% by 2040. More than 90% of the population in this area has type 2 diabetes. Insulin resistance is a major factor in the pathogenesis of type 2 diabetes.

Numerous metabolic and cardiovascular risk factors are connected to it. Due to its role in insulin resistance, obesity has become one of the highly related modifiable risk factors of type 2 diabetes. According to statistics, the number of people who are obese and consequently diabetic by 2025 will reach an unsettling 300 million.

Another risk factor for type 2 DM is hypertension. It is roughly twice as common in diabetes patients as it is in non-diabetics. A diabetic patient's risk of complications such stroke, myocardial infarction, retinopathy, neuropathy, and nephropathy increases if they have hypertension. The mortality and morbidity of diabetes individuals are increased by the concurrent presence of hypertension.

Numerous studies have looked at hypertension and obesity separately as DM risk factors. However, little research has been done on the relationship between obesity and hypertension in diabetes patients. This article aims to show how various obesity markers, such as waist circumference, waist to hip ratio, and body mass index, are related to hypertension in type 2 DM patients.

## RESEARCH METHODOLOGY

After receiving consent from the neighborhood Institutional Ethical Committee, this descriptive and analytical study was conducted at the Diabetic Outdoor. Data from 4556 type 2 DM patients who visited the Diabetes Clinic between 2013 and 2018 were gathered with their informed consent. All persons who were either newly diagnosed with type 2 DM or previously diagnosed as diabetes and were 18 years of age or older met the inclusion criteria. Fasting blood sugar (FBS) > 126 mg/dL and random blood sugar (RBS) > 200 mg/dL were the cutoff levels used to diagnose diabetes. The study excluded patients under the age of 18, as well as those with type 1 diabetes, poor glucose tolerance, impaired fasting glucose, or gestational diabetes. A thorough analysis of the patient's history, exam results, and laboratory tests was performed.

The patients' anthropometric and demographic data were entered into a pre-designed Performa. American College of Cardiology/American Heart Association (ACC/AHA) recommendations were used to define hypertension: either diastolic blood pressure (DBP) or systolic blood pressure (SBP) greater than 80 mmHg. The formula for calculating body mass index (BMI) is weight (kg)/height (m<sup>2</sup>). The BMI limit for Asians was 27 kg/m<sup>2</sup>, and this was used to characterize obesity. Waist circumference (WC; males 90 cm and women 80 cm) and waist to hip ratio (WHR; men > 0.9, women > 0.8) cutoff values were used to characterize central obesity. Data collected were entered into SPSS version 20. (IBM Corp., Armonk, NY, USA). The chi-square statistic was used to analyze the statistical data. The threshold for statistical significance was set at p 0.05. The gathered data was then examined.

By computing the odds ratio, the relationship between hypertension and several demographic factors and obesity-related characteristics was assessed (OR). Tables were used to present the findings.

## RESULT

2549 (55.9%) of the 4556 Type 2 DM patients were female, compared to 2007 (44.1%) who were male. The patients' ages ranged from 18 to 95 years old, with a mean age of 47.72 10.82 years. Males had a mean age of 48.2311.35 years compared to females' 47.3210.37 years. 3393 patients in all (74.5%) had hypertension. 1712 (56.35%) of the 3393 patients were female, while 1481 (43.6%) were male. While the mean DBP was 82.6519.36 mmHg, the mean SBP was 130.8429.64 mmHg. Table 1 displays the means and standard deviation of the indicators of obesity.

Indicators of Obesity	Mean	Standard Deviation
Waist circumference (WC)	102.85 cm	18.14 cm
Hip circumference	100.33 cm	11.81 cm
Weight	66.93 kg	14.92 kg
Height	1.59 m	0.159 m
Waist to hip ratio (WHR)	1.02	0.102
Body mass index (BMI)	26.37 kg/m <sup>2</sup>	5.86 kg/m <sup>2</sup>

**TABLE 1: Averages and standard deviations for obesity indicators**

Patient gender was not significantly linked with hypertension ( $p=0.35$ ). However, it was shown that hypertension was highly correlated with ageing. Patients with type 2 diabetes who were middle-aged and older were more likely to have hypertension than those who were younger (74.6% versus 41.7%, OR 4.5,  $p0.001$ ). According to the WC and WHR cutoffs, central obesity was present in 80.7% and 94.7% of type 2 DM patients, respectively.

All obesity variables were substantially correlated with hypertension ( $p 0.001$ ). When compared to type 2 DM patients with normal WHR, those with high WHR had a higher likelihood of having hypertension (75% versus 65%, odds ratio (OR) 1.6,  $p0.001$ ). Additionally substantially correlated with hypertension was having a higher than average WC (79% versus 56%, OR 2.9,  $p0.001$ ). Similar to this, type 2 DM patients who were obese and had a BMI  $>27$  kg/m<sup>2</sup> had a higher likelihood of having hypertension than those who had a BMI less than 18.5 (83.1%

versus 55.9%, OR 3.9, p0.001). Table 2 displays the correlation between age, gender, and several obesity-related factors and hypertension in people with type 2 diabetes.

Variable	Blood Pressure		Odds ratio	P value	
	Normotensive N(%)	Hypertensive N(%)			
Age (years)	18-20	21 (58.3%)	15 (41.7%)	1	<0.001
	21-30	93 (36.8%)	160 (63.2%)	2.4	
	31-40	268 (25.9%)	765 (74.1%)	4	
	41-50	426 (24.0%)	1346 (76.0%)	4.4	
	51-60	256 (23.7%)	822 (76.3%)	4.5	
	>60	99 (25.8%)	285 (74.2%)	4	
Gender	Female	637 (25.0%)	1912 (75.0%)	1	0.35
	Male	526 (26.2%)	1481 (73.8%)	0.9	
WC (cm)	Normal	383 (43.6%)	496 (56.4%)	1	<0.001
	High	780 (21.2%)	2897 (78.8%)	2.9	
WHR	Normal	86 (35.4%)	157 (64.6%)	1	<0.001
	High	1077 (25.0%)	3236 (75.0%)	1.6	
BMI (kg/m <sup>2</sup> )	<18.5	113 (44.1%)	143 (55.9%)	1	<0.001
	18.5-22.99	339 (35.6%)	614 (64.4%)	1.4	
	23-26.99	392 (26.9%)	1064 (73.1%)	2.1	
	≥27	319 (16.9%)	1572 (83.1%)	3.9	

**Table 2 shows the relationship between age, gender, and several obesity-related factors and hypertension in people with type 2 diabetes mellitus (DM)**

## DISCUSSION

The average age of type 2 diabetic patients in our study was 47.72 ± 10.82 years, which is younger than the average age of studies conducted in the West and the Middle East. Dietary practices, genetics, and other environmental factors may be to blame for this. Our study shows that women (75%) have a higher prevalence of hypertension than men (73.8%), however this difference was not statistically significant. This outcome differs

from that of other studies. In a Brazilian study, it was discovered that men (34%) were more likely than women (30.8%) to have hypertension. Studies carried out in Argentina, China, and England revealed similar findings on the high frequency of hypertension in men. Numerous factors, including the existence or absence of diabetes, socioeconomic position, variations in educational attainment, and environmental factors, may contribute to the discrepancy. There should be more research done on this. Our study also revealed a substantial correlation between age and hypertension, which is an important discovery. According to the study, the prevalence of hypertension rises to 76% once the patient reaches middle age and above. In our investigation, there was no statistically significant difference between the prevalence of diabetes in people who were middle-aged and older. However, the difference becomes significant when compared to early age (74% versus 41%, OR 4, p0.001). In contrast, according to statistics from the National Health and Nutrition Examination Survey, 32% of patients between the ages of 40 and 59 have hypertension, compared to 70% of older patients.

All of the obesity markers were statistically associated with hypertension, according to our study. In our investigation, hypertension was discovered in 83.1% of the individuals with high BMIs (27). A cross-sectional research on people with type 2 diabetes produced similar findings. In that investigation, hypertension was discovered in 86.2% of the obese subjects with a BMI of less than 30 kg/m<sup>2</sup>. WC was another sign of obesity in our study. Obesity was defined as WC >80 cm for women and >90 cm for males. In our study, 78.8% of patients with high WC and 56.4% of patients with normal WC had hypertension. This study's definition of abdominal obesity—a WC of less than 102 cm for men and less than 88 cm for women—was equivalent to another one. According to that study, 81.5% of obese individuals had hypertension, compared to 63.3% of non-obese patients. Studies carried out in Sweden and Jordan also produced results that were similar. WHR was another indicator that was defined in our study. Compared to 64.6% of individuals with normal WHR, 75% of those with high WHR were found to have hypertension. There isn't much information available on the use of WHR as an obesity indicator in type 2 diabetes individuals with hypertension. But numerous studies have found a substantial correlation between WHR and hypertension in the general population.

This research had several restrictions. It may not represent the broader population because it was conducted at a tertiary care facility. It was carried out at a single facility. The problem should be investigated further through multi-center investigations.

## CONCLUSIONS

People from various walks of life can get diabetes. It has grown to be a problem for global health, particularly in underdeveloped nations like Pakistan. According to our study, women and people in their middle years are more likely to have DM. In our study, type 2 DM patients had disturbingly high rates of obesity and hypertension. Once more, female diabetics had a higher likelihood of having hypertension than male diabetics. Given that it impacted more than 80% of the diabetics in our study, central obesity was a more concerning issue. In type 2 DM patients, obesity and hypertension were found to be strongly correlated. All obesity-related measurements (WC, WHR, and BMI) were significantly ( $p < 0.001$ ) correlated with hypertension. Additionally, it was discovered that older and middle-aged type 2 DM patients had higher rates of hypertension than younger individuals. If we are to manage the expanding issues of obesity and hypertension in type 2 diabetes patients, awareness and education in society are crucial.

## REFERENCE

1. Obesity and type 2 diabetes: two diseases requiring coordinated treatment techniques - EASO can lead the way. Leitner DR, Frühbeck G, Yumuk V, Schindler K, Micic D, Woodward E, Toplak H. Obesity Facts
2. Mogre V, Abedandi R, Salifu ZS: The prevalence of obesity and systemic hypertension among people with diabetes mellitus who attend an out-patient diabetes clinic at a Ghanaian Teaching Hospital. Metab Syndr Diabetes
3. Diabetes mellitus and hypertension by Epstein M. and Sowers J.R. Hypertension.
4. Whelton PK, Carey RM, Aronow WS, et al. : 2017
5. ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA guideline for the prevention, detection, evaluation, and management of high blood pressure in adults: a report of the American College of Cardiology/American Heart Association Task Force on clinical practise guidelines. J American Coll Cardiol
6. WHO Expert Consultation: Recommended body mass index for populations in Asia and its Tan CE, Ma S, Wai D, Chew SK, Tai ES: Can Asians use the Adult Treatment Panel of the National Cholesterol Education Program criteria of the metabolic syndrome? 2004. Diabetes Care
7. Cutoff values for normal anthropometric factors in Asian Indian adults. Snehalatha C, Viswanathan V, Ramachandran A. Anari, R., Amani, R., Latifi, S., Veissi, and H. Shahbazian. "Association of obesity with hypertension and dyslipidemia in type 2 diabetes mellitus individuals." Diabetes Care. 2003.
8. Diabetes Metab Syndr. 2017. Ridderstrle M, Gudbjörnsdottir S, Eliasson B, Nilsson PM, Cederholm J: Obesity and cardiovascular risk factors in type 2 diabetes: findings from the Swedish National Diabetes

Register. Mubarak FM, Froelicher ES, Jaddou HY, and Ajlouni KM: Hypertension among 1000 patients with type 2 diabetes attending a national diabetes centre in Jordan. *J Intern Med.* 2006,

9. *Ann Saudi Med.*, 13. Educational disparities in hypertension: complicated patterns in interconnections with gender and race in Brazil, Alves RF, Faerstein E. *Int J Equity Health*, 2016. 14. Trends in hypertension prevalence in Argentina during the past 25 years: a comprehensive analysis of observational research, Dáz A., Ferrante D. 2015, *Rev Panam Salud Publica*