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Study the effect of obesity on hypertension in a sample of women in Misan province

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ABSTRACT

Obesity increases the risk of several serious chronic diseases. Obesity and blood pressure for women in Misan province attending medical clinics from July 2024 to January 2025 are examined in the recent study. The current study comprised 100 women aged 25–45, divided into two groups of 50: In the control group, 50 non-obese women (normal BMI) aged 25–45 were sampled. The second group included 50 obese women (BMI 30 kg/m2 or higher) aged 25–45. SBP, DBP, and MBP were measured for all groups, as were weight, height, WHR, WHtR, BMI, and WC/WHR. A questionnaire was used to collect women's age, height, weight, waist, abdominal, hip, chronic condition, and family history. SPSS statistically evaluated data. The study found significant increases in body mass index, waist-to-hip ratio, and blood pressure (systolic, diastolic, and mean) in the second group compared to the control group ($p < 0.05$). According to the study, obesity increases the number of fat cells in the body, which need more oxygen and nutrients, which increases the heart's effort to pump blood, causing high blood pressure. Systolic, diastolic, and body mass index are linked, with obesity increasing the risk of high blood pressure.

Keywords: BMI; Central obesity; Blood pressure; WHtR; MBP.

Introduction

The vast majority of the Iraqi people suffer from obesity, a serious disease that is also widespread in other countries. Obesity often occurs as a result of many factors, including genetic, social, psychological, economic, and environmental causes. Obesity has pathological causes, but they constitute less than 10%, and the main cause remains an imbalance in the calories supplied to the body through food (1). Obesity is usually measured by anthropometric measurements in large field studies because of its ease of use and the existence of a correlation in population studies between it and cardiovascular diseases and diabetes in adults (2,3). A number of anthropometric measurements were taken from the volunteers, including weight, height, body mass index (BMI), waist circumference (WC), waist-to-hip ratio (WHR), and WC/WHR as important variables to express obesity (1). The Framingham study showed that high blood pressure and being overweight are two independent risk causes for cardiovascular disease (4). In 2017, approximately 73% of deaths were due to non-communicable diseases (NCDs), including 28 million deaths attributed to menace issues such as high blood pressure, diabetes, and body mass index.

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These diseases are expected to be the cause of nearly 81% of all global deaths in 2040 (5).

High blood pressure, insulin resistance, and heart disease are components of metabolic syndrome, and approximately 50%-60% of women with gynecological conditions are attributable to insulin resistance, one of which is obesity. Its prevalence in the general population ranges from 10% to 25%, depending on the assessment method and average body weight (6). Hypertension is a major contributor to the international spread of the disease, with its prevalence among adults worldwide accounting for approximately 7.5 million deaths annually. This is due to several factors, particularly stroke and coronary artery disease. Obesity and high blood pressure are two conditions that are directly related to one another, with obesity reported to be responsible for 60-80% of incident hypertension. Pathophysiological mechanisms and Pathogenesis factors associated with obesity to hypertension (Fig. 1) (7).

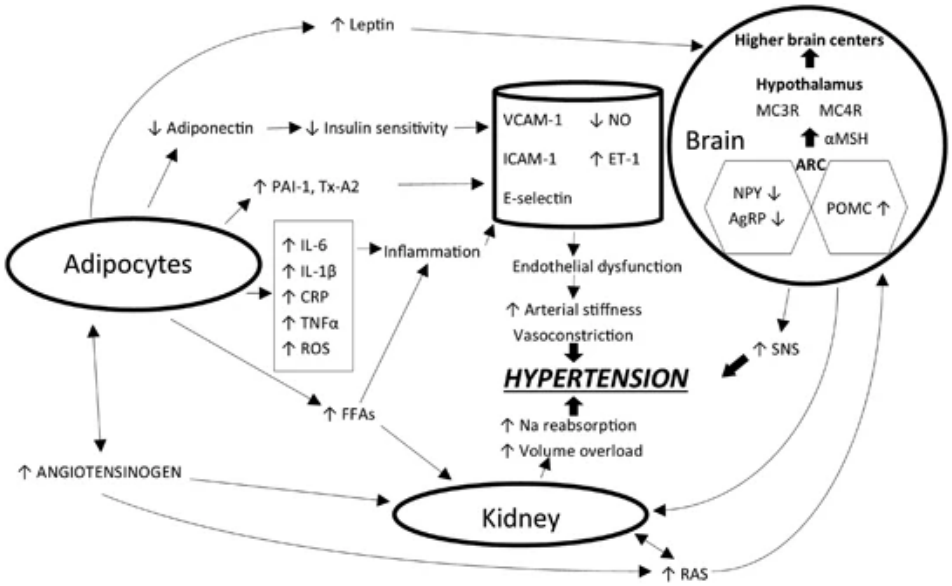

Fig. (1): Shows the Pathogenesis factors and pathophysiological mechanisms linking hypertension to obesity. (7).

Materials and methods

This study was done to explore the impact of obesity on blood pressure in a group of women attending medical clinics in Misan province, between July 2024 to January 2025. The current study included a sample of 100 women aged between 25 -45 years, divided into two groups, each group containing 50 women, as follows: The first group (the control group) included non-obese women (normal BMI), including 50 samples aged between 25 - 45 years. The second group included obese women (BMI 30 kg/m2 or greater), including 50 samples aged between 25 -45 years. Blood pressure (SBP, DBP and MBP) was measured for all groups, along with weight, height, body mass index (BMI), waist circumference (WC), WHR, WC/WHR, WHtR and A questionnaire was designed to obtain actual information about the women's age, height, weight,

waist circumference, abdominal circumference, hip circumference, chronic diseases, and family history. Data were statistically analyzed using SPSS.

Anthropometric Measurements

Overweight was defined as a BMI of more than 25 kg/m² and obesity as larger than 30 kg, according to the World Health Organization's ethics (8,9).

$$BMI = \text{weight (kg)} / \text{length } (m^2)$$

Waist to Hip Ratio (WHR)

The waist-hip ratio was used as an indicator to assess central
obesity. W/H ratio is calculated by dividing waist circumference (in cm) by hip circumference (in cm) (10).

''Central obesity is defined as a WC of >102 cm in males and >88 cm in females, or a WHR of >1.0 in males and >0.85 in females'' (10).

- To measure systolic &diastolic blood pressure, we use a mercury device (11).

Result and Discussion

The results of BMI, (WHR), waist-to-height circumference, (WHtR), waist circumference (WC), and (WC/WHR) revealed that the second group (BMI 30 kg/m2 or greater) increased significantly ($p \leq 0.05$) compared with the first group of non-obese women (BMI normal). This is attributed to abdominal or central visceral obesity, as visceral fat plays a crucial role that can lead to insulin resistance, which is one of the causative factors associated with the occurrence of metabolic syndrome. Environmental factors and lifestyle are strongly associated with this syndrome, as a high-calorie, high-fat diet, as well as low or no exercise, contribute to the occurrence of this syndrome. Our results agree with the studies (12).

Table (1): Shows anthropometric measurements through BMI types

Groups / Parameters	Group 1(Normal BMI)	Group 2 (BMI ≥30 kg/m²)
BMI	**21.329± 1.689**	**32.979 ± 3.3 ***
WHR	**0.870±0.027**	**1.001 ± 0.22 ***
WHtR	**0.422± 0.05**	**0.669± 0.071 ***

- N=100
- Values represent mean ± SD.

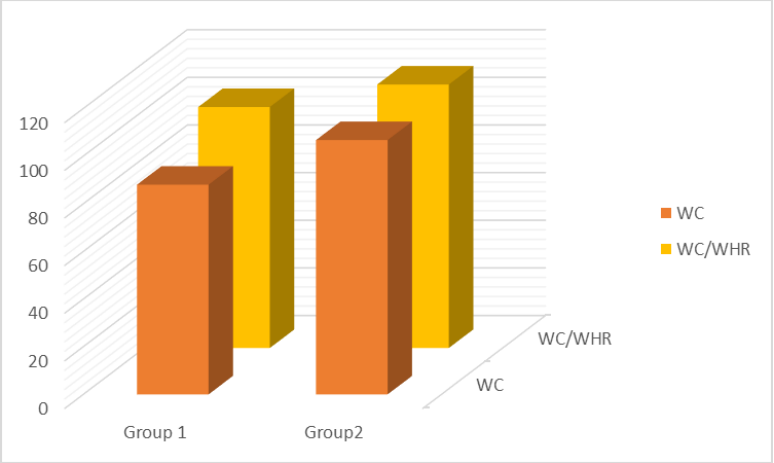

Fig. (2): Shows central obesity parameters.

- N=100
- Group 1= (Normal BMI)
- Group 2= (BMI ≥30 kg/m^2**)**

The results in Table 2 show a highly significant increase ($p \leq 0.05$) in systolic blood pressure (SBP), diastolic blood pressure (DBP), and mean blood pressure (MBP) in the second group (BMI 30 kg/m2 or more) compared to the first group (BMI normal). This is attributed to the fact that obesity leads to an increase in body mass tissue, which requires an increase in blood volume to meet the needs of new tissues. This leads to an increase in cardiac output, which is one of the causes of increased blood pressure (13). Obesity is often accompanied by insulin resistance, which in turn leads to increased renal sodium reabsorption, which contributes to increased blood pressure (14). In a popular hypothesis regarding the mechanism linking a central pattern of body fat to blood pressure or lipoproteins, intra-abdominal obesity plays a key role (15). Visceral fat is more metabolically active, thus increasing the liver's exposure to free fatty acids and reducing insulin sensitivity. Because free fatty acids may inhibit hepatic insulin uptake and stimulate the production of very low-density lipoprotein (VLDL) rich in triglycerides and other harmful lipid profiles, Visceral fat is sometimes associated with high blood pressure, hypertriglyceridemia, diabetes, and coronary heart disease (16). Our results are consistent with other studies (17).

Table 2: Shows the relationship between obesity and blood pressure.

Groups / Parameters	Group 1(Normal BMI)	Group 2 (BMI ≥30 kg/m^2)
SBP	**121,4±5,096**	**143.2±2.952***
DBP	**78.333±5.591**	**92.3 ± 5.924***
MBP	**43.066±7.464**	**50.266±5.464***

- N=100
- Values represent mean ± SD.

Conclusion

We conclude from this study that there is fat accumulated in the abdominal area plays an important role in raising blood pressure, which may lead to complications such as kidney failure, strokes, and other diseases.

DECLARATIONS

Study Limitations: The limitations of sample size and single geographic regions are the limitations of the current paper.

Author Contributions

The study design and the experiments have been done by Faten Khudhair AL-Husaini and Raya Najim Rasool. In addition, Faten Khudhair AL-Husaini and Raya Najim Rasool analyzed the data and wrote the manuscript.

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Ethics:

This study was conducted in accordance with the ethical standards of the Declaration of Helsinki and approved by the Human Ethics Committee of the College of Medicine, University of Misan, Iraq, under approval number MHD2025.

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Competing interest:

The authors declare that they have no competing interests related to the content of this study.

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