The Relation between Waist Circumference and Hypertension

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Abstract:

Background: Prior studies have supported that waist circumference correlates with abdominal (central) obesity, and values higher than normal are associated with increased prevalence of hypertension. .

Objective: To evaluate the association of waist circumference with increased prevalence of hypertension among population in Kirkuk city.

Materials and Methods: Across-sectional study was conducted comprising 300 male and female, their ages ranged from 20-72 years with an average mean of 53 year from Kirkuk city. The waist circumference was measured in centimeters, together with other data designed in the data sheet for this study, hypertensive people were identified and recorded. Patients who had coexisted Diabetes Mellitus and hypertension were excluded from the study.

Results: The total number of females was 218, out of them, 176(80.7%) had increased waist circumference, this included 74(42%) hypertensive, compared with 42(19.2%) women with normal waist circumference and included 6(14.2%) hypertensive. ($P < 0.05$). Out of 82 males, 46(56%) had increased waist circumference (>102cm), this included 17(37%) hypertensive; compared with 36(44%) with normal waist circumference, which included 7(19.4%) hypertensive. P. value <0.001 Waist circumference was positively correlated with hypertension

Conclusions: Increasing waist circumference was significantly associated with increased prevalence of hypertension, reduction in the occurrence of hypertension in male and female can be achieved if the waist circumference is decreased in these populations.

Keywords: Waist circumference, Abdominal obesity, Central obesity, Prevalence, Participants.

Introduction:

In the Middle East the prevalence of hypertension ranges from (20%) to (46%) [1]. A worldwide rising prevalence of hypertension has been well documented [2, 3]. Although the increase in mortality and morbidity arising directly from, hypertension (HTN), HTN also contributes directly to increase risk of cardiovascular diseases (CVD) and renal disorder, these diseases are both of them are significant causes of higher mortality [4].

Obesity is strongly associated with hypertension, which is risk factors for cardiovascular disease (CVD) [5].The body mass index (BMI) used as general marker of overt obesity, but it does not give the precise knowledge about the distributions of fat and obesity [6, 7]. And the BMI does not reflect directly the proportion of fat in the body [4]. Many studies found that abdominal obesity measured by waist circumference (WC) was more sensitive than total obesity measured by BMI in association with hypertension and in the assessment of cardio-metabolic risk [8, 9, 10, 11]. Higher attention had been given to (WC) as it complement and sometimes, superior to BMI for assessment of obesity [12, 13]. (WC) is globally used as a parameter to quantify central (abdominal) obesity [14]

and it is used to screen men and women for obesity especially in Asian population [15]. Assessment of abdominal obesity through (WC) is strongly associated with hypertension in both Europe and Asian population [6, 7].

Waist circumference upper limit value (cut-off points) in males is 102 cm. and in females 88cm. Above these values, the person is regarded as having increased waist circumference or suffering from abdominal (central) obesity [16, 17].

The aim of the study was to evaluate correlations between WC with the prevalence of hypertension among population of Kirkuk city/ Iraq.

Material and Methods:

The study was done on patients and their companions attending the inpatient and outpatient clinics in Azadi Teaching Hospital or in the private clinic in Kirkuk-Iraq. Informed consent had been written and taken from all the participant, their age ranged 20-72 years and the study was conducted from first of 10th of October 2013to 30th of June 2015. During this period, a total of 300 participated the survey.

The main data recorded were name, age, sex, weight, height, waist circumference (WC), blood pressure (BP), educational level, socioeconomic status and history of chronic medical illness. Waist circumference was defined as the distance in centimeters (cm); midway between the last rib and the iliac crest at mid expiratory phase of breathing [18, 19]. While the participant stand with unrigging position, the waist circumference had been measured at the narrowest torso point of the participant (which is the minimum circumference in (cm) between the iliac crest and the rib cage) [20]. By the use of anthropometrics tape measurement, we recorded it to the nearest tenth of centimeter with 2 to 3 trial and using the average of 2 closest reading (within 2 cm).

In order to evaluate the association of WC with increased health risk, the participants (male and female) then had been classified as normal risk when WC (<80 cm), high risk when WC (80–88 cm [21], while for males grouped upper limit value of WS is 102 cm. And in females groupe upper limit value of WS is 88cm, above these values, the person is regarded as having increased waist circumference or suffering from abdominal (central) obesity [16, 17].

Hypertensive patient was defined as a person with history which confirmed HT and/ or on treatment of HT, if not he/ she measured his or her blood pressure 3 times in sitting position with 10 minutes rest in the between. We did not search for end organ damage.

The exclusion criteria for the participants were the presence of any other coexistent serious disease. Pregnant female, individuals with diabetes, and physically or mentally disabled persons.

Questionnaire design:

The demographics and socioe-conomic information factors, diagnosis of hypertension, uses of tobacco and alcohols, the family history of HTN and the physical activity of the participants was collected by a structured questionnaires.

Statistical analysis:

Descriptive data were represented as tables; the data collected were analyzed by the Chi-squared test as appropriate between variables. A P-value <0.05 was considered to be statistically significant.

Results:

Data from a total of 300 men and women participated in this survey were included in the analysis. Females 218(72.6%) and males 82 (27.3%). Their age ranged from 20-72 years with an average mean of 53 year. The prevalence of abdominal obesity in females was (80.7%) compared with (56%) in males. The average prevalence adjusted for sex was (68.36%). It was more common in female (80.7%) compared with (56%) in male. The difference was highly significant. P. vale (<0.001), table (1).

There's a proportional increase in the number of cases of hypertension as the waist circumference is increased in females and male, table (2). For the females, out of 218 female; 176(80.7%) had increased waist circumference (>88cm). This includes 74(42%) women with hypertension, compared with 42(19.2%) females with waist circumference ≤88cm, in whom 6(14.2%) cases only had lady with hypertension. p.value <0.001, table (1, 2).

Out of 82 males, 46(56%) had increased waist circumference (>102cm), this included 17(37%) with hypertensive; compared with 36(44%) with normal waist circumference, which included 7(19.4%) hypertensive. P .value <0.001, table (1, 3).

The number of patients with increased waist circumference of both sexes was 222 distributed in such a way that as the age is increased the waist circumference is also increased until the age group 40-49 when this process seemed to be stopped, table (4).

Most of patients with increased waist circumference were of medium to high socioeconomic state and of medium educational level.

Out of 218 female with increased waist circumference, 32 were of poor socioeconomic state and 186 were of medium to high socioeconomic state, (50%) of them were of low educational level, (59%) of medium educational level and (14.7%) of high educational level, table (5).

Table (1): prevalence of abdominal obesity.

Sex	Total No.	No. of patients with increased W.C	Prevalence rate%	P value
Females	218	176	80.7	<0.001
Males	82	46	56	
Average prevalence adjusted for sex			68.3	

- No.=number
- WC=waist circumference
- Significant whenever P value < 0.05

Table (2): The relation of waist circumference to hypertension in female patients.

Waist circumference		Patients No. (%)	Patients with no HT&/ or DM No. (%)	Hypertensive patients No. (%)	P value
≤ 88 cm		42	36(85.8)	6(14.2)	<0.001
>88 cm	Total	176(80.7)	102(58)	74(42)	
	89-100 cm	52	38(22)	19(11)	0.379
	>100 cm	124	64(37)	55(31)	
Total		218	138	80	

- No.=number
- WC=waist circumference
- Significant whenever P value < 0.05
- HT =hypertension

Table (3): The relation of waist circumference to hypertension in male patients.

Waist circumference		Patients No. (%)	Patients with no HT&/ or DM No. (%)	Hypertensive patients No. (%)	P value
≤ 102 cm		36	29(80.6)	7(19.4)	<0.001
>102 cm	Total	46	29(63.0)	17(37)	
	103-110 cm	20	16(34.8)	4(8.7)	<0.001
	>110 cm	26	13(28.2)	13(28.3)	
Total		82	58	24	

- No.=number
- .WC=waist circumference
- .Significant whenever P value < 0.05
- HT =hypertension

Table (4): The relation of age and sex with the increased waist circumference.

Age group in years	No. of females with increased waist WC	No. of males with increased WC
20-29	7	3
30-39	36	8
40-49	60	17
50-59	56	14
60-69	16	3
70	1	1
Total No.	176	46

Table (5): the relationship between abdominal obesity, sex, socioeconomic and educational level.

Sex	Total No. with increased waist WC	Poor socioeconomic state	Medium to high socioeconomic state	Educational level %		
				Low	Medium	High
female	176	30	146	81(46)	82(46.5)	13(7.3)
male	46	3	43	9(19.5)	21(45.6)	16(34.7)

Discussion:

Waist circumference is used to assess the patient's abdominal fat. Increased WC is an indicator of excess abdominal fat (central obesity), and consequently increased risk of having hypertension [22, 23, 24, 25, 26].

This study showed that There is sex deference regarding the prevalence of visceral (abdominal) obesity with clear female preponderance (80.7%) compared with only (56%) in male. The fact that female has higher prevalence of abdominal obesity supported by Jensen Michael (17) and Pyeritz Reed [27].

This study shows proportional increase in the number of cases of hypertension as the WC value increased. This is consistent with a study done by Okosun et al, in which they assessed the correlation of WC and the risk of hypertension in African origin populations, showing that significant and positive association between WC and hypertension, regardless of origin [28]. Also consistent with study done by Wang Yufa et al, showed that WC was a better measure of central obesity for predicting the risk of hypertension [11]. And another Comparable study was

done on Mexican Americans aged 25-64 years showed that WC was the only significant predictor of hypertension [9]. Another study on Caribbean's showed; WC appeared as a major indicator correlate with hypertension [29].

This study shows proportional increase in WC (abdominal obesity) in late middle age then it begins to decrease in later years, this finding is showed in both sexes this is consistent with a study done by Dellon et al and Kuk et al showed that; WC is positively associated with age [29, 30]. Also consistent with study by Jensen Michael, reported that, the prevalence of central obesity rises steady from age 20 to age 60 years, later on it doesn't increase, or start to decrease then after [17].

This study shows that 146 out of 176 women (82.9%) are of medium to high socioeconomic state compared with 43 men out of 46 (93.4%). This means that females of medium to high socioeconomic state are much more likely to be obese, this is controversial with Jensen Michael writing on obesity when he mentioned that 'there is an inverse relationship between socioeconomic status and obesity, especially among women [17].

This study also shows that a majority (46.5%) of women with abdominal obesity have a medium educational level, while (45.6%) of males has a medium educational level. Whereas a Caribbean study done by Caribbean and Dutch researchers confirms higher prevalence of central obesity in females with a low educational level, in the Caribbeans [29]. The difference may be related to physical exercise, in our population exercise decreased with increase socioeconomic status but in other country there is increase physical exercise with increase socioeconomic status.

This study has limitations. It is a cross-sectional study, which prevents the causal- inferences. Results of this study suggest a association between WC and CVD risk factors, specifically hypertension. Our finding suggests that, maintaining of a normal WC may decrease the occurrence of hypertension. And the risk of development of hypertension considerably can be reduced by reducing WC; however, more researches are necessary in this area.

Our suggestions for future study is using a prospective study to find the degree to which waist circumference is predictable for the incidence of diseases, and second to examine whether the reduction in WC is an indicator which predict reductions in health risk, like hypertension.

Conclusions and recommendations:

There is a strong correlation between central obesity and the development of hypertension. Increasing waist circumference was significantly associated with increased prevalence of hypertension, and reduction in WC may be a predictable factor for reduction in the risk of development of hypertension.

Medium educational level and medium socioeconomic state are associated with increased prevalence of central obesity.

Intervention activity programmed to reduce WC through modification of lifestyle, including diet and exercise program, may have significant public health significance in reducing the incidence of hypertension in these populations.

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