Cardiovascular Risk and Anthropometric Measures in Women Attending Family Practice

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Abstract

Objectives: To assess the prevalence of selected cardiovascular risk factors and their association with various anthropometric measures in a sample of women using family practice clinics at the Jordan University Hospital.

Methods: Hospital records of 280 Jordanian women aged 25 years and over attending family practice clinics were reviewed. Information on anthropometric measures (BMI, waist circumference, waist/hip and waist/height ratios) and selected cardiovascular risk factors (diabetes, hypertension, and hyperlipidemia) were collected. Prevalence of risk factors and anthropometric measures were assessed. Association between cardiovascular risk factors and anthropometric indices were investigated.

Results: 27% and 22.5% of the study sample had hypertension and diabetes, respectively; 40%- 60% had an abnormal lipid profile. The prevalence of obesity using BMI, waist circumference, waist/hip and waist/height ratios were 43.6%, 74.3%, 64.6% and 86.1%, respectively.

Larger values of BMI were found to be significantly ($p \leq 0.05$) associated with diabetes and hypercholesterolemia. The prevalence of almost all cardiovascular risk factors increased with larger waist circumference. Waist/height ratio was significantly associated with diabetes, low HDL, hypertriglyceridemia and hypercholesterolemia, whereas waist/hip ratio showed a significant association with diabetes only. It was also observed that waist circumference was the only index found to be associated with hypertension while none of the indices showed a significant association with raised S.LDL.

Conclusion: Abdominal obesity indices were found to be better markers for cardiovascular risk morbidity than the BMI. Assessment of these indices should be incorporated within the routine practice of family medicine clinics.

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Keywords

Women, BMI, abdominal obesity, risk factor, Jordan

Introduction

Obesity is an "escalating" epidemic, affecting both the developed and developing worlds. It is associated with significant morbidity and mortality especially in relation to vascular accidents (both cardiac and cerebral). [1] Generalized obesity is usually measured through body mass index, which is the weight in kilograms divided by the square of the height in meters (Kg/m^2). Recent studies have shown that abdominal obesity could be a better predictor of subsequent cardiovascular risk factors than overall obesity. [2- 5] Waist circumference, waist/hip and waist/height ratios are the most frequently used anthropometric indices for measuring abdominal obesity.

Obesity is a definite health problem in Jordan. [6] Using body mass index measurement, the prevalence of obesity among Jordanians aged 25 years and above was found to be 30.5% and that of overweight 37.5%. [6] Previous studies in Jordan correlating cardiovascular risk factors (hypertension, diabetes, and hyperlipidemia) and obesity used body mass index as the only means to define obesity. [7- 9]

At Jordan University Hospital family practice clinics, an attempt was made to assess the prevalence of cardiovascular risk factors (hypertension, diabetes and hyperlipidemia) in a sample of females aged 25 years and

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over, and to investigate their association with obesity (BMI) and abdominal obesity (waist circumference, waist/hip ratio and waist/height ratio) indices. Recommendations for measuring these variables were formulated.

Methods

Design and Sample: This is a health care- based cross-sectional study utilizing information available in health records of female patients who attended the family practice clinics at Jordan University Hospital during July 2003. A total of 925 records of illegible female patients formed the sampling frame for this study (an illegible female is a Jordanian and aged 25 years and above). The sample was selected using a simple random technique where every third Jordanian patient's record was drawn to enter this study, thus ending up with a final sample of 280 records.

Data Collection: Data were collected by the principal investigator through a retrospective review of the existing health records. Health records of the family medicine clinics include a special sheet to document cardiovascular risk factors (hypertension, diabetes mellitus and hyperlipidemia) and anthropometric measures (weight, height, waist circumference and hip circumference). Information related to physical activity and smoking habit is also included.

Identification of Cardiovascular Risk Factors

Hypertension: The study sample was classified as normotensive and hypertensive based on the blood pressure status recorded in the patient's file. At the family practice clinics, the clinic nurse usually measures blood pressure in the sitting position. Using the suitable cuff sphygmomanometer, the mean of three readings separated by a one-minute interval is recorded in the file as the patient's blood pressure. Any reading >140/90 mmHg is repeated 2- 3 times over a 6-week interval. If persistent, the patient is labeled as hypertensive according to WHO criteria of hypertension. [10]

Diabetes: A patient was labeled as diabetic based on the medical history recorded in the file. At the family practice clinics, hyperglycemia is defined as fasting blood glucose ≥ 110mg/ 100ml. [11]

Lipid Profile: Lipid levels as recorded in the medical records were used to classify patients as having normal or abnormal lipid profile. Cardiovascular risk factors prevention protocol followed at the family practice clinics entails an assessment of lipid profile at least once every five years as an opportunistic screening [11] (on the occasion of a physical examination). Identification of hyperlipidemia was based on the Adult Treatment Panel III (ATP Criteria III),[11] as follows: S. cholesterol ≥ 200 mg/100 ml, S. triglycerides ≥ 150mg/100ml, S. HDL-C <50mg/100ml and S.LDL-C ≥ 130 mg.

All laboratory tests were done at Jordan University Hospital laboratories using the COBAS: INTEGRA 400 \ 700 \ 800 clinical System, (Roche) 10/ 2000, version 1.0.

Anthropometric Measurements: At the family practice clinics, height is usually measured to the nearest 0.5 cm without shoes using a stadiometer. Each participant stands with heels, buttocks and shoulders resting lightly against the backing board. Weight is also measured after removal of shoes and when wearing light clothing only. Using a mechanical beam balance, weight is recorded to the nearest 0.1 kg. Waist circumference is measured using a steel measuring tape, with measurement made halfway between the lower border of the ribs, and the iliac crest in a horizontal plane. Hip circumference is measured at the widest point over the buttocks. For both the waist and hip circumference, two measurements to the nearest 0.5 cm were recorded. If the variation between the measurements is greater than 2 cm, a third measurement is taken. The mean of the two closest measurements is then calculated.

Using the measurements recorded in each patient's file, two definitions of obesity were made: (a) overall or generalized obesity, defined as BMI ≥ 30 kg/ m^2. [1] A BMI ranging from 25 to 29.9 kg / m^2 is considered overweight, and from 18.5 to 24.9 kg / m^2 normal. [1] (b) Abdominal or central obesity, defined as waist circumference ≥ 88cm [12] or waist /hip ratio ≥ 0.85 [10] or waist to height ratio ≥ 0. 50. [13]

Data Management and Analysis: All data were entered into the computer and statistical analysis was performed using the Statistical Package for Social Sciences / personal computer (SPSS version 10, Chicago, USA software). Descriptive statistics were used for the prevalence of cardiovascular risk factors and anthropometric measurements. All results are expressed as means ± S.D. or percentages as appropriate. Chi square test (2×2 data tables) was used to examine associations between categorical variables. Throughout the study a p value is considered significant if p ≤0.05.

Results

The sample consists of 280 females with a mean age of 50.9 years (SD ± 11.2) (range 25-88, median 52 years). Table (1) shows the mean anthropometric measurements and lipid profile of the sample.

The mean BMI for this group was observed to be 29.5 Kg /m² and the mean waist circumference 95. 6 cm. The lipid profile appears to be within the upper limits of normal values. It is noteworthy that 13 females (4.5 %) refused to have their hips measured, thus waist/hip ratio was calculated for 267 women only. Table (2) shows the frequency of selected cardiovascular risk factors among the study population. It was observed that 27% was hypertensive and around 23% diabetic. 60% had high S. cholesterol and 57% low HDL, while around 40% had high S. triglycerides.

Table (3) shows the distribution of anthropometric indices for generalized obesity (BMI) and central obesity (waist circumference, waist/hip ratio and waist/height ratio). It was observed that 43.6% of the sample was considered obese and 35% overweight when evaluated by BMI. Central obesity indices indicated that 65% to 86% of the sample was obese.

Table (4) shows the association of cardiovascular risk factors with obesity and abdominal obesity indices. Waist circumference was the only index found to be associated with hypertension (p= 0.002), and none of the indices showed a significant association with high level of S.LDL.C. On the other hand, all the indices of obesity (generalized and abdominal) demonstrated significant (p≤0.04) associations with diabetes.

The table also demonstrates that waist circumference was found to be significantly (p≤0.02) associated with five of the six cardiovascular risk factors under study (diabetes, hypertension, S. cholesterol, S.HDL.C and S. triglycerides). Waist / height ratio was significantly (≤0.04) associated with four cardiovascular risk factors, whereas BMI was associated with only two (diabetes and S. cholesterol). On the other hand, waist/hip ratio showed a significant (p=0.02) association with diabetes only.

Table (1): Mean anthropometric measurements and mean lipid profile of the study sample.

Characteristic	*Mean (± SD)*
Weight (kg)	*76.2 (13.8)*
Height (cm)	*160.9 (6.7)*
Body mass index (Kg/m)	*29.5 (5.2)*
Waist circumference (cm)	*95.6 (13.3)*
Hip circumference (cm)	*108.6 (11.8)*
Waist/height ratio	*0.59 (.09)*
Waist/hip ratio	*.88 (.09)*
S.cholesterol mg/100ml	*207.2 (43.9)*
S. Triglycerides mg/100ml	*150.9 (83.4)*
S.LDL mg/100ml	*128 (31.4)*
S.HDL mg/100ml	*48.8 (12.6)*

Table (2): Frequency of selected cardiovascular risk factors among the study sample.

Cardiovascular risk factor	*Frequency*	*Percentage*
Hypertension ≥ 140/90mmHg	*76*	*27.0%*
Diabetes ≥ 110mg/100ml	*63*	*22.5%*
Cholesterol≥200 mg/100ml	*168*	*60%*
S.HDL≤50 mg/100ml	*160*	*57.1%*
S.LDL≥120 mg/100ml	*132*	*47.1%*
S.triglycerides≥150 mg/100ml	*110*	*39.3%*

Table (3): Distribution of the study sample by anthropometric indices of obesity and central obesity.

Index	Frequency	Percentage
BMI		
1) Normal < 25	60	21.4 %
2) Overweight 25-29.9	98	35 %
3) Obese ≥ 30	122	43 %
Waist circumference		
Less than 88 cm	72	25.7 %
More than or equal 88 cm	208	74.3 %
Waist/hip ratio		
Less than 0.85	86	30.7%
More than or equal 0.85	181	64.6%
Refused	13	4.6%
Waist/height ratio		
Less than 0.5	39	13.9%
More than or equal 0.5	241	86.1%

Table (4): Association of CVR factors with obesity and abdominal obesity indices.

Index of obesity	N	DM %	Hypertension %	S.Cholesterol >200mg/100ml %	S.HDL<50 mg/100ml%	S.LDL >120mg/100ml%	S.Triglycerides >150 mg/100ml%
(1) BMI							
Normal	60	8.3	18.3	43.3	45	43.3	28.3
Overweight	98	28.6	24.5	66.4	57.1	55.1	39.8
Obese	122	24.6	33.6	63.1	63.1	42.6	44.3
Total	280	22.5	27	60	57.1	47.1	39.3
Chi-square		9.3	5.3	9.1	5.4	3.8	4.3
P value		P=0.01*	P= 0.07	P=0.01*	P=0.07	P=0.15	P=0.12
Central obesity Indices							
(1) Waist Circumference							
<88cm	72	11.1	16.7	43.1	41.7	38.9	27.8
>88cm	208	26.4	30.8	56.9	62.5	50	43.3
Total	280	22.5	27	60	57.1	47.1	39.3
Chi-square		7.2	5.4	11.6	9.5	2.7	5.4
P value		P=0.007*	P= 0.002*	P= 0.001*	P=0.002*	P=0.1	P=0.02*
(2)Waist /hip							
ratio <0.85	86	13.9	22.1	58.1	52.3	50	32.6
>0.85	181	26.5	29.8	61.9	59.7	45.1	42.5
Total	267	22.5	27	60.0	57.1	47.1	39.3
Chi-square		5.3	1.8	034	1.3	0.40	2.4
P value		P=0.02*	P=0.19	P=0.6	P=0.26	P=0.53	P= 0.12
(3)Waist/height							
ratio<0.53	39	10.3	17.9	41	41	38.5	17.9
>0.53	241	24.5	28.6	63.1	59.8	48.5	42.7
Total	280	22.5	27	60	57.1	47.1	39.3
Chi-square		3.9	1.9	6.8	4.8	1.4	8.6
P value		P=0.04*	P=0.16	P=0.009*	P=0.03*	P=0.24	P=0.003*

* Significant at P≤ .05

Discussion

We investigated the distribution of the prevalence of six cardiovascular risk factors (hypertension, diabetes, hyperlipidemia with its subtypes) in a randomized sample of 280 Jordanian females (aged 25 years and above) attending the family practice clinics. Anthropometric measurements (weight, height, waist circumference, waist/ hip ratio and waist/ height ratio) were also assessed. 27% of the study sample was found to be hypertensive and 22.5% diabetic. The rate of hypertension observed in our study is close to the 32% prevalence rate of hypertension among adult Jordanians aged ≥25 years found by the Jordan National Morbidity Survey 1996. [14] The rate of diabetes, given the mean age of the study sample, is in agreement with a prevalence of 24% after the age of 50 years, as demonstrated by a cross sectional study in four Jordanian communities. [8] The lipid profile in the study sample is similar to that of 2000 Jordanian individuals followed up as out and in patients in a tertiary care center. [15] The mean cholesterol level is close to the level of some European countries. [11]

43.7% of the study sample was found to be obese based on the international cut off point of the body mass index. The results also showed that more than 65% had central obesity, as measured by the three indices of abdominal obesity: 74.3% using waist circumference, 86.1 % using waist/height ratio and 64.6% using waist/hip ratio.

Body mass index is the most frequently used measure of obesity. However, it has serious limitations, since it does not differentiate between body weight due to excess fat or increased muscle bulk. Moreover, it fails to take into account fat distribution, which is more important than the total body fat content when it comes to its relation to cardiovascular risk factors. [10]

Other more refined measurements are desirable. One such measure is the waist/hip ratio, which is representative of abdominal obesity. [16- 18] Waist circumference and waist to height ratio have also been recently used as predictors of cardiovascular risk factors. [17- 21] It was observed that the level of risk varies between genders and ethnic population groups.

In a comparison of the utility of various anthropometric measures in identifying cardiovascular risk factors in a Hong Kong population, it was found that the waist circumference and waist/hip ratio were preferable predictors for women, while BMI and waist circumference proved more relevant for men. [22] In a study of four proxy measures of abdominal obesity in three different ethnic groups (Chinese, Europeans and South Asians), it was found that Europeans have higher measures than Chinese and South Asians and their figures are closer to our data. [19]

Further analysis was carried out and an attempt was made to associate obesity and abdominal obesity indices with each one of the risk factors under study. All obesity and abdominal obesity indices showed a significant ($p \leq 0.04$) association with diabetes, but failed to demonstrate such a relationship with S.LDL-C. On the other hand, waist circumference was the only index to show a significant association with an increased prevalence of hypertension. Other studies showed that waist circumference was strongly correlated with hypertension and seems to be a good predictor of cardiovascular risk factors. [5, 11] In our study, BMI as a measure of obesity, waist circumference and waist/height ratio as measures of central obesity, were found to be significantly associated with increased serum cholesterol level, while only waist circumference and waist / height ratio, demonstrated a significant association with a lower level of S.HDL-C. Excluding S.LDL-C, which did not show any significant relationship to any of the obesity and abdominal obesity indices used, it could be concluded that a larger waist circumference demonstrated (consistently) a significant association with an increased prevalence of all morbid conditions under study. Computed tomography and dual energy X-ray absorptiometry has shown that waist circumference is the best surrogate measure for estimating visceral fat mass. [15, 23] The World Health Organization (WHO) echoed these findings and supported waist circumference as the preferred measure for abdominal obesity. [1] Furthermore, a number of cross sectional studies related waist measurement to the prevalence of diabetes and cardiovascular risk factors. [15] More recently, waist circumference replaced BMI as one of the criteria for the definition of metabolic syndrome. [11]

In general, our results suggest that waist circumference appears to be superior to BMI in its association with the majority of cardiovascular risk factors under investigation. Simple abdominal obesity measures could be used as indicators of cardiovascular risk factors, thus reflecting the changing trend of substituting obesity and BMI with central obesity indices particularly the waist circumference.

Conclusion

The findings of the study show that obesity and cardiovascular morbidity are highly prevalent among female patients presenting to Jordan University Hospital Family medicine clinics. A potential weakness of the study is the fact that the patient population is exclusively female and is presenting for care at a Family Medicine Clinic at a tertiary care centre. However, central abdominal indices were found to be better indicators of the problem and were more likely to be associated with individual cardiovascular risk factors than BMI. Assessment of these indices should be incorporated within the routine practice of family medicine services.

To consolidate our findings, a larger number of patients including males need to be studied. Further investigation of the problem in the community is urgently needed and community awareness campaigns should be carried out to educate people about dietary and physical activity habits.

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دراسة المقاييس الجسمية المختلفة وعلاقتها ببعض عوامل الخطورة لأمراض القلب الوعائية في عينة مختارة من مراجعات طب الأسرة

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ملخص:

الهدف:

تقييم أهمية المقاييس الجسمية المختلفة وعلاقتها ببعض عوامل الخطورة لأمراض القلب الوعائية في عينة مختارة من مراجعات عيادة طب الأسرة في مستشفى الجامعة الأردنية.

الطريقة:

تمت دراسة ملفات 280 مراجعة أردنية بعمر 25 سنة فأكثر من مراجعات عيادة طب الأسرة. اشتملت المعلومات التي تم جمعها على المقاييس الجسمية (محيط الخصر، نسبة محيط الخصر/محيط الورك ونسبة محيط الخصر إلى الطول، الوزن، الطول، محيط الورك ومؤشر كتلة الجسم وكذلك عوامل الخطورة للأمراض القلبية مثل السكري، ارتفاع ضغط الدم، ارتفاع الدهنيات.

تم دراسة مدى انتشار عوامل الخطورة القلبية والمقاييس الجسمية وكذلك تقييم مدى العلاقة بينهم.

النتائج:

بلغت نسبة انتشار السمنة بين عينة الدراسة باستخدام مؤشر كتلة الجسم 43%. أما بحسب محيط الخصر ونسبة محيط الخصر إلى محيط الورك ونسبة محيط الخصر إلى الطول فكانت كالتالي: (74.3%، 64.6%، 86.1%) على التوالي زيادة محيط الخصر ارتبطت بزيادة انتشار معظم عوامل الخطورة القلبية بينما مؤشر كتلة الجسم ارتبط فقط بزيادة انتشار مرض السكري وارتفاع الكوليسترول .

خاتمة:

تبين أن مؤشرات البدانة المركزية كانت أهم من مؤشر كتلة الجسم في تحديد نسبة البدانة وكانت اكثر احتمالية للارتباط بعوامل الخطورة للأمراض القلبية .

ينصح بإدخال هذه القياسات في عيادات الرعاية الصحية الأولية والاعتماد عليها في قياس عوامل الخطورة القلبية.

مفتاح الكلمات:

البدانة، محيط الخصر، مؤشر كتلة الجسم، عوامل الخطورة للأمراض القلبية.