ISSN 0976 – 3333

Available Online at www.ijpba.info

International Journal of Pharmaceutical & Biological Archives 2012; 3(4):760-763

ORIGINAL RESEARCH ARTICLE

Correlations between the Derived and Basic Anthropometric Indices in Hypertension among the People at Chitwan District of Nepal

Kalpana Sharma Dhakal[1], Mamata Sharma Neupane [1], Shankar Dhakal[2] and Bijay Aryal[*3]

[1]College of Nursing, Chitwan Medical College, Bharatpur-10, Chitwan, Nepal
[2] Department of Orthopedic Surgery, Chitwan Medical College, Bharatpur-10, Chitwan, Nepal
[3]Department of Clinical Pharmacology, Chitwan Medical College, Bharatpur-10, Chitwan, Nepal

Received 12 Mar 2012; Revised 05 Jun 2012; Accepted 14 Jun 2012

ABSTRACT

This study is aim at determining the correlations between the derived and basic anthropometric indices in hypertension among the people at Chitwan District of Nepal. A total 500 subjects above aged 20 were recruited for the study. This study was conducted from 7th November, 2011 to 15th November 2011. All historical information was obtained by interview and medical records. Height and weight were measured after the removal of shoes and with the patients wearing light clothing. Similarly, waist circumference was measured using a steel measuring tape, with measurements made halfway between the lower border of the ribs, and the iliac crest in a horizontal plane. Hip circumference was measured around the widest portion of the buttocks, with the tape parallel to the floor. The result showed that the mean value of waist hip ratio (WHR) for male participants fell below the range for the overweight and obese, while the mean value of WHR for female participants fell within the range classified as obese. The mean body mass index (BMI) for all the participants fell within the healthy weight range. Furthermore, there was a significant relationship between the systolic blood pressure as well as the diastolic blood pressure, and the indices of adiposity of all the participants (p=0.0001).In conclusion, WHR is a strong independent indicator of hypertension, particularly in men aged 40-59 years and women aged 40-69 years. However, age disparity in relation to hypertension was not taken into consideration.

Key words: Waist hip ratio, body mass index, systolic blood pressure and diastolic blood pressure.

INTRODUCTION

Obesity has been particularly recognized as a major independent risk factor for cardiovascular diseases [1].This is because increased body fat is accompanied by profound changes in the physiological and metabolic functions of the body, which are directly dependent on the degree of excess weight and on its distribution around the body.

The prevalence of obesity is rising in developed and developing nations, and it is cited as an important risk factor for early mortality [2].Obesity has a strong relationship with cardiovascular diseases like hypertension, coronary heart disease and diabetes [1, 3, 4].A number of clinical measurements for obesity have been used to determine susceptibility to cardiovascular diseases [4] .These include anthropometric indices such as body mass index (BMI), waist-hip ratio (WHR) and waist circumference (WC) [5,6].

Body mass index (BMI), which is defined as weight (kg)/ height (m^2), is the accepted measure to assess obesity [2]. Obesity is defined by a BMI value $\geq$ 30 kg/m^2 [7], BMI is an indicator of total body fat; however, it is not a good indicator of regional fat distribution [8, 9].Waist-hip ratio (WHR) is an index of body fat distribution. As the WHR is difficult to interpret biologically and less sensitive to changes in total body fat and visceral fat [10], waist circumference (WC) has been proposed to be a better predictor of cardiovascular risk factors [7]. This study is aim at determining the correlations between the derived and basic anthropometric indices in hypertension among the people at Shivanagar VDC in Chitwan District of Nepal.

MATERIALS AND METHODS

This cross-sectional study was carried out at Shivanagar, Jagatpur and Sharadpur VDC of Chitwan District by organizing medical camps

***Corresponding Author:** Dr. Bijay Aryal **, Email:** phrbijayaryal@gmail.com, **Phone No:** 977-9843087444

and a total 500 subjects above aged 20 were recruited for the study. Informed consent was obtained from each subject. This study was conducted from 7th November, 2011 to15th November 2011. All historical information was obtained by interview and medical records.

Measurement of BMI

Height and weight were measured after the removal of shoes and with the patients wearing light clothing. BMI was calculated as weight (kg)/height (m^2). Those with a BMI of 25.0–29.9 kg m^2 were classified as overweight, whilst those with a BMI ‡ 30.0 kg m^2 were classified as obese.

Measurement of hip and waist circumference

Waist circumference was measured using a steel measuring tape, with measurements made halfway between the lower border of the ribs, and the iliac crest in a horizontal plane. Hip circumference was measured around the widest portion of the buttocks, with the tape parallel to the floor. For each of waist and hip circumference, two measurements to the nearest 0.5 cm were recorded. If the variation between the measurements was greater than 2 cm, a third measurement was taken. The mean of the two closest measurements was calculated. Men with a waist circumference 94–101.9 cm (>102 cm) and women with a waist circumference 80–87.9 cm (>88 cm) were classified as overweight, whilst men with a waist circumference ‡102.0 cm and women with a waist circumference ‡88.0 cm were classified as obese [6]. WHR was obtained by dividing the mean waist circumference by the mean hip-circumference. Men with a WHR 0.90–0.99 and women with a WHR 0.80–0.84 were classified as overweight, whilst men with a WHR ‡ 1.00 and women with a WHR ‡ 0.85 were classified as obese.

Blood pressure was measured in a seated position after the participant had rested for at least 5 min. After measurement of the circumference of the mid upper arm, a cuff of suitable size was applied to the participant's exposed upper arm (the arm not used for blood collection), which was supported by the table at heart level. Blood pressure was measured twice with a standard mercury sphygmomanometer and the mean measurement was used. Participants were classified as hypertensive if they were on treatment for hypertension, had a mean systolic reading ‡140 mmHg or a mean diastolic reading ‡90 mmHg.

Statistical Analysis

The statistical software SPSS (version 15) was use for data analysis. The mean values of WC, HC, BMI, WHR and BP was determined. Correlations between the BMI vs BP, and WHR vs BP were examined using the Pearson correlation coefficients keep statistical significance at 95% confidence interval of mean (P=0.05,P<0.05).

RESULTS

Characteristics of Participants

The study population consisted of 500 individuals with ages ranging from 20-85 years. Their weights ranged between 22 and 90 kg and heights between 122 and 176 cm. (**Table 1**) shows the demographic characteristics and the indices of adiposity of the participants. From the table 1, it can be observed that male participants were significantly taller and heavier (P < 0.05), while no significant difference existed in age between the male and female participants (P= 0.057, P > 0.05). Furthermore, the mean value of WHR for male participants (0.891) fell below the range for the overweight and obese, while the mean value of WHR for female participants fell within the range (0.94) classified as obese [11]. The mean BMI for all the participants fell within the healthy weight range (18.5 to 25kg/m^2).

Table 1: Socio-demographic Characteristics

Parameters	All Subject X±SD	Male X±SD	Female X±SD	Calculated t- value	P-value
Age	50.953±16.71	56.458±16.41	52.070±16.03	1.910	0.057
Weight	56.981±13.18	66.869±14.63	52.122±9.96	1.769	0.000
Height	153.695±11.49	163.086±10.84	146.946±6.70	1.275	0.000
Waist Circumference	81.903±13.78	91.782±11.73	77.333±12.50	1.715	0.000
Hip Circumference	91.735±10.53	96.956±10.10	90.096±10.35	1.446	0.000
Waist-Hip Ratio	0.891±0.10	0.946±0.07	0.858±0.93	0.012	0.000
BMI	23.987±4.09	24.922±3.87	24.148±4.22	1.350	0.178

Relationship between Indices of Adiposity and Cardiovascular Variables of Participants

There was a significant relationship between the systolic blood pressure as well as the diastolic blood pressure, and the indices of adiposity of all the participants (P < 0.05) (**Table 2**).

Table 2: Correlation between Indices of Adiposity and Cardiovascular Variables

		WC	WHR	BMI
SBP	R	0.259	0.309	0.215
	p-value	0.010	0.001	0.031
DBP	R	0.386	0.291	0.313
	p-value	0.000	0.003	0.001

Comparison of Indices of Adiposity of Hypertensive and Normotensive Participants

The participants were further classified as normotensive (SBP <160; DBP <100) and hypertensive (SBP >160; DBP >100). A significant difference ($P < 0.05$) was observed between the WHR and BMI of hypertensive and normotensive participants. The hypertensive participants had a significantly higher WHR (> 0.9) as well as a significantly higher BMI (> 25kg/m^2) compared to the normotensive participants (**Table 3**).

Table 3: Comparison of Indices of Adiposity of Hypertensive and Normotensive Participants

	Normotensive X±SD	Hypertensive X±SD	T value	P value
WHR	0.89±0.15	0.94±0.11	-0.05	0.0001
BMI	23.98±4.08	32.74±6.12	-8.76	0.0001

DISCUSSION

In this study, the mean values of WHR for female participants (> 0.9) fall within the range classified as obese in women. This shows an increase in abdominal fat [12] for this group of participants, even though the mean value for BMI falls within the healthy weight range. WHR may prove to be a more appropriate and universal indicator of risk for an ethnically-diverse population [12, 13]. It has also been suggested to be a better indicator of cardiovascular risk, as it is less dependent on body size and height and WHR ratio [14]. Furthermore, the measurements used for obesity assessment in this study – BMI and WHR, correlated significantly with systolic and diastolic blood pressures. This result is similar to that of Canoy et al., [15], in which it was observed that waist and hip circumferences were positively related to systolic and diastolic blood pressures in male and female participants who were involved in a Norfolk cohort study. However, hip circumference was not independently correlated with blood pressure. In addition, the result of this study showed that an increase in BMI > 25kg/m^2 and WHR > 0.9 correlates with hypertension in both the male and female participants. This finding is in accordance with the study by Hartz et al., [16], in which it was discovered that WHR is a strong independent indicator of hypertension, particularly in men aged 40-59 years and women aged 40-69 years. However, age disparity in relation to hypertension was not taken into consideration.

ACKNOWLEDGEMENT

The authors would like to thank Chitwan Medical College for providing research facilities and fund.

REFERENCES

1. Despres J P, Lemieux I, and Prud'Homme D. Treatment of obesity, need to focus on high risk abdominally obese patients. British Medical Journal, 2001; 322:716-720.
2. Cameron AJ, Welborn TA, and Zimmet PZ. Overweight and obesity in Australia. The 1999-2000, Australian Diabetes, Obesity and Lifestyle Study. Medical Journal of Australia, 2003; 178:427-432.
3. Stevens J, Cai J, and Pamuk ER.The effect of age on the association between body mass index and mortality. New England Journal of Medicine, 2003; 338:1-7.
4. Bray GA and Gray DS.Obesity. The-Pathogenesis. West Journal of Medicine, 1999; 149: 429-41.
5. Lapidus L, Bengtsson C, Larsson B, Pennert K, Rybo E, and Sjostrom L.Distribution of adipose tissue and risk of cardiovascular disease and death: A 12-year follow up of participants in the population study of women in Gothenburg, Sweden. British Medical Journal, 1984; 289:1257- 61.
6. Lemieux B, Prud'Homme D, Bouchard C, Tremblay A, and Despres JP.A single threshold value of waist girth identifies normal weight and overweight subjects with excess visceral adipose tissue. American Journal of Clinical Nutrition, 1996; 64:683-693.
7. Larsson B, Svardsudd K, and Welin L. Abdominal adipose tissue distribution, obesity and risk of cardiovascular disease and death: 13 year follow-up of participants in the study of men born in 191. Br. Med. J, 1984; 288(6428):1401 - 1404.
8. Bray GA, Jablonski KA, Fujimoto WY, Barrett-Connor E, Haffner S, and Hanson RL: Relation of central adiposity and body mass index to the development of diabetes in the Diabetes Prevention Program. Am J Clin Nutr, 2008; 87:1212–8.
9. Vazquez G, Duval S, Jacobs DR Jr and Silventoinen K.Comparison of Body Mass Index, waist Circumference, and Waist/Hip Ratio in Predicting Incident Diabetes: A Meta-Analysis. Epidemiol Rev, 2007; 29:115–28.

10. Low S, Chin MC, Ma S, Heng D and Deurenberg-Yap M.Rationale for Redefining Obesity in Asians. Ann. Academy Med, 2009; 38:66–74.
11. Shera AS, Rafique G, Khwaja IA, Baqai S, Khan IA and King H. Pakistan national diabetes survey: prevalence of glucose intolerance and associated factors in Shikarpur, Sindh Province. Diabet Med, 1995; 12(12):1116–21.
12. Deurenberg P, and Yap M.The assessment of obesity: methods for measuring body fat and global prevalence of obesity. Bailliere Clin Endocrinol Metab, 1999; 13:1-11.
13. Chan D C, Watts G F and Barrett P H R.Waist circumference, waist to hip ratio and body mass index as predictors of adipose tissue compartment in men. Q J Med, 2003; 96:441-447.
14. Pouliot MC, Despres JP, Lemieux S, Moorjani S, Bouchard C and Tremblay A. Waist circumference and abdominal saggittal diameter: best simple anthropometric indexes of abdominal visceral adipose tissue accumulation and related cardiovascular risk in men and women. Am J Cardiol, 1994; 73:460-8.
15. Canoy D, Luben R, Welch A, Bingham S, Wareham N, Day N, and Khaw K.T. Fat distribution, body mass index and blood pressure in 22,090 men and women in the Norfolk cohort of the European prospective investigation into cancer and nutrition (EPIC-Norfolk) study. Journal of Hypertension, 2004*;* 22(11):2067-74.
16. Hartz AJ, Rupley DC, and Rimm A. The association of girth measurements with disease in 32,856 women. American Journal of Epidemiology, 1984*;* 119:71-80.