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THE CORRELATION OF ANTHROPOMETRIC MEASUREMENT WITH BLOOD PRESSURE AS AN INDICATOR OF CARDIOVASCULAR RISK AMONG URBAN COLLEGE GOING GIRLS IN NORTHERN INDIA

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ABSTRACT

Purpose of study: - To know the utility of anthropometric measurement and blood pressure in prediction of risk for cardiovascular diseases and to observe if any particular level of waist hip ratio, Body mass index and blood pressure can be helpful. Basic procedures:-A cross-sectional study has been carried out in Allahabad city. This study was undertaken among four hundred girls above the age of seventeen years. A questionnaire was filled after taking a written consent; the data has been compiled and analyzed. Main finding:-Out of 400 girls, 3.3% were having BMI ≥ 25, 40.5% were having ≥ 80 waist hip ratio, 2.25% were having both WHR≥ 80 and BMI ≥ 25. Correlation coefficient of systolic blood pressure with BMI were 0.11, and that of diastolic blood pressure were 0.16, correlation coefficient of systolic blood pressure with waist hip ratio were 0.18 and that of diastolic blood pressure 0.16.Principal Conclusion:- A positive linear correlations were found between BMI, WC,WHR and blood pressure. The inter-relationship of these variables offers us the opportunity to predict the risk of cardiovascular disease.

Key Words: BMI, WC, WHR, Blood pressure, CVD.

INTRODUCTION

The prevalence of overweight is rising all over the world *(Kanaley JA et al 1993)*, including our country due to the rapid socio-economic change. Abdominal obesity is a strong independent risk factor for heart disease, and using the waist – hip ratio rather than waist measurement alone is a better predictor of heart disease risk among men and women. Adiposity is an established risk factor for cardiovascular disease *Gang Hu et al, 2007).* Increase of mean systolic and mean diastolic blood pressure in higher weight range was observed by many workers *(Laroia et al,1989); (Gupta AK & Ahmad AT,1990); (Agarwal VK et al ,1983). Laroia D et al ,1989 and Gupta AK et al 1990* found positive correlation between blood pressure and height. In contrast *Singh BM et al , 1994* did not find any significant correlation between blood pressure and height. Cutoff points for waist-hip ratio were seen to have a higher percentage of correct prediction than Body Mass Index, Waist circumference and Waist Height Ratio in all age categories *(M.Dalton et al,2003)* . The major cardiovascular risk factor (high blood pressure, plasma lipid, insulin-resistances) all aggregate independently with body mass index (BMI) and waist-hip ratio(WHR),*(Bjorn torp, 1987); (Seidell JC ,1989)* and improve with weight loss *(Casimiri et al , 1989); (Dennis KE & Goldberg AP,1993).* Waist circumference is also the indicator of change in intra-abdominal fat during weight loss , *(Van Dev et al 1993).*

The present study was carried out with following objectives.

(i) To know the utility of anthropometric measurement and blood pressure in prediction of risk for cardiovascular diseases.

(ii)To see the inter-relationship of waist circumference with waist hip ratio and Body Mass Index

(iii) To observe if any particular level of waist circumference, waist hip ratio, Body mass index and blood pressure can be used to predict with relative accuracy those requiring preventive measures.

METHODS

A Community based cross-sectional study has been carried out in one of the densely populated district of the northern India, Allahabad, situated in Uttar Pradesh state. The study was done in the urban area of the city after approval from ethical committee. This study was undertaken among four hundred urban girls above the age of seventeen years which makes the actual material for study. A pre designed and pre tested questionnaire was filled after taking a signed

consent on Informed consent form. The exclusion criteria were that a subjects who was suffering from diseases like Ascites, Cushing's syndrome or Oedema from any cause and below the age of seventeen. Height and weight was measured by using standard procedures suggested by *Jellife BD(1966)* . Weight was measured by digital scales to within 100grams, using light clothing, after light food in bare feet. Height was measured by stadiometer to within 0.1centimeter.The Body Mass Index (BMI) was calculated and classified according to the International Classification of adult underweight, overweight and obesity to Body Mass Index,*(WHO expert committee,1995).*The cutoff point for BMI were ≥ 25. Waist circumference was measured mid way between the lowest rib and the iliac crest in standing posture at the end of gentle expiration. The measurement was taken after light meals. The cutoff point for waist circumference was ≥ 72cm. The Hips was measured at the greater trochanter, as per earlier studies of Lean MEJ et al,1995. The Waist Hip Ratio (WHR) has been calculated. The cutoff point for WHR was ≥ 0.80. Plastic measuring tapes was used for measuring circumference to within one millimeter. As recommended by WHO study group, blood pressure was taken by mercury sphygmomanometer in sitting position on left hand. The systolic and diastolic pressure was measured at least three times over a period of at least three minutes and the lowest reading was recorded,*(WHO,1983)* . One instrument has been used throughout the study and has been checked periodically for any loss of mercury height or any leaking in the tubing or the control valves.Blood pressure has been classified as per the seventh report of the Joint National Committee (JNC VII) on prevention, detection, evaluation and treatment of high blood pressure, *(Chobanian AV et al,2003)* .The data has been compiled and analyzed. Statistical analysis has been done with the help of SPSS statistical software version -12.

RESULTS

Out of four hundred girls, 3.3% were having BMI ≥ 25, Table-(1); 40.5% were having ≥ 80 waist hip ratio, ; 8.1%were having ≥ 0.53 Waist Height Ratio (WHtR) and mean WHtR is 0.45 ; 2.25% were having both WHR≥ 80 and BMI ≥ 25, .Mean Systolic blood pressure (MSBP) and Mean Diastolic blood pressure (MDBP) were higher as the range of weight increased except in case of mean diastolic pressure at weight range of 56-60 kg ,Table-(2). Correlation coefficient of systolic blood pressure with weight was 0.30 and that of diastolic blood pressure were 0.31. Both correlations were significant at the 0.01 level (2-tailed). MSBP and MDBP were higher as the range of BMI increased except at BMI range of ≥ 40.Correlation coefficient of systolic blood pressure with BMI were 0.11 ; correlation were significant at the 0.05 level (2-tailed) and that of diastolic blood pressure were 0.16 ; correlation were significant at the 0.01 level (2-tailed),Table- (3). Correlation coefficient of systolic blood pressure with waist circumference was 0.319, correlations were significant at the 0.01 level (2-tailed) and that diastolic blood pressure was 0.320; correlation was significant at the 0.01 level (2-tailed), Table-(4)a & b . Correlation coefficient of systolic blood pressure with waist hip ratio was 0.18 and that of diastolic blood pressure 0.16. Both correlations were significant at the 0.01 level (2-tailed), Table-(5)a & b . Correlation coefficient of systolic blood pressure with waist height ratio was 0.271 and that of diastolic blood pressure 0.277. Both correlations were significant at the 0.01 level (2-tailed).

Table (1):- distribution of urban college going girls according to their body mass index (BMI), n=400

BMI	Frequency	Percent	Valid Percent	Cumulative Percent
<18.5	156	39.0	39.0	39.0
18.5-24.99	231	57.8	57.8	96.8
25-29.99	10	2.5	2.5	99.3
30-34.99	2	.5	.5	99.8
>40	1	.3	.3	100.0
Total	400	100.0	100.0	

Table (2):-distribution of blood pressure according to body weight, n= 400

Weight(kg)	*MSBP[1]	*MDBP[2]	n
31-35	103.40	72.60	10
36-40	107.82	72.03	60
41-45	110.27	73.96	105
46-50	113.17	75.14	88
51-55	115.97	77.40	77
56-60	115.76	76.49	37
61-65	121.89	84.84	19
>66	129.00	91.50	4
Total	112.71	75.49	400

r^1 = .30 , r^2=.31, * Correlation is significant at the 0.01 level (2-tailed)

Table (3):-distribution of blood pressure according to body mass index, *n= 400*

B.M.I	Mean SBP*	Mean DBP**	n
<18.5	109.29	73.27	156
18.5-24.99	114.51	76.37	231
25-29.99	120.00	83.80	10
30-34.99	137.00	102.00	2
>40	110.00	80.00	1
Total	112.71	75.49	400

r^1=.11, * Correlation is significant at the 0.05 level (2-tailed r^2 = .16 ** Correlation is significant at the 0.01 level (2-tailed).

Table (4) A:-Correlations between Waist Circumference and Systolic Blood Pressure, n=400

		Waist circumference	Systolic BP
Waist circumference	Pearson Correlation	1	.319(**)
	Sig. (2-tailed)	.	.000
	N	400	400
Systolic BP	Pearson Correlation	.319(**)	1
	Sig. (2-tailed)	.000	.
	N	400	400

** Correlation is significant at the 0.01 level (2-tailed).

Table (4) B:-Correlations between Waist Circumference And Diastolic Blood Pressure, n=400

		Waist circumference	Diastolic B.P
Waist circumference	Pearson Correlation	1	.320(**)
	Sig. (2-tailed)	.	.000
	N	400	400
Diastolic B.P	Pearson Correlation	.320(**)	1
	Sig. (2-tailed)	.000	.
	N	400	400

*** Correlation is significant at the 0.01 level (2-tailed).*

Table (5)A:-Correlations between Waist Hip Ratio (Whr) And Systolic Blood Pressure, *n=400*

		WHR	SYS
WHR	Pearson Correlation	1	.182(**)
	Sig. (2-tailed)	.	.000
	N	400	400
SYS	Pearson Correlation	.182(**)	1
	Sig. (2-tailed)	.000	.
	N	400	400

*** Correlation is significant at the 0.01 level (2-tailed*).

Table (5) B:-Correlations between Waist Hip Ratio (Whr) And Diastolic Blood Pressure=400

		WHR	DIAST
WHR	Pearson Correlation	1	.166(**)
	Sig. (2-tailed)	.	.001
	N	400	400
DIAST	Pearson Correlation	.166(**)	1
	Sig. (2-tailed)	.001	.
	N	400	400

*** Correlation is significant at the 0.01 level (2-tailed).*

DISCUSSION

In this study it was found that systolic blood pressure and diastolic blood pressure appeared to have a positive correlation with weight, which agreed with finding of *Gupta AK & Ahmad AT, 1990*. Similar observation of increase of mean systolic and mean diastolic blood pressure in higher weight range was observed by many workers, *(Laroia et al,1989); (Gupta AK & Ahmad AT,1990); (Agarwal VK et al ,1983)* .There was positive correlation between BMI & blood pressure similar finding were observed by Indranil Saha et al,2007. It is evident that increase in BMI predisposes higher blood pressure, similar findings were observed by others also *Thakor HG et al ,1998 ; Torok E et al ,1998; Aullen JP , 1978.* .High WHR (40.5%) were more prevalent than high BMI (3.3%).Similar finding were observed by *S.Das gupta & S.C.Hazra ,1999.* High WHR is directly correlated to blood pressure similar findings were found in other study , *(M.Dalton et al, 2003); (Nemesure B et al,2008)* . So WHR is more accurate than BMI to predict the risk.

CONCLUSION

Mean systolic and diastolic pressure were higher as the range of Weight, Body mass index, Waist circumference, and Waist hip ratio increased and positive linear correlations were found between these variables . The inter-relationship of these variables offers us the opportunity to predict the risk of cardiovascular disease. These are the simple parameters which can be measured simply by means of measuring tape. So it can be useful in health promotion by easy means in developing counties.

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