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CORRELATION OF BMI, WAIST CIRCUMFERENCE, WAIST –HIP RATIO, LIPID PROFILE IN NORMOTENSIVE AND HYPERTENSIVE FEMALES.

Physiology

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ABSTRACT

Background: Overweight and obesity have become a major public health problem as they are related to a wide spectrum of chronic diseases. However there is controversy regarding anthropometric measurements which defines obesity and risk of obesity related diseases.

Material and methods: The present case control study was carried out in 60 female subjects which includes 30 hypertensive & 30 normotensive females. Blood Pressure measurement was done by sphygmomanometer. All anthropometric measurements were taken. BMI was calculated by weight in Kg's divided by height in m2 and waist to hip ratio was calculated as waist circumference divided by hip circumference.

Results: Overweight and obese subjects who had increased waist-hip ratio shows significantly increased BP & lowered HDL – C Level, higher LDL-C & Triglyceride levels.

Conclusion: Waist to Hip ratio is a stronger correlating factor than BMI for higher blood pressure.

KEYWORDS

Body Mass Index, Blood Pressure, Waist to hip ratio, Lipid profile.

INTRODUCTION

Overweight and obesity have become a major public health problem in both developing and developed countries as they are casually related to a wide spectrum of chronic diseases including Type- 2 diabetes, Hypertension and cancer[1].

Obesity is a major independent risk factor for hypertension[2]. Waist to hip ratio (WHR) an indirect estimate of visceral obesity which has been found significantly associated with cardiovascular risk in southasian migrants in united kingdom[3]. Others studies stressed out that waist circumference (WC) is the single best predictor for visceral adiposity[4].

The prevalence of obesity is increased in industrialized and developed countries [6]. Obese people are susceptible to chronic diseases such as diabetes, CVD and cancers[7]. According to recent studies, about 1.5 million deaths have occurred in India due to cardiovascular diseases and this number is projected to increase in future[13, 14]. Hypertension affects 26% of world adult population[15]. Hypertension itself is an independent risk factors for cardiovascular diseases and deaths[16]. Dyslipidemia[17] occurs in patients suffering with hypertension as compared to normal subjects[18,19,20]. Therefore, elevated level of blood lipids signify the increase cardiovascular risk in subjects suffering from pre- hypertension. The present study was therefore undertaken to determine and to compare the correlation of waist to hip ratio with blood pressure & hyperlipidemia status in a group of hypertensive & normotensive females.

AIMS AND OBJECTIVES:

AIM - Correlation of body mass index, waist to hip ratio, lipid profile in normotensive, hypertensive females between the age group of 40 – 60 years.

OBJECTIVES:

1. To study the correlation of BMI, waist to hip ratio, lipid profile in normotensive females between the age group of 40 – 60 years.
2. To study the correlation of BMI, waist to hip ratio, lipid profile in hypertensive females between the age group of 40-60 years.

MATERIAL AND METHODS:

The present case- control study was carried out in 60 female subjects that include 30 hypertensive & 30 normotensive females. The subjects were selected from general population of town area. Maximum females belong to middle socio-economic class. The subjects were between the age group of 40 – 60 years. Informed consent was taken from subjects. Procedure was explained before taking the blood samples for lipid profile assessment. Early morning Venus blood samples had been obtained from each participant for lipid profile screening .Lipid profile includes total cholesterol (TC), high density lipoprotein cholesterol (HDL-C), low density lipoprotein cholesterol (LDL-C) and triglyceride (TG).

Blood Pressure measurement was taken by specially trained and experienced health care worker. Hypertension was defined on the basis of seventh report of joint national Committee. Cut-off point for systolic blood pressure ≥ 140mm Hg and for diastolic blood pressure ≥ 90mmHg. All anthropometric measurements were taken. A weighing machine was used for measuring weight and height was measured with a wall mounted stadiometer. Body mass index was calculated by weight in Kg's divided by height in m^2. Waist circumference was measured midway between the iliac crest and lowest rib margin i.e. at the level of umbilicus during minimum respiration. Hip circumference was measured at the widest part of the hip at the level of the greater trochanter. Waist to hip ratio was calculated as waist circumference divided by hip ciurcumference[5].

STATISTICAL ANALYSIS:

The collected data was compiled in Excel sheet and master sheet was prepared. For analysis of this data SPSS (statistical software for social sciences) software version 28 was used.

RESULT-

Table No. 1 - Comparison of mean SBP, DBP, BMI and Lipid Profile in Normotensive & Hypertensive Females between the age group 40 to 60 years.

Parameter	Group	N	Mean	Std.deviation	T-Value	P-Value
SBP	Hypertensive	30	156.4000	4. 94522	18.50	0.000
	Normotensive	30	130.2000	5.97350		
DBP	Hypertensive	30	97.2000	4.59885	14.21	0.000
	Normotensive	30	78.6667	5.12824		
BMI	Hypertensive	30	28.1027	2.64505	9.24	0.000
	Normotensive	30	23.0223	1.21311		
WC	Hypertensive	30	101.0000	3.66719	13.25	0.000
	Normotensive	30	86.2667	5.45156		
WHR	Hypertensive	30	0.9887	0.03739	18.41	0.000
	Normotensive	30	0.8500	0.01742		
TC	Hypertensive	30	188.833	15.34900	3.25	0.000
	Normotensive	30	178.7000	7.48861		

TG	Hypertensive	30	197.1333	25.88400	13.06	0.000
	Normotensive	30	134.4000	4.68011		
HDL	Hypertensive	30	32.2000	3.49778	14.21	0.000
	Normotensive	30	49.7333	5.67471		
LDL	Hypertensive	30	173.9000	17.77319	7.64	0.000
	Normotensive	30	147.4000	6.66747		

Table No. 2 - Correlation of SBP, DBP, BMI and Lipid Profile in Normotensive Females between the age group 40 to 60 years.(N=30)

		SBP	DBP	BMI	WC	WHR	TC	TG	HDL	LDL
SBP	Pearson Correlation	1	.662**	.181	-.074	.000	.134	.229	.117	-.219
	Sig(2 Tailed)		.000	.339	.699	1.000	.480	.224	.351	.246
DBP	Pearson Correlation	.662**	1	.115	-.169	-.093	.117	.466**	.002	.004
	Sig(2 Tailed)	.000		.547	.371	.626	.539	.010	.993	.983
BMI	Pearson Correlation	.181	.115	1	-.044	-.413*	-.092	.40	-.107	.018
	Sig(2 Tailed)	.339	.547		.818	.023	.627	.836	.575	.925
WC	Pearson Correlation	-.074	-.169	-.044	1	.399*	.002	-.221	-.296	-.068
	Sig(2 Tailed)	.699	.371	.818		.029	.992	.241	.112	.723
WHR	Pearson Correlation	.000	-.093	-.413*	.399	1	.317	-.178	.216	.238
	Sig(2 Tailed)	1.000	.626	.023	.029		.088	.348	.251	.206
TC	Pearson Correlation	.134	.117	-.092	.002	.317	1	.198	0.87	-.123
	Sig(2 Tailed)	.480	.539	.627	.992	.088		.293	.646	.519
TG	Pearson Correlation	.229	.466*	.040	-.221	-.178	.198	1	-.172	.242
	Sig(2 Tailed)	.224	.010	.836	-.241	.348	.293		.361	.197
HDL	Pearson Correlation	.177	.002	-.107	-.296	.216	.087	-.172	1	-.147
	Sig(2 Tailed)	.351	.993	.575	.112	.251	.646	.361		.440
LDL	Pearson Correlation	-.219	.004	.018	-.068	.238	-.123	.242	-.147	1
	Sig(2 Tailed)	.246	.983	.925	.723	.206	.519	.197	.440	

**Correlation is significant at the 0.01 level (2-Tailed).*Correlation is significant at the 0.05 level (2-Tailed).

Table No. 3 - Correlation of SBP, DBP, BMI and Lipid Profile in Hypertensive Females between the age group 40 to 60 years(N=30).

		SBP	DBP	BMI	WC	WHR	TC	TG	HDL	LDL
SBP	Pearson Correlation	1	.479**	-.194	-.369*	-.146	.324	.327	.326	.301
	Sig(2 Tailed)		.007	.304	.045	.441	.080	.078	.076	.106
DBP	Pearson Correlation	.479**	1	-.301	-.172	-.115	-.283	.519**	.122	.30
	Sig(2 Tailed)	.007		.107	.364	.546	.129	.003	.521	.874
BMI	Pearson Correlation	-.194	-.301	1	-.074	.148	.037	.230	.040	.034
	Sig(2 Tailed)	.304	.107		.699	.435	.845	.222	.834	.857
WC	Pearson Correlation	.369*	-.172	-.074	1	.060	-.429*	.001	-.516**	.195
	Sig(2 Tailed)	.045	.364	.699		.751	.018	.994	.004	.301
WHR	Pearson Correlation	-.146	-.115	.148	.060	1	.177	-.032	-.135	.184
	Sig(2 Tailed)	.441	.546	.435	.751		.350	.867	.477	.330
TC	Pearson Correlation	.324	-.283	.037	-.429*	.177	1	-.155	.340	.319
	Sig(2 Tailed)	.080	.129	.845	.018	.350		.413	.066	.085
TG	Pearson Correlation	.327	.519**	.230	.001	-.032	-.155	1	-.115	-.007
	Sig(2 Tailed)	.078	.003	.222	.994	.867	.413		.544	.970
HDL	Pearson Correlation	.326	.122	.040	-.516**	-.135	.340	-.115	1	.025
	Sig(2 Tailed)	.079	.521	.834	.004	.477	.066	.444		.897
LDL	Pearson Correlation	.301	.030	.034	.195	.184	.319	-.007	.025	1
	Sig(2 Tailed)	.106	.874	.857	.301	.330	.085	.970	.697	

**Correlation is significant at the 0.01 level (2 Tailed)., *Correlation is significant at the 0.05 level(2-Tailed).

DISCUSSION:

Our study shows that waist circumference was significantly increased in hypertensive compared to Normotensive females.

Mokdad AH et al (2000)[6], kuczmarski RJ et al[7], WHO /46(1997)[8] match with our findings which shows that there was significant increase in waist circumference and waist to hip ratio in the females who were suffering from Hypertension.

It is widely accepted that having more than normal BMI is defined as having as a major risk of wide ranges of diseases such as Diabetes, CVD, and certain cancers. The correlation between BP and BMI is explained by increase in body weight and thus BMI is related to increase in body fluid volume, peripheral resistance and cardiac output.

Pouliot MC etal 1994[9] showed that waist circumference (WC), weight to height and waist to hip circumference are better indicators of abdominal obesity and better predictor of CVD[9]. Central obesity has been highlighted as a growing problem where individuals may exhibit a normal BMI but has a disproportionately longer WC[10]. Although BMI has traditionally been the chosen method by which to measure body size in Epidemiological studies, alternative measures such as waist circumference (WC)[11], waist hip ratio (WHR)[12] which reflect central obesity have been reflected to be superior to BMI in predicting CVD risk.

CONCLUSION:

Central obesity is a stronger correlation factor than BMI for hypertension. This study indicates that most overweight and obese females were hypertensives. Age is also the important factor that affect systolic and diastolic BP. Increase in body weight and waist circumference are most important factors affecting BP than BMI. This study suggests that earlier prevention of excessive weight gain, lifestyle modification is needed to reduce hypertension. Epidemiological studies are needed to indicate the relation between central obesity and hypertension.

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