

Relation of Body Mass Index with Lipid Profile and Blood Pressure in Healthy Female of Lower Socioeconomic Group, in Kaduna Northern Nigeria

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Abstracts: In Nigeria 30 million people suffer from this hypertension which is the main risk factor for stroke, and renal failure. Elevated levels of triglyceride, cholesterol and LDL-C are documented as risk factors for atherogenesis. LDL-C in its oxidized or acetylated form has been identified as a major atherogenic particle. Fifty two women between 19-32 years of age attending Primary Health Care center (PHC) in Kaduna and its environment were used in this study. Their height, weight and systolic and diastolic blood pressures were recorded. Body Mass Index (BMI) was calculated by using their height (m²) and weight (kg). On the basis of BMI, all participants were divided into three groups that is under weight whose BMI was less than 19 kg / m², normal whose BMI was between 19 and 26 kg / m² and overweight whose BMI was more than 26 kg / m². The mean BMI of the three groups in the 52 participants was 150.1 mg/dl ±31.7, mean LDL-C was 91.6 mg/dl ±22.6, mean HDL-C was 39.7 mg/dl ±9.1 and mean triglycerides were 93.9 mg/dl ±41.6. Mean systolic blood pressure was 114.1 mmHg ±11.8 and mean diastolic blood pressure was 74.1 mmHg ±7.9. There were significant differences in mean serum HDL-C, triglycerides, systolic and diastolic blood pressure among three BMI groups (P<0.05) but none in mean serum cholesterol and LDL-C. No significant correlation was found between any of the lipid profile variables and blood pressure variables with BMI. The importance of this finding is to enable "care-givers" in hypertension pay more attention to the control of obesity so that several complications associated with it might be prevented.

Key words: Hypertension, body mass index and cholesterol

INTRODUCTION

Blood cholesterol, Obesity and high Blood pressure have been identified as risk factors in developing hypertension Jones *et al.* (1992) People with Obesity and high blood pressure are also more likely to have lipid abnormality than those with normal blood pressure Wannarinthee *et al.* (1998). Furthermore blood pressure is strongly related to body weight and control of obesity is a critical component of prevention and control of hypertension Kummayinka (1997). Clinical trials have also suggested a reduction in the incidence of Ischemic heart disease by lowering serum cholesterol levels.

Hypertension is now a global epidemic affecting 1.5 billion people world wide and claiming about 7 million lives every year. In Nigeria 30 million people suffer from this conditions which is the main risk factor for stroke, and renal failure. In Nigeria, as well as in many other countries in Africa the situation is complicated even further by wide spread presence of substandard or fake drugs in the markets which make hypertension and hypercholesterolemia even more deadly silent killers, yet awareness about hypertension and hypercholesterolemia very poor among the Nigerian public Daily Trust (2009).

The prevalence of hypertension is probably on the increase in Nigeria where adoption of western lifestyles and the stress of urbanization both of which are expected to increase the morbidity associated with unhealthy lifestyles are not on the decline FMOH (2009). Genetic and environmental factors are reported to play a key role in IHD, 90% of which are better classified as idiopathic. Hypertension in adults has a high impact on the economy and on the quality of life of individuals with important implications for resource expenditures Jones *et al.* (1992).

Elevated levels of triglyceride, cholesterol and LDL-C are documented as risk factors for atherogenesis Lipid Research Clinic Program (1984). LDL-C in its oxidized or acetylated form has been identified as a major atherogenic particle; as it not only load macrophages with cholesterol for the formation of foam cells but also because it is chemotactic for circulating monocytes, is cytotoxic and can adversely alter coagulation pathways Fogelman *et al.* (1980). The blood level of HDL-C in contrast bears an inverse relationship of the risk of atherosclerosis and coronary heart disease that is higher the level, smaller the risk Witztum *et al.* (1991) and Palinski *et al.* (1989).

Different plasma lipids vary significantly in various population groups due to difference in geographical, cultural Hart *et al.* (1997) economical, social conditions Vartiainen *et al.* (1997), dietary habits and genetic makeup. Age and gender differences also affect serum lipids considerably Malik *et al.* (1995) and Shahid *et al.* (1985). This study was conducted to assess serum lipids and blood pressure among non pregnant normotensive women belonging to a lower socioeconomic group, in Kaduna Northern Nigeria.

MATERIALS AND METHODS

Fifty two women between 19-32 years of age attending Primary Health Care center (PHC) in Kaduna and its environment were used in this study between April and July 2009. Their height, weight and systolic and diastolic blood pressures were recorded. Body Mass Index (BMI) was calculated by using their height (m^2) and weight (kg). On the basis of BMI, all participants were divided into three groups that is under weight whose BMI was less than $19 \text{ kg} / m^2$, normal whose BMI was between 19 and $26 \text{ kg} / m^2$ and overweight whose BMI was more than $26 \text{ kg} / m^2$. After twelve hours fast, serum samples were collected and total cholesterol, HDL-C, LDL-C and triglycerides were estimated on photometer 5010 and 911-Hitachi auto-analyzer. Statistical analysis was done on Epi-Info-6. The means of the three groups were compared by ANOVA at the significance level of $\alpha = 0.05$. Correlation coefficient was determined for the dependent variables of lipid profile and blood pressure with BMI (in kg/m^2) as the independent variable.

RESULTS

The height, weight, mean systolic and diastolic blood pressure and lipid profile levels were available for all the 52 women included in the study.

The mean BMI of the three groups in the 52 participants was $150.1 \text{ mg}/\text{dl} \pm 31.7$, mean LDL-C was $91.6 \text{ mg}/\text{dl} \pm 22.6$, mean HDL-C was $39.7 \text{ mg}/\text{dl} \pm 9.1$ and mean triglycerides were $93.9 \text{ mg}/\text{dl} \pm 41.6$. Mean systolic blood pressure was $114.1 \text{ mmHg} \pm 11.8$ and mean diastolic blood pressure was $74.1 \text{ mmHg} \pm 7.9$

Among 52, 23 were underweight that is their BMI was less than $19 \text{ kg}/m^2$, 17 were normal that is their BMI was between $19 \text{ kg}/m^2$ and $26 \text{ kg}/m^2$ and 12 were overweight that is their BMI was more than $26 \text{ kg}/m^2$. Mean values of serum cholesterol, LDL-C, HDL-C, triglycerides, systolic and diastolic blood pressure with their standard deviations according to three BMI groups are given in Table 1. There were significant differences in mean serum HDL-C, triglycerides, systolic and diastolic blood pressure among three BMI groups ($P < 0.05$) but none in mean serum cholesterol and LDL-C. No significant correlation was found between any of the lipid profile variables and blood pressure variables with BMI.

In this study, comparison of three BMI groups (underweight, normal and overweight) with regards to serum total cholesterol, LDL-C, HDL-C, triglycerides, mean systolic and diastolic blood pressure were also examined. Finding of this study shows there is positive and significant association between BMI and triglycerides which is similar to the findings of Donahue *et al.* (1985) and Prineas *et al.* (1980)., this study also found no significant difference ($P > 0.05$) in serum total cholesterol and LDL-C but there is significant difference ($p < 0.05$) in mean serum HDL-C, triglycerides, mean systolic and mean diastolic blood pressure in three BMI groups.

The percentage of subjects whose BMI was > 30 in this study was 23% which is similar to the findings of Yekeen *et al.* (2003). who found 33%. Okosun *et al.* (1999) had suggested that the prevalence of hypertension was closely linked to abdominal adiposity; however since waist-hip ratio was not measured in this study, it is difficult to confirm their observation with the findings of the present study. Ezenwaka *et al.* (1997) had also reported a higher prevalence of obesity and high blood pressure in women and in urban settings.

DISCUSSION

It has been estimated that risk of hypertension is 35% to 55% less in adults and normal weight as compared to obese adults Manson *et al.* (1992). However, the influence of obesity on cardiovascular risk begins before adulthood and overweight during adolescence is associated with an increased risk of coronary heart disease in male and female subjects DiPietro *et al.* (1984) as 23.1% of our total study populations are overweight, so the number of at-risk individuals is not much higher.

As the prevalence of hypertension in several population studies has overshot the 10% trigger-point, it is necessary to activate intervention to lower this rate. The control of dietary energy intake, sodium consumption and inactivity are areas of potential interventions. So far the prevalence of coronary heart disease is still low in Africa; paradoxically the risk factors of hypertension, obesity and high serum cholesterol associated with coronary heart disease are emerging.

CONCLUSION

The importance of this finding is to enable "care-givers" in hypertension pay more attention to the control of obesity so that several complications associated with it might be prevented. The risk factors of hypertension already seen in several of the obese patients can be lowered by dietary intervention, as well as other medical control of hypertension. It is clear that the population prevalence of obesity, hypertension and hyper-cholesterol if known will be useful in planning interventions. Therefore, strategies designed to limit cardiovascular risk should address weight reduction.

Table 1: Cholesterol, LDL-C, HDL-C, triglycerides, systolic blood pressure and diastolic blood pressure according to three BMI groups (Means \pm SD)

Variables	Under weight(BMI<19kg/m ²)	Normal(BMI19-26kg/m ²)	Overweight(BMI>26kg/m ²)	p-value*
Cholesterol(mg/dl)	145.2 \pm 30.4	149.7 \pm 31.7	155.5 \pm 31.3	0.23
LDL-C(mg/dl)	87.3 \pm 29.2	92.2 \pm 22.6	95.4 \pm 27.5	0.26
HDL-C(mg/dl)	41.9 \pm 9.3	39.7 \pm 9.1	37.7 \pm 6.9	0.04
Triglycerides(mg/dl)	80.2 \pm 28.6	89.2 \pm 41.6	112.2 \pm 58.0	0.001
SBP(mmHg)	108.6 \pm 14.0	113.6 \pm 11.8	120.1 \pm 16.5	<0.001
DBP(mmHg)	71.7 \pm 8.3	74.5 \pm 7.9	76.0 \pm 7.8	0.01

*p-value calculated by ANOVA comparing the means of the variables for the three BMI groups

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