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Studies of Apo B-100 As Risk Indicator Of Cardiovascular Diseases Based On Body Mass Index In Kebbi State.

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ABSTRACT

Dyslipidaemia and altered Apolipoprotein level had been associated with obesity (BMI > 30kg/m^2). Increased synthesis of TG in obese stimulates Apo B-100 production that causes excess formation of VLDL-TG and VLDL-Apo B-100. High plasma level of Apo -100 is strongly associated with increased risk of coronary Heart Disease and reflects increased in TG as well as the number of small density lipoprotein particles (VLDL-C and LDL-C). This study was therefore designed to evaluate lipid profile and Apo B-100 in obese diabetic/hypertensive patients. This case study was carried out at Department of chemical pathology at Sir Yahaya Memorial Hospital Birnin Kebbi, Kebbi State, Nigeria which involved one hundred and fifty (150) apparently healthy subjects and one hundred and fifty (150) diabetic/hypertensive patients. Biochemical parameters measured in this study were fasting blood glucose, lipid profile (Total Cholesterol (TC), Triglycerides (TG), Low Density Lipoprotein Cholesterol (LDL-C), High Density Lipoprotein Cholesterol (HDL-C) and Apo B-100. Obesity is expressed in terms of BMI (kg/m^2). The result of this study revealed hat the serum Apo B-100 increases significantly ($p < 0.05$) as the BMI increases in the diabetic/hypertensive persons compared with the apparently healthy persons. The study also observed that as BMI increases in the diabetic/hypertensives, there was a reciprocal increase in Apo B-100 as well as rise in lipid profile (TC, LDL-C, HDL-C and TG). This therefore is an indication that a rise in Apo B-100 could serve as an indicator of cardiovascular disease risk in diabetics/hypertensive as the BMI increases.

Keywords: Apo B-100, BMI, CAD, LDL-C, Obese, TG, VLDL-C.

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1.0 INTRODUCTION

Dyslipidaemia alongside hypertension, obesity and diabetes mellitus are components of metabolic syndrome and have been established as a risk factor for cardiovascular diseases.

The prevalence and pattern of dyslipidaemia varies depending on the population, the geographical location, and socio-economic development of individuals[1]. Caucasians generally have higher mean total cholesterol level than do other population of Asians or Africans[2]. The proportion of individuals aged ≥ 25 years with hypercholesterolaemia is numerous in Western African countries such as Nigeria and Sierrialeone this is relatively lower (15-20%) when compared with global averages[3].

. Overweight and obesity have reached epidemic proportion, not only in developed but also in developing countries[4]. In low and middle income countries where under nutrition is still highly prevalent, overweight and obesity especially among women is a public health problem[5]. WHO and FAO reviewed the evidence on the relationship between obesity and risk of cardiovascular disease and the results revealed that overweight and obesity are major risk of coronary heart disease[6].

Excess energy food intake is one of the key contributors to obesity[7]. Studies in developed countries relates to sugar consumption, primarily in the form of sugar sweetened beverages including soft drinks, juice drinks ,energy and vitamin drinks from showed that up to 5.5% of dietary calories comes from sugar sweetened beverages in the United States. This study has led to the American Heart Association (AHA) to recommend an upper limit of 100 calories/day of sugar intake for men and 150 calories/day for women. In some developing countries, consumption of sugar sweetened beverages has increased dramatically in recent years[7]. Due to excess calorie and sugar content of sweetened beverages, increasing consumption of these products may have important implication for obesity[7].

2.0 SAMPLING AND METHODS

This study was carried out at Sir Yahaya Memorial Hospital Birninin Kebbi, Nigeria,in the Department of Chemical Pathology. One hundred and fifty (150) diabetic/hypertensive patients and one hundred and fifty (150) apparently healthy individuals were investigated. The weight and height of individuals were measured in meters and in kilograms respectively. The body mass index (BMI) was calculated using the formular:

BMI = Body Weight in Kilograms / Height (m^2).

History of Nephrotic syndrome, acute or chronic renal failure, thyroid disorder and acute infections were taken. The patients with either the history or have ever been diagnosed with this mentioned disorder were excluded from the study. Again, the patients noted taking medication to reduce their lipid level (Lipid lowering agents), oral contraceptives, hormone

replacement therapy and steroid were also excluded .For the choosen patients, blood pressure were taken, cholesterol was estimated by enzymatic glucose oxidase method[9] using the Random Assay kit. The HDL-Cholesterol was estimated by precipitation method using fortress Assay kit[10]. Serum Low Density Lipoprotein Cholesterol (LDL-C) was calculated using Friedwald formula[11]: The Serum Very Low Density Lipoprotein Cholesterol was also determined using Friedwald method.. Triglycerides was estimated by fortress diagnostic assay kit[12.]. Apolipoprotein B-100 was estimated by the turbidimetry assay method [13]with fortress diagnostic assay kit. The World Health Organisation[14,15,16] reference ranges of BMI is shown in table 1 below.

Table.2: Reference ranges of Body Mass Index(BMI).

Parameters	REFERENCE RANGES
Body Mass Index	
Underweight	<18.49 kg/m²
Normal weight	18.50 - 24.99 kg/m²
Overweight	25.00 - 29.99 kg/m²
Obesity class 1	30.00 - 34.99 kg/m²
Obesity class 11	35.00 – 39.00kg/m²
Obesity class 111	≥40.00 kg/m².

Data generated were expressed as mean ± S.D. Statistical difference between means of the subject groups were analysed using one-way analysis of variance (ANOVA) using SPSS 21. Value that gave $P < 0.05$ was considered statistically significant.

3.0 RESULTS : The results of Apo B-100 and lipid profile of Kebbi State based on BMI was presented in the table 3.0 as shown below.

Table 3.0: Apo B-100 and lipid profile of Kebbi State based on BMI.

AH- Apparently Healthy. D/H- Diabetic/Hypertensive. (*P <. 0.05) Significantly different from apparently healthy subjects. (^P < 0.05) Significantly different fromdiabetic/hypertensive. Values were expressed as mean ± S.D. HDL-C-High Density Lipoprotein Cholesterol. LDL-C- Low Density Lipoprotein Cholesterol . VLDL-C-Very Low Density lipoprotein Cholesterol. TG- Triglycerides.

Parameters		BMI(kg/m²) <18	18.50 -24.99	25.00 -29.99	30.00-34.99	>35
Apo B-100 (mg/dl)	AH	83.12 ± 13.50	88.77± 14.35	88.92 ±12.57	88.94 ±12.11	88.98±15.9
	D/H	97.27 ±11.40*	98.90 ± 9.74*	99.85 ±9.29*	101.08±11.*	104.28±10*
TC (mmol/l)	AH	4.14 ± 0.62	4.35 ± 0.86	4.57 ± 0.79	4.89 ± 0.91	4.98 ± 1.25
	D/H	7.29 ± 0.99*	7.36 ± 1.06*	7.38 ± 0.94*	7.55 ± 1.26*	7.62 ±0.81*
LDL-C (mmol/l)	AH	1.88 ± 0.80	1.90 ± 0.71	2.01 ± 0.89	2.12 ± 0.94	3.99 ± 6.64
	D/H	5.20 ± 1.18*	5.61 ± 1.10*	5.76 ± 0.99*	5.83 ±1.36*	5.97 ±1.09*
HDL-C (mmol/l)	AH	1.66 ± 0.57^	1.89 ± 0.66^	1.96 ± 0.61^	2.23 ± 0.74^	2.15 ±1.03^
	D/H	0.68 ± 0.44	0.77 ± 0.26	0.80 ± 0.29	0.84 ± 0.28	0.82 ± 0.25
VLDL-C (mmol/l)	AH	0.52 ± 0.13	0.54 ± 0.16	0.56 ± 0.14	0.58 ± 0.09	0.62 ± 0.12
	D/H	1.29 ± 0.32*	1.33 ± 0.31*	1.37 ± 0.29*	1.42 ± 0.30*	1.46 ±0.38*
TG (mmol/l)	AH	1.16 ± 0.29	1.19 ± 0.34	1.23 ± 0.31	1.27 ± 0.18	1.30 ± 0.26
	D/H	3.10 ± 0.27*	3.16 ± 0.72*	3.22 ± 0.79*	3.44 ± 0.62*	3.53 ±0.64*

4.0 DISCUSSION OF RESULTS

The mean serum Apo B -100 was higher and significant ($P < 0.05$) in diabetic/hypetensive subjects as the BMI increases compared to the apparently healthy subjects. Furthermore, the serum TC, LDL-C, VLDL-C and TG increased significantly ($P < 0.05$) as the BMI increases in diabetic/hypertensive subjects compared to the apparently healthy subjects. However, the HDL-C increases significantly ($P < 0.05$) in the apparently healthy subjects as the BMI increases compared to the diabetic/hypertensive subjects.

The Apo B-100 is a large hydrophobic, non exchangeable apolipoprotein playing an essential role in formation of triglycerol rich lipoproteins[17]. Metabolism of Apo B-100 is hampered in Obesity[18]. Measurement of Apo B-100 represents the total burden of the main lipoprotein particles involved in atherosclerotic process. Increased synthesis of TG in obese stimulate apolipoprotein B (Apo B) production that causes excess formation of VLDL-TG and VLDL-Apo B. High plasma level[15]. Apo B-100 is strongly associated with increased risk of coronary artery disease and reflects increased in TG as well as the number of small density lipoprotein particles (VLDL, LDL). In this study, the serum Apo B-100 increases significantly ($P < 0.05$) as the BMI increases in the diabetics/hypertensive subjects compared to the apparently

healthy subjects as shown in Table 3.0. Measurement of Apo B-100 represents the total burden of the main lipoprotein particles involved in the atherosclerotic process. Increased synthesis of TG in obese stimulate Apo B-100 production that causes formation of VLDL-TG and VLDL-Apo B[15]. In the present study, a significantly raised Apo B-100 level in diabetic/hypertensive patients is seen as the BMI increases compared to the apparently healthy subjects ($p < 0.05$). This is similar to the studies done by Sucheta *et al*.,(2017)[19], Taskinem *et al*., 2011[20], and Panagiotakos *et al*., 2008[21].

CONCLUSION

The result of this analysis revealed that the serum Apo B-100 was significantly increased as the BMI increases in diabetic/hypertensive patients compared to the apparently healthy persons. This is an indication that these patients were subjected to atherogenesis and consequently cardiovascular diseases. This study therefore identifies pro-atherogenic states with increasing BMI as elucidated by a rise of lipid parameters and Apo B-100 levels. Further study is therefore suggested using these parameters to ascertain the relationship between Apo B-100 and BMI.

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