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LIPID PROFILE OF APPARENTLY HEALTHY GERIATRICS IN EKPOMA, EDO STATE, NIGERIA.

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ABSTRACT

Lipids abnormality is one of the major risk factors of coronary artery disease which can be modified either by proper life-style changes or medical management or by both. Study of lipid profile in general population is important in determining certain metabolic disorders and the distribution of different lipid levels in the society. In this study, lipid pattern of geriatrics in Ekpoma, Edo State, Nigeria were assessed on a total of 90 individuals comprising of 60 apparently healthy aged (60 above) as test and 30 apparently young persons of age (20 - 30) as control subjects using standard laboratory procedures (enzymatic methods). Results which are presented as mean ± standard deviation showed significantly higher ($P<0.05$) plasma total cholesterol (CHL) (4.78±0.97), triglycerides (TG) (1.84±0.49), high density lipoprotein (HDL) (2.06±0.64) and very low density lipoprotein (VLDL) (0.84±0.22) respectively of geriatrics of age 60 and above (test) when compared to those of young persons of age 20 - 30 (control) (3.90±1.10; 1.33±0.52; 1.66±0.74; 0.84±0.22) respectively. There was an insignificant difference ($p>0.05$) in low density lipoprotein (LDL) in both groups. These findings indicates that age could be one of the factors that affect the lipid profile of apparently healthy geriatrics and could be put into consideration of metabolic conditions associated with lipids.

KEYWORDS: Dyslipidaemia, Coronary heart disease, atherosclerosis, lipid profile, aging, sex.

INTRODUCTION

The increase in the number of older people represents a profound demographic revolution with potential for impact that will exceed even that of the Industrial Revolution (United Nations, 2000). The proportion of the world's population over the age of 60 years doubled in the last century and will increase 2- to 3-fold during the first century of this millennium (United Nations, 2000). Although aging has been considered largely a crisis for the global economy and health care services (Jacobzone, 2000; Watts, 2001), the potential capacity for excellent health in older age, allowing older people to make a positive contribution to society, should be recognized (United Nations, 2000).

Aging is a universal process whose manifestations are familiar and unambiguous and old age in humans and even animals can be recognized readily after minimal assessment. Despite this, an accepted definition of aging and a detailed understanding of the biological mechanisms underpinning aging are elusive. Aging has been defined as the progressive loss of function accompanied by decreasing fertility and increasing mortality and disability (Kirkwood and Austad, 2000).

The prevalence of markers of disease, disability consequent on disease and mortality rate increases exponentially in old age (Geiss *et al.*, 1993; Devesa *et al.*, 1999; American Heart Association, 2002). Consequently, old age is considered to be the major risk factor for many, if not most, diseases in developed countries. For example, representative percentages of people aged 60 years or older with various common chronic diseases are arthritis, 58%; hypertension, 45%; heart disease, 21%; cancer, 19%; diabetes, 12%; and stroke, 9% (Federal Interagency Forum on Aging-Related Statistics, 2000).

Biological lipids are chemically diverse group of compounds, the common and defining feature of which is their insolubility in water. Fat and oil are the principal stored forms of energy in many organisms. Phospholipids and sterols are major structural elements of biological membranes. Other lipids, although present in relatively small quantities, play crucial roles as enzyme cofactors, electron carriers, light absorbing pigments, hydrophobic anchor for proteins 'chaperons' to help membrane protein fold, emulsifying agents in the

digestive tract, hormones and intracellular messengers (Libby, 2005).

There are four main classes of lipids. These are cholesterol and its ester, triglycerides, phospholipids and fatty acids and each class is present in plasma and cell (Whitby *et al.*, 1978). To be able to perform their physiological functions, lipids must be capable of movement from one cell or tissue to another in aqueous medium. Lipids are bound to specific proteins to form lipoproteins which provide solubility in the aqueous environment and can be metabolized (Ochei and Kolhatkar, 2000). Ultracentrifugation separates lipoproteins on the basis of their density into very low density lipoprotein (VLDL), low density lipoprotein (LDL) and high density lipoprotein (HDL), with the exception of chylomycrons which are responsible for the visual opalescence of the plasma (Ochei and kolhatkar, 2000). The lipids and lipoproteins which are central to the metabolism of the cell have become increasingly important in association with coronary heart disease (CHD) (Hevonoja *et al.*, 2000).

Coronary heart disease (CHD) is a major health problem worldwide. The major pathogenetic mechanism underlying CHD is atherosclerosis (Libby, 2005). Atherosclerosis is a chronic progressive disorder which remains asymptomatic for a long time. It simultaneously affects coronary, carotids, aorta and other vessels in the body. Common risk factors for the development of atherosclerosis are advancing age, ethnicity, hypertension, diabetes and metabolic syndrome, dietary habits, obesity and physical activity (Koba et al., 2002).

MATERIALS AND METHODS

Subjects

The test population comprised of Sixty (60) apparently healthy subjects (test) of age 60 and above (27 males and 33 females) and thirty (30) apparently healthy subjects (control) of age 20–30 (15 males and 15 females) selected among the population of Ekpoma, Edo State, Nigeria were recruited for this study. Ekpoma is located at latitude 6.75^{o}N and longitude 6.13^{o}E with population of 61,870 (World Gazetteer, 2007).

SAMPLE COLLECTION AND SEPARATION

Collection

After an informed consent was sought, five milliliters (5 ml) of venous blood were collected by standard venepuncture technique from the subjects using lithium heparin evacuated blood tubes (vacutainers).

Separation

The blood samples were spun in the centrifuge at 3000rpm for 5minutes. The plasma was separated from the cells with the aid of a Pasteur pipette and stored frozen prior to analysis.

ANALYTICAL METHOD

Plasma total cholesterol was determined using the method described by Richmond, (1973), triglycerides determined using the colourimetric method of Trinder, (1969), high density lipoprotein was determined using the method described by Lopes-Virella, (1972) and low density lipoprotein was determined using Friedewald formular (Friedewald *et al*., 1972).

Statistical analysis

The data obtained were analysed statistically, the mean and standard deviation values were calculated in each case. The Student's t- test statistical method was employed for comparison using a computer programme (SPSS) for window release 16.0. A p-value equal or less than 0.05 ($P \leq 0.05$) was considered statistically significant at 95% confidence level.

RESULTS

The analysis showed a significant increase ($p<0.05$) in plasma total cholesterol (4.78±0.97mmol/l), triglyceride (1.84±0.49mmol/l), high density lipoproteins (2.06±0.64mmol/l) and very low density lipoproteins (0.84±0.22mmol/l) in geriatrics compared to control subjects of values of 3.90±1.10mmol/l, 1.33±0.52mmol/l, 1.66±0.74mmol/l and 0.60±0.24mmol/l respectively. There was an insignificant increase ($p>0.05$) in the value of low density lipoproteins (1.88±0.70mmol/l) of geriatrics when compared with the control subjects of 1.73±1.09mmol/l (Table 1).

Total cholesterol (5.27±0.66mmol/l), triglyceride (2.02±0.38mmol/l), high density lipoproteins (2.49±0.41mmol/l) and very low density lipoproteins (0.92±0.17mmol/l) respectively were significantly higher ($p<0.05$) in female geriatrics compared to male geriatrics (4.17±0.95mmol/l, 1.63±0.54mmol/l, 1.53±0.47mmol/l and 0.72±0.24mmol/l respectively. While the low density lipoproteins showed no significant difference in both sexes (1.87±0.63mmol/l for males and 1.89±0.78mmol/l for females). Despite no significant difference in both sexes, the male geriatrics presented higher level of low density lipoproteins (Table 2).

All the parameters (total cholesterol, triglycerides, high density lipoproteins, low density lipoproteins and very low density lipoproteins respectively) in male and female geriatrics were significantly higher ($p<0.05$) compared to the corresponding male and female control subjects (Table 3 and 4).

Table 1: Plasma lipid profile (CHL, TG, HDL, LDL and VLDL) levels in geriatrics and the control subjects.

Parameter (Mmol/l)	Control (n=30)	Geriatrics (n=60)	t- value	p- value
CHL	3.90±1.10	4.78±0.97*	5.11	p<0.05
TG	1.33±0.52	1.84±0.49*	5.83	P<0.05
HDL	1.66±0.74	2.06±0.64*	3.61	P<0.05

LDL	1.73±1.09	1.88±0.70	1.13	P>0.05
VLDL	0.60±0.24	0.84±0.22*	5.99	P<0.05

Values are Mean±Standard deviation. CHL: Total cholesterol; TG: Triglycerides; HDL; High density lipoprotein; LDL: Low density lipoprotein; VLDL: Very low density lipoprotein; n: frequency; Values in a row and in different column having superscript are significantly different (p<0.05).

Table 2: Plasma lipid profile (CHL, TG, HDL, LDL and VLDL) levels in male geriatrics and female geriatrics

Parameter (Mmol/l)	Female (n=33)	Male (n=27)	t- value	p- value
CHL	5.27±0.66*	4.17±0.95	4.87	p<0.05
TG	2.02±0.38*	1.63±0.54	3.37	P<0.05
HDL	2.49±0.41*	1.53±0.47	6.34	P<0.05
LDL	1.87±0.63	1.89±0.78	-0.09	P>0.05
VLDL	0.92±0.17*	0.72±0.24	4.11	P<0.05

Values are Mean±Standard deviation. CHL: Total cholesterol; TG: Triglycerides; HDL; High density lipoprotein; LDL: Low density lipoprotein; VLDL: Very low density lipoprotein; n: frequency; Values in a row and in different column having superscript are significantly different (p<0.05).

Table 3: Plasma lipid profile (CHL, TG, HDL, LDL and VLDL) levels in male geriatrics and male control

Parameter (Mmol/l)	Male geriatrics (n=27)	Male Control(n=15)	t- value	p- value
CHL	4.17±0.95	3.76±1.29	0.12	p>0.05
TG	1.63±0.54*	1.21±0.58	3.05	P<0.05
HDL	1.53±0.47	1.59±0.61	-0.47	P<0.05
LDL	1.89±0.79	1.61±1.31	1.18	P>0.05
VLDL	0.74±0.24*	0.55±0.26	3.05	P<0.05

Values are Mean±Standard deviation. CHL: Total cholesterol; TG: Triglycerides; HDL; High density lipoprotein; LDL: Low density lipoprotein; VLDL: Very low density lipoprotein; n: frequency; Values in a row and in different column having superscript are significantly different (p<0.05).

Table 4: Plasma lipid profile (CHL, TG, HDL, LDL and VLDL) levels in female geriatrics and female ccontrol

Parameter (Mmol/l)	Female geriatrics (n=33)	Female control (n=15)	t- value	p- value
CHL	5.27±0.66*	4.05±0.89	6.29	p<0.05
TG	2.02±0.38*	1.44±0.45	5.72	P<0.05
HDL	2.49±0.41*	1.73±0.87	3.32	P<0.05
LDL	1.87±0.63	1.85±0.83	0.14	P>0.05
VLDL	0.92±0.17*	0.65±0.20	5.84	P<0.05

Values are Mean±Standard deviation. CHL: Total cholesterol; TG: Triglycerides; HDL; High density lipoprotein; LDL: Low density lipoprotein; VLDL: Very low density lipoprotein; n: frequency; Values in a row and in different column having superscript are significantly different (p<0.05).

DISCUSSION

Dyslipidaemia is one of the major risk factors of coronary artery disease which can be modified either by proper life style changes or medical management or by the combination of both. Study of lipid pattern in general population is important to assess the lipid profile and the distribution of different lipid level in society. From the present study, it was observed that there were alterations in the plasma concentrations of lipid and lipoproteins in apparently healthy geriatrics when compared with apparently healthy young adults (20-30 years). There were significantly higher levels of total cholesterol, triglyceride, high density lipoproteins and very low density lipoproteins, (p<0.05). There was no significant difference (p>0.05) in the LDL level of both groups. These findings are in agreement with the work of Nakanishi *et al.*, (1997), Karki *et al.*, (2004), Hirai *et al.*, (2004) and Limbu *et al.*, (2008), who also reported higher plasma total cholesterol, Triglyceride, High Density Lipoproteins, Low Density Lipoproteins and Very Low Density Lipoproteins in apparently healthy individuals of age 60 years and above in separate studies in Nepal. This present study showed that, although there was significantly higher levels of total cholesterol and triglyceride (indicators of dyslipidaemia) in the population studied, the people of the area are not at risk of developing coronary heart diseases because of the significant increase in the High Density Lipoproteins level which continually scavenge these indicators.

The pronounced sex differences in lipids and lipoproteins values have been observed in many studies. The values are consistently higher in women of all ages after adolescence and of a magnitude that may play some part in explaining the sex difference in incidence and mortality of coronary heart disease (Beaglehole *et al.*, 1980). From this study, it was observed that there is alteration in the lipid profile of apparently healthy female geriatrics when compared to their male counterpart. There was a significant increase in total cholesterol (p<0.05), triglyceride (p<0.05), high density lipoprotein (p<0.05) and very low density lipoprotein (p<0.05) but

low density lipoprotein was insignificantly reduced. A study by Shabita *et al*., (1987) had suggested a strong association between female hormones and serum lipid metabolism. Among these female hormones, oestrogen has been known to have beneficial effects on lipid metabolism. The work of Arca et al. (1994), showed that; with advancing age, the ovaries fail to produce adequate amount of oestrogen and progesterone. This reduction in oestrogen level exert an unfavorable effect on lipid metabolism thereby causing increase in lipid profile of female geriatrics as observed in this study.

From this study, it was also observed that there was increase in the lipid profile of female apparently healthy geriatrics when compared to the female control subjects. There were significantly higher levels of Total cholesterol, Triglycerides, High Density Lipoproteins and Very Low Density Lipoproteins, ($p<0.05$) when compared with female control subjects. These findings are in partial agreement with the reports of Berg *et al.*, (2004), Damodaran *et al.*, (2006) and Usoro *et al.*, (2006) who in their various studies on post menopausal women observed increase in the levels of total cholesterol, triglycerides but low level of high density lipoprotein when compared with pre- menopausal women. But the significant increase in high density lipoproteins (HDL) ($p<0.05$) observed in this study is in agreement with the work done by Igweh et al., (2005) who also observed increase in high density lipoprotein in post menopausal women in their separate studies. The increase in the level of HDL may be of beneficial effect to female geriatrics in Ekpoma because epidemiological studies have suggested that increasing level of HDL may reduce the development of atherosclerosis (Rossouw, 1990). Although in this present study, there was an increased in the level of low density lipoproteins (LDL) in female geriatrics, it was not statistically significant ($p>0.05$) unlike those of Usoro *et al*., (2006) and Osakue, (2013). This observation has been reported in the work of Koba et al., (2002) that in post menopause, the ovarian stroma continue to secrete androgen in a little content and a proportion of androgen from ovary and adrenal cortex is converted peripherally into oestrogen so that not all post menopausal women are oestrogen deficient.

CONCLUSION

Conclusively, the results generated in this study have shown that age, sex and hormonal changes associated with advancing age are factors that affect the lipid profile of apparently healthy geriatrics. The high level of high density lipoprotein and non-significant high level of low density lipoprotein implies that the subjects are not at risk of cardiovascular disease since high density lipoprotein is cardio-protective.

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