Serum lipid Profile and Nutritional Status of the Hypertensive Outpatients in University College Hospital, Ibadan

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Abstract

Background: Dyslipidaemia among hypertensive patients increases risks of cardiovascular morbidity and mortality. Nutritional status of the patients relates to the clinical diagnosis in confirming the cause of their ailment. This study aims to evaluate the lipid profile and its relationship with nutritional status of hypertensive outpatients attending University College Hospital in Ibadan.

Methodology: This was a descriptive cross-sectional study involving the fifty-five (55) alternative hypertensive outpatients (32 females and 23 males) attending cardiology clinics of Medical Outpatients in University College Hospital, Ibadan, Oyo State, Nigeria. A semi-structured, interviewer-administered questionnaire was used to obtain patients’ socio-economic data. The mean of the last four (4) blood pressure readings and lipid profile of the patients were obtained from their hospital records. Anthropometric parameters, weight (kg), height (m), waist and hip circumferences of the patients were assessed. Descriptive and inferential statistics were employed in data analysis. Level of significance was placed at p<0.05.

Results: The mean age of the patients was 56.7±12.3. Less than half (45.5%) of the patients were between the age 50-64 years. The mean BMI of the patients was 28.7±6.12 (kg/m²). A large number (36.4%) of patients were found to be overweight, (34.5%) were obese and (29.1%) had normal weight. There were more (46.9%) female patients obese than male patients. Large number (73.9%) male and (84.4%) female patients had waist-hip ratio above normal cut-off points for both sexes. Male patients had higher mean low lipoprotein, high density lipoprotein and triglycerides than female counterparts while female patients had higher mean total cholesterol than their male counterparts. A significant difference was observed in total cholesterol and low density lipoprotein profile between the male and...
female patients (p<0.05). A positive correlation between hypertension and waist-hip ratio, and serum total cholesterol was also observed only among the male patients.

**Conclusion:** Many of the patients were overweight and obese. Most of them suffered from diabetes mellitus which they were not aware of. Large numbers of the patients lived a sedentary life. There was raised serum total cholesterol, and decreased high density lipoprotein especially among the patients.

**Keywords:** Lipid profile; Nutrition status; Hypertension; Outpatients

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**Abbreviations:** VLDL-C: Very-Low-Density Lipoprotein Cholesterol; HDL-C: High-Density Lipoprotein Cholesterol; TG: Triglycerides; TC: Total Cholesterol; SPSS: Statistical Package for Social Science; NCEP: American National Cholesterol Education Program; HDL: High Density Lipoprotein; LDL: Low Density Lipoprotein.

**Introduction**

Hypertension is one of the chronic non-communicable diseases which pose public health challenge in developing countries especially among the black race where it is most prevalent [1]. It is the number one cardiovascular disease which affects approximately 1 billion people globally and it accounts for about 7.5 million deaths annually, which is about 12.8% of all total deaths [2]. It is confirmed when blood pressure is sustained at ≥140 /90mmHgafter two or more systolic and diastolic blood pressure readings [3], and dyslipidemia is one of its risk factors [4,5].

Dyslipidemia, also referred to as hyperlipidemia, is an abnormal serum lipid which is characterized by elevated plasma total cholesterol (TC), triglycerides (TG), and TG-rich very-low-density lipoprotein cholesterol (VLDL-C), reduced high-density lipoprotein cholesterol (HDL-C). It contributes significantly to excess risk of cardiovascular diseases among which is hypertension [6].

The relationship between hypertension and several lipid abnormalities involves elevated total cholesterol (TC) concentrations and the presence of dyslipidemia increases risks of cardiovascular morbidity and mortality [4].

The predisposing factors of the hyperlipidemia identified include increased consumption of dietary animal fat, lack of physical exercise, genetic factors, severe stress, increased age, sex, alcohol and tobacco consumption, and metabolic disorders like diabetes mellitus and hypothyroidism. Serum lipid level of hypertensive patients which is usually higher, can however be lowered by dietary restriction and hypolipidemic agents [4,7].

Excessive daily intake of saturated fats, cholesterol, other sources of calorie and subsequent lipid profile have been established to contribute to hypertriglyceridemia among the obese-hypertensive individuals, and hypercholesteremia resulting to obesity and consequently hypertension [8]. Furthermore, hyperlipidemia also substantially worsens the prognosis in hypertensive patients [9].

This therefore necessitates a need to examine the serum lipid profile and nutritional status of the hypertensive patients in order to have holistic clinical examination in diagnosis of hypertension. The aim of this study is to examine the serum lipid profile and nutritional status of the hypertensive patients attending tertiary hospitals especially medical outpatient clinics in the University College Hospital, Ibadan in Oyo state, Nigeria in order to determine the contribution of the patients’ serum lipid profile and nutritional status to the episode of the hypertension status so that information gathered could be useful in the management of hypertension among the hypertensive patients in the hospitals.

**Methodology**

**Study Design**

The study was a descriptive cross-sectional in design to assess the association between serum lipid profile and nutritional status of hypertensive patients.

**Study Location**

Study was carried out at the University College hospital, Ibadan Oyo State, Nigeria. A total of fifty-five (55) hypertensive outpatients (32 females and 23 males) attending Cardiology Clinics of Medical Outpatients (MOP) of the University College Hospital, Ibadan, Oyo State, Nigeria.
Data Collection Technique

A semi-structured, interviewer-administered questionnaire was used to interview each patient that gave their consent to participate in the study. The patients’ hospital records were used to obtain the last four (4) blood pressure levels and lipid profile. Weight (kg), Height (m), Percentage body fat, visceral fat and resting metabolism of the respondents were measured using body composition device (Omron instrument). Waist and Hip circumferences (cm) of the respondents were assessed by using measuring tape.

Information on the patients’ socio-demographic data namely; age, sex, tribe, religion, income, occupation and educational status were obtained with the aid of the semi-structured questionnaire. The nutrition status of the patients was assessed by measuring their weight, height, waist and hip circumferences. The Patients’ Body Mass Index and waist-to-hip ratio were calculated for the two sexes. BMI was classified into underweight, normal weight, overweight and obesity. The classification of waist-to-hip ratio was based on the specification of World Health Organisation [1].

According to the Third Report of the National Cholesterol Education Program on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III) for the serum lipid profile reference level, hypercholesterolemia was defined as TC > 200mg/dl, high LDL-C when value is ≥130mg/dl, hypertriglyceride as TG > 150mg/dl, and low HDL-C as < 40mg/dl [10]. Dyslipidemia was defined by presence of one or more abnormal lipid concentration. The target for normal lipid values are LDL <130mg/dl, HDL > 40mg/dl, Triglyceride <150mg/dl and Total cholesterol <200mg/dl.

Data Analysis

The data collected were evaluated by using Statistical Package for Social Science (SPSS) 20.0 version software. Descriptive statistics was measured for mean, standard deviation, frequency and percentage. Tabulation of the variables was done. T-test and ANOVA were used to compare between mean differences across the gender. Pearson’s correlation was performed to determine association between hypertension and lipid profile. The result was considered significant when p≤0.05.

Results

A total of 55 patients were interviewed; 23(41.8%) males and 32 (58.2%) females were recruited for the study. The mean age of the patients was 56.7±12.3. Less than half (45.5%) of the patients were between the age 50-64 years. Majority of the patients were Yoruba (83.6%) while others were Igbo, Edo, Iroboand Isoko. Most (89.1%) of the patients were married and 80.0% were monogamous. A large number (80.0%) had either secondary or tertiary education.

Serum Lipid Profile and Blood Pressure of the Hypertensive Patients

The result presented in Table 1 shows the analysis of variance of lipid profile of male and female hypertensive patients. The mean total cholesterol levels of male and female patients were 177.4±29.44mg/dl and 197.5±38.52mg/dl respectively. Average low density lipoproteins of male and female patients were 104.5±31.99mg/dl and 127.9±31.71mg/dl respectively. Average high density lipoproteins of male and female patients were 51.2±19.89mg/dl and 47.1±10.18mg/dl respectively. Mean triglycerides of male and female patients were 107.1±87.60mg/dl and 117.7±43.66mg/dl respectively.

Average Systolic blood pressure readings of the male and female patients were 148±15.3mmHg and 143±15.4mmHg while diastolic blood pressure readings of the male and female patients were 90±8.9 mmHg and 85±10.7mmHg. A significant difference was observed in total cholesterol and low density lipoprotein profile between the male and female patients (p<0.05).

Nutritional Status of the Patients

The mean Body Mass Index of the patients was 28.7±26.12 (kg/m²) (Table 2). According to result presented on Table 3, a significant difference was observed in BMI between the male and female patients. A large number of the patients were found to be overweight and obese (65.5%) combined while only few (29.1%) of the patients had normal weight. There were more (46.9%) female patients obese than male patients (Table 2).

The result (Figure 1) of the patients’ waist and hip circumferences shows that large number (73.9%) male and (84.4%) female patients had waist-hip ratio above normal cut-off points of 0.90 and 0.85 for male and female respectively. This expresses that most of the patients were at the risk of metabolic disorders (such as hypertension, obesity, diabetes mellitus and others). The male patients were found to have higher visceral fat, muscle, resting metabolism, and to be taller and heavier than women. However, female patients had more body fat than their male counterparts. A significant mean difference was observed in height, BMI, body fat, muscle and resting metabolism between male and female patients (Table 3).
Correlation between Lipid Profile and Hypertension of the Patients

There is a significant positive correlation between hypertension and total cholesterol and high density lipoprotein only among the male patients (Table 4).

Body Mass Index and Lipid Profile of the Hypertensive Patients

According to the result presented on the table 5, no association was found between the serum lipid profile and nutritional status of the hypertensive patients.

Figure 1: Patients' waist-to-hip ratio

Table 1: Summary of Analysis of Variance of Lipid Profile and Blood Pressure of Patients. TC- Total Cholesterol, LDL- Low Density Lipoprotein, HDL- High Density Lipoprotein, TG- Triglyceride, SBP- Systolic Blood Pressure, DBP- Diastolic Blood Pressure, x-Mean, SD- Standard deviation. *Significant at p<0.05.

Table 2: Body Mass Index of the Hypertensive Patients.

Table 3: Analysis of Variance of the Anthropometric/Body Composition and Resting Metabolic Indices of the Patients. BMI- Body Mass Index, WC- Waist circumference, HC- Hip circumference, RM- Resting Metabolism, n-Mean, SD- Standard deviation. *Significant at p<0.05.
Discussion

This study shows that hypertension is prevalent among the patients within the age of 50-64 years. This confirms the reports of many studies within and outside Nigeria which establish the association between age and hypertension [11,12]. Elisabete indicated that increase in hypertension in the older adult was due to the structural changes in the arteries especially large artery stiffness associated with ageing [12].

Having majority of the respondents in this study to be Yoruba is attributed to the research location. The remaining patients come from other ethnicities which include; Igbo, Isoko and Edo. It was also observed that hypertension was more prevalent among the females than their male counterparts. This disparity supports the claim of Megan, et al. (2008) that menopause contributes to high blood pressure among the older women [5].

On the average, this study observed that female patients had raised blood cholesterol against the cut off points given by the American National Cholesterol Education Program (NCEP) Expert Panel for hypertension and other Coronary Heart Diseases (2003) more than male patients. Not that alone, the female patients were also found to have more body fat than their male counterparts. This is traceable to postmenopausal effect in which older women have their estrogen reduced and body fat increased [13].

Many previous studies had observed negative correlation between blood lipid and elevated blood pressure among the hypertensive patients [7,14,15]. However the result of this study shows that the serum lipid profile (including total cholesterol and high density lipoprotein) is found to be positively correlated to hypertension most especially among male hypertensive patients. Low density lipoprotein (LDL) and triglyceride (TG) have no significant changes with hypertension for both sexes. The association of hypertension with raised total cholesterol (TC) and lowered high density lipoprotein (HDL) among the hypertensive patients in this research is established to be the result of overweight and obesity which are rampant among the patients.

Some studies done inside and outside Nigeria had established raised total cholesterol among the hypertensive patients [4,7]. This study also confirmed higher serum cholesterol among the hypertensive patients with significant correlation between hypertension and total cholesterol observed only among male patients.

In contrast, the study of Onwubere, et al., (2011) reported that no correlation between hypertension and total cholesterol among the hypertensive patients in their study [15]. The increased in serum total cholesterol among the hypertensive patients in our study is due to the genetic factor, and other factors such as; increased consumption of dietary animal fats, lack of physical exercise, claimed stress, and old age which were found to be true among the hypertensive patients. This finding is supported by the report of Akuuyam, et al. (2009) in their study conducted among the hypertensive and normotensive individuals in Zaria, Nigeria [4].

Table 4: Correlation between Hypertension, Lipid Profile and Waist-hip ratio of the Patients.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Total Cholesterol</th>
<th>LDL</th>
<th>HDL</th>
<th>TRG</th>
<th>Waist-hip ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R</td>
<td>P value</td>
<td>R</td>
<td>P value</td>
<td>R</td>
</tr>
<tr>
<td>Male</td>
<td>0.413</td>
<td>0.050*</td>
<td>0.278</td>
<td>0.199</td>
<td>0.414</td>
</tr>
<tr>
<td>Female</td>
<td>0.031</td>
<td>0.868</td>
<td>0.027</td>
<td>0.883</td>
<td>-0.187</td>
</tr>
</tbody>
</table>

Table 5: Association between Body Mass Index and Lipid Profile of the Hypertensive Patients.

<table>
<thead>
<tr>
<th>BMI (Kg/m²)</th>
<th>TC</th>
<th>TG</th>
<th>HDL</th>
<th>LDL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Normal</td>
<td>At risk</td>
<td>Normal</td>
<td>At risk</td>
</tr>
<tr>
<td>&lt;18.5</td>
<td>0(0.0)</td>
<td>1(100.0)</td>
<td>1(100.0)</td>
<td>0(0.0)</td>
</tr>
<tr>
<td>18.5-24.9</td>
<td>13(86.7)</td>
<td>2(13.3)</td>
<td>15(100.0)</td>
<td>0(0.0)</td>
</tr>
<tr>
<td>25.0-29.9</td>
<td>12(60.0)</td>
<td>8(40.0)</td>
<td>18(90.0)</td>
<td>2(10.0)</td>
</tr>
<tr>
<td>≥30.0</td>
<td>10(52.9)</td>
<td>9(47.1)</td>
<td>16(84.2)</td>
<td>3(15.8)</td>
</tr>
<tr>
<td>Total</td>
<td>35(63.6)</td>
<td>20(36.4)</td>
<td>50(90.9)</td>
<td>5(9.1)</td>
</tr>
<tr>
<td>p-value</td>
<td>0.098</td>
<td>0.829</td>
<td>0.152</td>
<td>0.449</td>
</tr>
<tr>
<td>X²</td>
<td>6.297</td>
<td>0.885</td>
<td>5.282</td>
<td>2.652</td>
</tr>
</tbody>
</table>

The result of this study on low density lipoprotein and triglycerides is contrary to the findings of Saha, et al. who reported higher level of low density lipoprotein and triglycerides among the hypertensive patients [7]. However, the significant higher low density lipoprotein noticed among the male patients is due to the metabolic disorders such diabetes mellitus which result from the excessive weight gain among them. The Body Mass Index of the patients revealed that most of the patients were overweight and obese. Women were found to be more obese than men while men were more overweight than women. This explains the reason why almost all the women and greater number of men in this study had higher waist-hip ratio than recommended. Sedentary lifestyle of the hypertensive patients also influences the excessive weight gain, and lack of job among the elderly makes most of them to stay at home and physically inactive [16,17].

Most of the patients under this study had waist-to-hip ratio higher than normal cut off points for healthy life as recommended by World Health Organisation for both adult male and female [1]. The waist to hip ratio of the patients was found significantly associated with hypertension (p<0.05). This suggests that many of the patients were suffering from metabolic disorders such as diabetes and obesity which are precursors to cardiovascular diseases. This similar case of obesity among the hypertensive patients was reported by Adediran, et al. in Abuja where obesity was found to be more prevalent among urban dwellers who were hypertensive than rural dwellers who could engage in physical activity with their farming work [11]. Yoko, et al. also confirmed prevalence of obesity among hypertensive outpatients in Fukuoka, Japan [2].

Conclusion

It is established from this study that hypertension is prevalent among the young adults and elderly patients attending University College Hospital, Ibadan. There is raised serum total cholesterol; and decreased high density lipoprotein among the female patients. A lot of the patients were overweight and obese. Most of the patients were suffering from diabetes mellitus which they might not be aware of. A significant correlation was found between total cholesterol, waist-hip ratio and hypertension among the hypertensive patients.

Recommendation

The hypertensive patients should be encouraged to engage in physical activities and receive counseling on how to maintain normal weight as a means to prevent the risk of obesity and diabetes which can complicate their condition. The patients need to also undergo test to check their blood sugar level so as to know their medical status for diabetes.

References


