Original Article

Comparative Analysis of Serum Lipid Profiles Among Hypertensive and Diabetic Patients in Kaduna State, Northwest, Nigeria: A Retrospective Study

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ABSTRACT

The serum lipid profile is a key biochemical parameter that serves as a marker for predicting adverse cardiovascular events. This study aims to analyze and compare the serum lipid profiles among hypertensive and diabetic patients. The serum lipid profiles of 172 hypertensive and 142 diabetic patients, seen over a four-year period (2019 – 2022), were retrieved from the electronic database of the Department of Chemical Pathology and Immunology, at Barau Dikko Teaching Hospital, Kaduna. The percentages of patients with abnormal lipid values were calculated for various lipids in both groups. T-test was used to compare the mean lipid values between the two groups. Among hypertensive patients, the percentages of abnormal lipid values were as follows: HDL (16.0%), LDL (25.6%), total cholesterol (31.8%), and triglycerides (14.0%), with 5.8% having both elevated cholesterol and triglycerides. In the diabetic group, the percentages were: HDL (22.4%), LDL (16.9%), total cholesterol (30.1%), and triglycerides (13.8%), with 7.3% having both elevated total cholesterol and triglycerides. The mean lipid values for hypertensive versus diabetic patients were compared as follows: HDL (1.3 ± 0.8 vs 1.2 ± 0.3, t=1.737, p=0.08), LDL (3.3 ± 1.0 vs 3.1 ± 1.1, t=2.170, p=0.03), total cholesterol (5.3 ± 1.2 vs 5.2 ± 1.7, t=0.598, p=0.55), and triglycerides (1.6 ± 1.0 vs 1.6 ± 0.6, t=0.389, p=0.70).The predominant lipid abnormality among both hypertensive and diabetic patients was hypercholesterolaemia. Hypertensive patients had significantly higher LDL levels compared to diabetic patients.

Keywords: Comparative, Diabetes, Dyslipidaemia, Hypertension, HDL, Hypertension, LDL, Lipid profile

INTRODUCTION

Cardiovascular diseases (CVDs) are the leading cause of morbidity and mortality globally, with hypertension and diabetes mellitus being prominent risk factors. Dyslipidaemia, characterized by abnormal lipid levels, is a key contributor to the pathogenesis of CVDs in these patient populations.1 Understanding the distinct lipid profile patterns associated with hypertension and diabetes is crucial for developing targeted therapeutic strategies and improving patient outcomes.

Hypertension, a condition affecting over a billion people worldwide, is often associated with an atherogenic lipid profile, including elevated low-density lipoprotein (LDL) and reduced high-density lipoprotein (HDL) levels.[1,2] These lipid abnormalities contribute to the increased risk of atherosclerosis and subsequent cardiovascular events in hypertensive patients. Similarly, diabetes mellitus, particularly type 2 diabetes, is linked to a characteristic dyslipidaemia that includes elevated

triglycerides, low HDL cholesterol, and a predominance of small dense LDL particles. 3[,4] This dyslipidaemia is a major factor in the heightened cardiovascular risk observed in diabetic individuals.

Despite the well-established links between dyslipidaemia hypertension and diabetes, comparative studies examining the lipid profiles of these two groups are relatively scarce. Such comparative analyses are essential to elucidate each condition's unique lipid abnormalities and inform more precise and effective lipid-lowering interventions.

This retrospective study aims to analyze and compare the serum lipid profiles of hypertensive and diabetic patients treated at Barau Dikko Teaching Hospital in Kaduna over four years. By assessing the prevalence of abnormal lipid values and comparing mean lipid levels between the two groups, this research seeks to provide a deeper understanding of the lipid profile variations in these high-risk populations. The findings of this study could have significant implications for the management and treatment of dyslipidaemia in hypertensive and diabetic patients.

MATERIALS AND METHODS

Study Design

This retrospective cross-sectional study was conducted at Barau Dikko Teaching Hospital in Kaduna, analyzing patient records over a four-year period from January 2019 to December 2022. The study focused on comparing the serum lipid profiles of patients diagnosed with hypertension and diabetes mellitus (type 2).

Study Population

The study included all results of adult patients (aged 18 years and above) who were diagnosed with either hypertension or type 2 diabetes mellitus and had their serum lipid profiles measured and recorded during the period of study.

Data Collection

Data were extracted from the hospital's electronic medical records system (EMR), including patient demographics (age, sex), clinical diagnoses (hypertension or diabetes mellitus), and serum lipid profile results. The serum lipid profile included the following parameters: Total cholesterol (TC), Low-density lipoprotein cholesterol (LDL-C), High-density lipoprotein cholesterol (HDL-C), and Triglycerides (TG). The samples were processed with the reagent kits obtained from Agappe Diagnostics Switzerland, and using spectrophotometry technique on fully automated analyzer Biolis 24Ai to quantify the values for the different lipids. The reference range used for the study were TC (2.5–6.0 mmol/L), HDL- C (> 0.9mmol/L), LDL-(< 4.1mmol/L), Triglyceride ($\leq$ 2.3mmol/L) as calibrated by the Chemical Pathology Laboratory BDTH Kaduna.

Data Analysis: The data retrieved were analyzed using statistical package for social sciences (SPSS) version 22.5 The mean and standard deviation (SD) were determined for continuous variables. Frequencies and percentages were calculated for categorical variables. The prevalence for abnormal lipid values was determined for each group based on established clinical cut-offs: TC > 6mmol/L, LDL-C > 4.1mmol/L, HDL-C < 40 mg/dL (men) or < 50 mg/dL (women) and TG > 2.3mmol/L. Independent samples t-test was used to compare the mean lipid levels between hypertensive and diabetic patients. P- values of < 0.05 were considered to be statistically significant.

Ethical Considerations

Ethical approval for the study was obtained from the Ethics and Research committee of the Kaduna State Ministry of Health, with ethical approval number: NHREC/1/03/2018. The study adhered to the principles of the Declaration of Helsinki.

RESULTS

Patient Demographics

A total of 314 patients' records were analyzed, comprising 172 hypertensive patients and 142 diabetic patients. The mean age for the hypertensive patients' was 54.47±13.8 and the male to female ratio of 1:2.6 while among diabetic patients the mean age was 56.76±10.6 with male to female ratio of 1:2.4

Lipid Profiles

The mean lipid levels for hypertensive and diabetic patients are presented in figure 1. The predominant

abnormality of lipids in the 2 group was total cholesterol and the least prevalent was triglycerides. Comparison of the mean of the various lipid parameters is as shown in table 1. Hypertensive patients showed significantly higher LDL cholesterol (3.3 ± 1.0 mmol/L) when compared to that of diabetic patients (3.1 ± 1.1 mmol/L), with a p-value of 0.03. The mean HDL level in hypertensive patients was slightly higher (1.3 ± 0.8 mmol/L) than in diabetic patients (1.2 ± 0.3 mmol/L), but this difference was not statistically significant (p=0.08). The mean triglyceride levels were virtually identical (1.6 ± 1.0 mmol/L in hypertensive patients and 1.6 ± 0.6 mmol/L in diabetic patients, p=0.70)
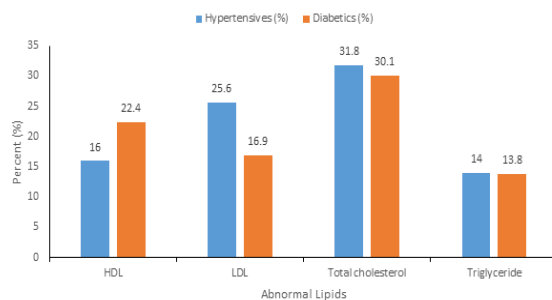

Figure 1: Prevalence of Abnormal Lipid Values in Hypertensive and Diabetic Patients.

Table 1: Comparison of Mean Lipid Levels between Hypertensive and Diabetic Patients

Lipid parameters (mmol/L)	Hypertensives (Mean ± SD)	Diabetics (Mean ± SD)	P- value
HDL	1.3±0.8	1.2±0.3	0.08
LDL	3.3±1.0	3.1±1.1	0.03
Total cholesterol	5.3±1.2	5.2±1.7	0.55
Triglyceride	1.6±1.0	1.6±0.6	0.70

DISCUSSION

The present study aimed to analyze and compare the serum lipid profiles of hypertensive and diabetic patients at Barau Dikko Teaching Hospital in Kaduna, Nigeria. The findings revealed notable differences in the prevalence and mean levels of various lipid parameters between these two high-risk groups.

Prevalence of Abnormal Lipid Values

The study demonstrated that the predominant lipid abnormality in both hypertensive and diabetic patients was hypercholesterolaemia, with prevalence rates of 31.8% and 30.1%, respectively. This finding aligns with global trends where hypercholesterolaemia is frequently observed among patients with cardiovascular risk factors.[1,2] Local studies conducted in Nigeria have similarly reported high rates of hypercholesterolaemia in hypertensive and diabetic populations. [3,4] For instance, a study by Adegoke et al. found that 34.5% of hypertensive patients in southwestern Nigeria had elevated total cholesterol levels.[6]

Comparison of Mean Lipid Levels

Our analysis showed that hypertensive patients had significantly higher mean LDL levels compared to diabetic patients. Elevated LDL cholesterol is a well-known risk factor for atherosclerosis and cardiovascular disease (CVD).[7] The significant difference in LDL levels suggests that hypertensive patients may have a higher risk of developing CVD compared to diabetic patients, necessitating more aggressive lipid-lowering strategies in this group. This observation is consistent with findings from other regions of Africa, such as a study in Ghana by Osei-Yeboah et al., which reported higher LDL levels among hypertensive compared to diabetic patients.[8]

Interestingly, no significant differences were found in the mean HDL and triglyceride levels between the two groups. This contrasts with some studies in other populations, such as the Framingham Heart Study, which reported significantly higher triglyceride levels in diabetic patients compared to non-diabetics.[9] This observed disparity in our study may be due to the fact that our study is retrospective in nature and some patients may be on lipid lowering drugs.

Clinical Implications

The findings of this study underscore the importance of tailored lipid management strategies for hypertensive and diabetic patients. Given the higher LDL levels observed in hypertensive patients, healthcare providers should prioritize LDL-C lowering interventions in this group. This could involve more aggressive use of statins or other lipid-lowering agents, alongside lifestyle modifications such as diet and exercise.[10] For diabetic patients, although the LDL levels were lower, the overall management should still include regular monitoring and treatment of dyslipidaemia to mitigate cardiovascular risk.[11]

Limitations

This study is a retrospective study, which may introduce selection bias and limit the ability to establish causality. Additionally, patients on lipid-lowering therapy were not excluded and this may result in an underestimation of the true prevalence of dyslipidaemia in these populations.

CONCLUSION

In conclusion, this study highlights hypercholesterolaemia as the predominant lipid abnormality in both hypertensive and diabetic patients at Barau Dikko Teaching Hospital, Kaduna, Nigeria with hypertensive patients exhibiting significantly higher LDL levels. These findings underscore the need for targeted lipid-lowering strategies to effectively manage cardiovascular risks in these populations. By understanding the unique lipid profile patterns in hypertensive and diabetic patients, healthcare providers can better tailor interventions to reduce the burden of cardiovascular disease in these high-risk groups.

RECOMMENDATIONS

1. There is the need for the hospital management to design and implement a health education program on lifestyle modifications targeted at the population of patients attending clinics.

2. The clinical departments need to adopt and implement lipid-lowering strategies and encourage the patients to adopt these strategies

3. The patients should embark on routine testing and monitoring of lipid profile as a way of tracking progress of values following adoption of lipid lowering strategies.

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