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Behind the Facade: Unmasking the Hidden Threat of Dyslipidemia Among Healthy Looking Students

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Abstract

Dyslipidemia is a significant risk factor for cardiovascular disease (CVD), and its prevalence is increasing globally. This study aimed to investigate the prevalence of dyslipidemia and its associated risk factors among apparently healthy students in the Department of Science Laboratory Technology, Bauchi State University Gadau. A total of 200 students (137 males and 63 females) aged 18-42 years participated in the study. Anthropometric measurements, including body mass index (BMI), and lipid profile parameters, including total cholesterol (TC), triglycerides (TG), high-density lipoprotein cholesterol (HDL-C), and low-density lipoprotein cholesterol (LDL-C), were assessed. The results showed a high prevalence of dyslipidemia (52.0 %) among the students, with abnormal lipid profiles observed in 18.2 % for TC, 9.3 % for TG, 19.8 % for HDL-C, and 3.3 % for LDL-C. The study also found no significant difference in the mean values of TC, TG, HDL-C, and LDL-C between males and females. However, a significant difference was observed in the mean age of participants when compared across underweight, normal weight, and overweight categories. The study highlights the need for regular assessment of lipid profiles and promotion of healthy lifestyle habits among students to prevent and control CVD. The findings of this study can inform the development of targeted interventions to reduce the burden of dyslipidemia and CVD among young adults.

Keywords: dyslipidemia, prevalence, apparently healthy students, lipid profile, cardiovascular disease risk factors, body mass index, lifestyle habits.

1. Background of the study

Dyslipidemia, defined by abnormal amounts of lipids in the blood including triglycerides (Kosmas et al., 2023), cholesterol, and phospholipids, remains a serious worldwide health issue. The disorder comprises a spectrum of lipid abnormalities, such as hypercholesterolemia, hypertriglyceridemia, and mixed dyslipidemia, which may come from both hereditary and environmental causes (Pirillo et al., 2021). In industrialized nations, the major type of dyslipidemia is hyperlipidemia, typically related to high-calorie diets rich in saturated fats and trans fats, sedentary lifestyles, and other modifiable risk factors (Al-Worafi, 2024).

Dyslipidemia is a key modifiable risk factor for ischemic heart disease (IHD), the main cause of morbidity and death globally. Elevated levels of triglycerides (TG), total cholesterol (TC), and low-density lipoprotein cholesterol (LDL-C), along with low levels of high-density lipoprotein

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cholesterol (HDL-C), contribute to the pathogenesis of atherosclerosis, a process involving lipid deposition, endothelial dysfunction, and inflammation (Georgoulis et al., 2022; Kosmas et al., 2023). The presence of dyslipidemia has been demonstrated to accelerate the formation of atherosclerotic plaques, increasing the risk of myocardial infarction, stroke, and other cardiovascular events (Brunham et al., 2024). According to the World Health Organization (WHO), dyslipidemia is responsible for around 15 % of ischemic heart disease and stroke cases, contributing to over four million deaths yearly (Yuyun et al., 2020).

The worldwide burden of cardiovascular disease (CVD) highlights the urgency of managing dyslipidemia. In 2012, CVD contributed to 17.5 million fatalities, with dyslipidemia cited as one of the primary factors to this frightening number (Pirillo et al., 2021). Epidemiological studies suggest a constant, graded association between total plasma cholesterol concentrations and coronary risk, especially in younger persons (Liu et al., 2023). While lifestyle variables, such as food and physical exercise, account for 80 % of lipid abnormalities, hereditary illnesses such as familial hypercholesterolemia contribute to the remaining 20 % (Ogura et al., 2018). Understanding the relationship between these elements is critical for establishing effective preventative and treatment measures.

While dyslipidemia has generally been linked with industrialized nations, its incidence is growing in underdeveloped countries due to urbanization and the adoption of Western food and lifestyle practices. This epidemiological shift has led to an increasing burden of CVD in areas that formerly had lower rates of dyslipidemia and associated disorders (Mbogori, Mucherah, 2019; Qureshi et al., 2021). Addressing this problem requires extensive public health initiatives, including awareness campaigns, regular lipid monitoring, and lifestyle adjustments customized to varied groups.

Despite rising awareness of dyslipidemia, research on its incidence and risk factors in particular subpopulations remains restricted (Gebreegziabiher et al., 2021). For instance, statistics on university students, a population at a vital stage of establishing lifetime health practices, are rare. This group typically undergoes major lifestyle changes, such as changing food habits, reduced physical activity, and higher stress levels, which might predispose them to dyslipidemia (Banna et al., 2022; Moossavi, Bishehsari, 2019). Understanding the lipid profiles and related variables among students is vital for directing focused actions.

This research intends to address the information gap by examining lipid profiles and related variables among apparently healthy students in the Department of Science Laboratory Technology at Bauchi State University, Gadau. By studying the frequency and determinants of dyslipidemia in this community, the findings may influence preventative interventions and enhance cardiovascular health in comparable demographic groups. Such initiatives are crucial for decreasing the long-term burden of CVD and improving overall public health outcomes.

2. Materials and Methods

Study Area

This study was conducted at the Faculty of Science, Department of Science Laboratory Technology, Bauchi State University Gadau, located in Gadau town, Bauchi State, North East Nigeria.

Study Subjects

A random sampling technique was used to recruit 200 apparently healthy students from the Department of Science Laboratory Technology. Informed consent was obtained from each participant prior to the study.

Inclusion and Exclusion Criteria

Apparently healthy students in the Department of Science Laboratory Technology were included, while non-healthy students were excluded.

Ethical Clearance

Ethical clearance was obtained from the Research and Ethical Clearance Committee of Bauchi State University Gadau, in accordance with the World Association Declaration of Helsinki's Ethical Principles for Medical Research Involving Human Subjects.

Anthropometric Measurements

Height, weight, and body mass index (BMI) were measured. Height was measured using a calibrated pole, while weight was measured using a measuring scale. BMI was calculated as weight (kg) divided by height (m) squared according to techniques as described by Molepo (2018).

Statistical Analysis

Data were analyzed using SPSS version 20.0. The level of significance was set at $p < 0.05$.

Sample Collection

Blood samples were collected from participants after an overnight fast of 10–12 hours. Five milliliters (5 ml) of blood were collected from the cubital superficial vein by venepuncture.

Estimation of Total Cholesterol

Serum total cholesterol was determined using an enzymatic reaction as described by Meiattini et al. (1978).

Estimation of Serum Triglyceride

Serum triglyceride was determined using an enzymatic calorimetric method as described by Saleem et al. (2016).

Estimation of High-Density Lipoprotein Cholesterol (HDL-C)

Serum HDL-C was determined using the Groove method as described by Ogura et al. (2018).

Estimation of Low-Density Lipoprotein Cholesterol (LDL-C)

Serum LDL-C was calculated using the Friedewald formula as described by Hong et al. (2023).

3. Results

This study investigated the lipid profile and prevalence of dyslipidemia among apparently healthy students in the Department of Science Laboratory Technology. A total of 200 students participated in the study.

Demographic Characteristics

The majority of participants were male (68.5 %), with a mean age of 26.00 ± 5.09 years. The age distribution ranged from 18–42 years, with 38 % of participants falling within the 23–27 age range. The body mass index (BMI) classification revealed that 52 % of participants were overweight, 44 % had a normal weight, and 4 % were underweight (Table 1).

Table 1. Sex and Age Distribution and Body Mass Index (BMI) of Apparently Healthy Students in Department of Science Laboratory Technology

Variable	Number of participants (N)	Percentage(%)
Sex		
Male	137	68.5
Female	68	31.5
Total	**200**	**100.0**
Age group (years)		
18-22	58	29.0
23-27	76	38.0
28-32	43	21.5
33-37	16	8.0
38-42	7	3.5
Total	**200**	**100.0**
BMI (Kg/m²)		
Under weight ≤18.4	8	4.0
Normal weight 18.5-24.9	88	44.0
Overweight ≥25.0	104	52.0
Total	**200**	**100.0**

Lipid Profile

The mean values for total cholesterol (TC), triglycerides (TG), high-density lipoprotein cholesterol (HDL-C), and low-density lipoprotein cholesterol (LDL-C) were 4.36 ± 1.01 mmol/L, 1.16 ± 0.44 mmol/L, 1.30 ± 0.28 mmol/L, and 2.53 ± 0.95 mmol/L, respectively (Table 2).

Table 2. Mean ± Standard deviation of BMI and lipid profile parameters of Apparently Healthy Students in Department of Science Laboratory Technology

Variable	Study Subjects
	Mean ± SD
Body Mass Index (Kg/m²)	26.00 ± 5.09
Total cholesterol (mmol/L)	4.36 ± 1.01
Triglyceride (mmol/L)	1.16 ± 0.44
HDL-Cholesterol (mmol/L)	1.30 ± 0.28
LDL-Cholesterol (mmol/L)	2.53 ± 0.95

Notes: Mean ± SD

Comparison of Lipid Profile Parameters

No significant differences were observed in the mean values of TC, TG, HDL-C, and LDL-C between males and females. However, the mean age was significantly higher in males than in females (Table 3).

Table 3. Comparison of mean BMI and Lipid Profile of Male and Female Apparently Healthy Students in the Department of Science Laboratory Technology

Variable	Male (Mean ± SD)	Female (Mean ± SD)	p-value	Remark
Age (years)	26.45 ± 5.53	25.00 ± 3.80	0.01	S
Body Mass Index (Kg/m2)	25.73 ± 5.03	26.18 ± 4.31	0.39	NS
Total cholesterol (mmol/L)	4.40 ± 1.01	4.29 ± 1.01	0.35	NS
Triglyceride (mmol/L)	1.19 ± 0.47	1.10 ± 0.37	0.07	NS
HDL-Cholesterol (mmol/L)	1.31 ± 0.29	1.27 ± 0.26	0.23	NS
LDL-Cholesterol(mmol/L)	2.54±0.98	2.51±0.90	0.81	NS

Notes: Mean ± SD

Comparison of Lipid Profile Parameters Based on BMI

A significant difference was observed in the mean age of participants when compared across underweight, normal weight, and overweight categories. However, no significant differences were observed in the mean values of TC, TG, HDL-C, and LDL-C across these BMI categories ($p < 0.01$). (Table 4).

Table 4. Comparison of Lipid profile parameters based on Body mass index of Apparently Healthy Students in Department of Science Laboratory Technology

Variable	Under weight (≤18.4Kg/m²)	Normal weight (18.5-24.9Kg/m²)	Over weight (≥25.0Kg/m²)	p-value	Remarks
	(Mean ± SD)	(Mean ± SD)	(Mean ± SD)		
Age (years)	24.44 ± 4.29	25.19 ± 4.34	26.79 ± 5.60	0.001	S
Total cholesterol(mmol/L)	4.68 ± 0.86	4.41 ± 0.99	4.36 ± 1.01	0.28	NS
Triglyceride (mmol/L)	1.04 ± 0.51	1.14 ± 0.48	1.19 ± 0.40	0.35	NS
HDL-Cholesterol (mmol/L)	1.34 ± 0.29	1.29 ± 0.29	1.30 ± 0.27	0.77	NS
LDL-Cholesterol (mmol/L)	2.85 ± 0.94	2.58 ± 0.92	2.47 ± 0.97	0.20	NS

Notes: Mean ± SD

Correlation Analysis

No significant correlations were observed between BMI and lipid profile parameters (TC, TG, HDL-C, and LDL-C) ($p < 0.01$) (Table 5).

Table 5. Pearson Correlation Coefficient (r) of BMI and lipid profile parameters

Variable	Pearson Correlation Coefficient (r)	p-value	Remark
	R		
BMI and TC	-0.035	0.484	NS
BMI and TG	0.088	0.078	NS
BMI and HDL	0.036	0.473	NS
BMI and LDL	-0.060	0.232	NS

Foot note: The correlation is considered to be significant at $P \leq 0.05$ level(2-tailed). S = Statistically Significant while NS = Not Statistically Significant

Prevalence of Dyslipidemia

The overall prevalence of dyslipidemia was 52 % (104/200). The prevalence of abnormal lipid profiles was 18.2 % for TC, 9.3 % for TG, 19.8 % for HDL-C, and 3.3 % for LDL-C (Table 6 and Table 7).

Table 6. Prevalence of Dyslipidaemia among Apparently Healthy Students in Department of Science Laboratory Technology

Variable	NumberObserved(N)	Prevalence(%)
Dyslipidaemia		
Yes	104	52.0
No	96	48.0
Total	**200**	**100.0**

Table 7. The percentage prevalence of abnormal TC, TG, HDL & LDL among apparently Healthy Student of Science Laboratory Technology

Biochemical Parameters	Percentage (%) (Abnormal)
Total Cholesterol (2.2-5.2) mmol/l	18.2 %
Triglyceride (≤1.7) mmol/l	9.3 %
HDL (1.1-1.5) mmol/l	19.8 %
LDL (≤3.9) mmol/l	3.3 %

4. Discussion

This research examined the frequency of dyslipidemia among ostensibly healthy students in the Department of Science Laboratory Technology at Bauchi State University Gadau. Dyslipidemia is a major risk factor for cardiovascular diseases (CVD), accounting for 13 % of worldwide instances of ischemic heart disease (IHD) and stroke (Yuyun et al., 2020). Given that almost 80 % of lipid problems are associated with food and lifestyle, comprehending regional patterns and risk factors is essential for timely management (Kenneth, 2024).

The prevalence of dyslipidemia in this research was 52.0 %, with mean values for BMI, total cholesterol (TC), triglycerides (TG), HDL-cholesterol, and LDL-cholesterol recorded at 26.00 ± 5.09 kg/m², 4.36 ± 1.01 mmol/L, 1.16 ± 0.44 mmol/L, 1.30 ± 0.28 mmol/L, and 2.53 ± 0.95 mmol/L, respectively. The significant incidence raises concerns about long-term cardiovascular risks in young people and necessitates aggressive public health interventions.

The global incidence of dyslipidemia varies markedly depending on lifestyle, dietary habits, socioeconomic variables, and access to healthcare. A research conducted in China among university students indicated a much lower frequency of 13.17 % (Liu et al., 2023). This gap may be ascribed to the dietary practices in China, characterized by a high intake of vegetables and lean meats, which mitigates the risk of lipid abnormalities. In contrast, research in industrialized nations on

dyslipidemia like the United States reveals greater prevalence rates (Aggarwal et al., 2023). Data from the National Health and Nutrition Examination Survey (NHANES) suggest that roughly 20 % of adults aged 20–34 years display at least one kind of dyslipidemia (Chen et al., 2023). This increased prevalence is connected with sedentary lifestyles and the widespread use of processed, calorie-dense foods, exhibiting trends comparable to those in the present research sample.

In Africa, urbanization and the adoption of Westernized diets have contributed to an increasing trend in dyslipidemia prevalence (Mbogori, Mucherah, 2019). A research in Ethiopia indicated a frequency of 67 % among university students, surpassing the 52.0 % seen in this survey (Gebreegziabiher et al., 2021). The Ethiopian research emphasized excessive carbohydrate and fat diet combined with low physical exercise as important causes.

A prevalence of 41.1 % was observed among young people in Ghana, somewhat lower than the present research (Blankson et al., 2022). This disparity may be linked to variances in eating habits and urbanization levels. Many African nations, including Nigeria, are experiencing a dietary shift marked by increasing consumption of energy-dense, processed foods, worsening the dyslipidemia load (Afolabi, Holdbrooke, 2024). Dyslipidemia prevalence among young adults in Nigeria has been thoroughly examined, with conclusions that accord with this study's results. A research in Southwest Nigeria revealed a frequency of 56.8 % among university students (Durowade et al., 2021). The somewhat greater incidence may reflect regional variations in eating patterns and degrees of urbanization. Similarly, a research done in Northern Nigeria found a frequency of 46.5 % among teenagers (Gebreegziabiher et al., 2021). While lower than the 52.0 % identified in this research, it shows the rising public health issue across various age groups in Nigeria.

The mean BMI in this research (26.00 ± 5.09 kg/m²) reveals a general tendency toward overweight and obesity, with 52.0 % of individuals categorized as overweight. This conclusion is similar with previous Nigerian research, such as Ahmed et al. (2019) and Banna et al. (2022), where overweight and obesity were frequent among university students. Overweight and obesity contribute to dyslipidemia by encouraging lipid metabolism dysregulation, increasing cardiovascular risk (Vekic et al., 2023).

The lipid profile characteristics in this research were comparable to those reported in similar African environments. The mean TC (4.36 ± 1.01 mmol/L) and HDL-C (1.30 ± 0.28 mmol/L) accord with data from Ghana (Blankson et al., 2022) but are somewhat higher than those reported in Ethiopia (Gebreegziabiher et al., 2021). These disparities underscore the importance of food and lifestyle variables distinct to each location.

Interestingly, no significant variations in lipid profile characteristics were identified between males and females, consistent with the results of Hussain et al. (2019) in Pakistan. This shows that gender may not have a substantial effect in dyslipidemia prevalence among younger populations, whereas hormonal and metabolic variations could alter lipid profiles in later age groups.

The significant incidence of dyslipidemia in this research underscores the urgent need for focused therapies in academic settings. Routine lipid profile examinations, nutritional advice, and attempts to increase physical activity should be included into health programs for students. Additionally, public health initiatives stressing the hazards of dyslipidemia and promoting good eating habits might play a significant role in lowering the incidence of cardiovascular illnesses in Nigeria.

5. Conclusion

In conclusion, this study highlights a high prevalence rate of dyslipidemia (52.0 %) among apparently healthy students in the Department of Science Laboratory Technology. The findings emphasize the need for regular assessment of lipid profiles and promotion of healthy lifestyle habits among students.

6. Recommendations

Further studies are recommended to investigate the prevalence of dyslipidemia among a larger sample size of apparently healthy students in the Department of Science Laboratory Technology. Additionally, students are advised to reduce their intake of fast and processed foods to minimize the risk factors associated with dyslipidemia and promote overall health and well-being.

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