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Prevalence of dyslipidemia in the Mohammed VI University Hospital of Oujda

Imane Naji [1, 2], Dounia El-Zarrouki [1, 2], El-houcine Sebbar [1, 2], Mohammed Choukri [1, 2]

1. *Faculty of Medicine and Pharmacy of Oujda, Mohammed First University, PB 724,Oujda 60000, Morocco*
2. *Central Laboratory, Mohammed VI University Hospital of Oujda, PB 4806, Oujda 60049, Morocco*

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ABSTRACT

The aim of this study was to evaluate the prevalence of dyslipidemia in patients who were examined at the biochemistry laboratory of the CHU Mohammed VI in Oujda for a lipid assessment. This retrospective study included all patients who underwent a lipid assessment. The analytes measured were total cholesterol, HDL cholesterol, LDL cholesterol, and triglycerides, which were all assessed using enzymatic methods on the Architect ci8200 analyzer (Abbott). The prevalence of dyslipidemia among our study population was found to be 33.46%. Specifically, the prevalence rates of various types of dyslipidemia were as follows: hypercholesterolemia was 32.44%, hypoHDLemia 10.11%, hyperLDLemia 27.2%, hypertriglyceridemia 2.34%, and mixed hyperlipidemia 5.26%. Individuals within the age group of 40 to 59 years appeared to be at a higher risk, and a female predominance was observed in cases of hypercholesterolemia, hypoHDLemia, and mixed hyperlipidemia. Our findings underscore the necessity for implementing information, communication, and education programs aimed at the prevention and management of dyslipidemia.

Corresponding Information: *Imane Naji, Faculty of Medicine and Pharmacy of Oujda, Mohammed First University, PB 724,Oujda 60000, Morocco; Email: hussein.hamid@limu.edu.ly.*

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Abbreviations

HDL, High density lipoprotein; LDL, Low density lipoprotein; VLDL, Very low-density lipoprotein; NCEP, The National Cholesterol Education Program; RR, Relative Risk

Introduction

Dyslipidemia refers to a qualitative or quantitative abnormality in one or more lipid parameters, including total cholesterol, HDL (high-density lipoprotein) cholesterol, LDL (low-density lipoprotein) cholesterol, and triglycerides. Essentially, dyslipidemia represents an alteration in the lipid balance, which is generally characterized by an increase in plasma cholesterol or triglycerides, or a low level of HDL cholesterol. These abnormalities significantly contribute to the development of atherosclerosis [1-5].

There are two main types of dyslipidemia: primary and secondary. Primary dyslipidemia is predominantly caused by genetic factors, which may result in either excessive production or insufficient clearance of triglycerides or LDL cholesterol, or, conversely, insufficient production or excessive clearance of HDL cholesterol. In adults, secondary dyslipidemia is more prevalent and is often linked to a sedentary lifestyle coupled with a diet that is high in calories and fats. Additional secondary causes include conditions such as diabetes mellitus, alcoholism, chronic kidney disease, chronic liver disease, and certain medications, such as glucocorticoids and estrogens [6-12].

The diagnosis of dyslipidemia is based on the measurement of plasma cholesterol and triglyceride levels. Initial treatment strategies typically involve dietary modifications and increased physical activity. If these lifestyle changes are inadequate, the use of lipid-lowering medications may be considered [1, 2, 7, 9].

In this study, we aim to evaluate the prevalence of dyslipidemia in patients at the biochemistry laboratory of Mohammed VI Hospital in Oujda.

Materials and Methods

The study was conducted in accordance with ethical guidelines and received approval from the Ethics and Biomedical Research Committee of Oujda. The inclusion criteria encompassed all patients who underwent lipid assessments at the biochemistry laboratory of the Mohammed VI University Hospital in Oujda from January 2019 to December 2021. Patients were excluded if they had incomplete lipid profiles or insufficient clinical data.

The study included a total of 26,785 patients, with a male-to-female ratio of 0.74. Participants ranged in age from 9 to 98 years. Where available, medical background information, such as comorbidities and current medications, was recorded.

Blood samples were collected using standard venipuncture techniques carried out by trained laboratory staff. Specimens were collected in the appropriate tubes and immediately processed to ensure accuracy in results. Total cholesterol, HDL cholesterol, LDL cholesterol, and triglycerides were measured using enzymatic methods on the Architect ci8200 system (Abbott). The assay kits used in these evaluations were supplied by Abbott. Dyslipidemias were defined according to the criteria established by the National Cholesterol Education Program (NCEP) [13].

- Hypercholesterolemia (total cholesterol > 2 g/L)
- HypoHDLemia (HDL cholesterol < 0.4 g/L)
- Hypertriglyceridemia (triglycerides > 1.5 g/L)
- Mixed hyperlipidemia (total cholesterol > 2 g/L and triglycerides > 1.5 g/L)
- HyperLDLemia (LDL cholesterol > 1.3 g/L)

Statistical analysis was conducted using Excel software. The chi-square test was employed to assess the significance of differences between categorical variables, with a significance threshold set at 0.05. Relative risks (RR) were calculated for associations between dyslipidemia and other risk factors.

Results

Table 1 provides a summary of the characteristics of the study population. The data indicates a predominance of female participants, reflected in a sex ratio of 0.74 (male to female). The age group predominantly represented in this study for both genders was between 40 and 59 years. A significant portion of the study population, 49.38%, comprised hospitalized patients from various departments within the hospital. However, clinical information accompanied only 43% of the analysis requests, revealing hypertension as the most frequently recorded cardiovascular complication.

The overall prevalence of dyslipidemia within the study cohort was noted to be 33.46%. Specific prevalence rates for various dyslipidemic conditions were as follows: hypercholesterolemia was prevalent in 32.44% of patients, hypoHDLemia in 10.11%, hyperLDLemia in 27.2%, hypertriglyceridemia in 2.34%, and mixed hyperlipidemia in 5.26% (as detailed in Table 2). The distribution of dyslipidemia across different age groups (illustrated in Figure 1) revealed that individuals aged 40 to 59 years were more frequently affected. Additionally, the analysis of the relationship between dyslipidemia and sex (depicted in Figure 2) showed a notable female predominance for conditions such as hypercholesterolemia and hyperLDLemia, which was statistically significant with a p-value of less than 0.01.

Table 1. Demographic and clinical characteristics of the study population.

Variables	**Total n (%)**	**Dyslipidemia**	
Demographic characteristics		**Yes n (%)**	**No n (%)**
Male	11345(42,35)	4530(39)	6815(61)
Female	15440(57,64)	7195 (46,6)	8245 (53,4)
Sex ratio	0,74		
hospitalized	12800 (47,78)	3162 (24,6)	9638 (75,3)
external	13985 (52,21)	7468 (53,4)	6517 (46,6)
Age (years)			
0-39	6251 (23,37)	2062(32,99)	4189 (67,01)
40-59	15244 (56,91)	7815(51,26)	7409 (48,37)
≥60	5290 (19,74)	1964 (37,12)	3326 (62,87)

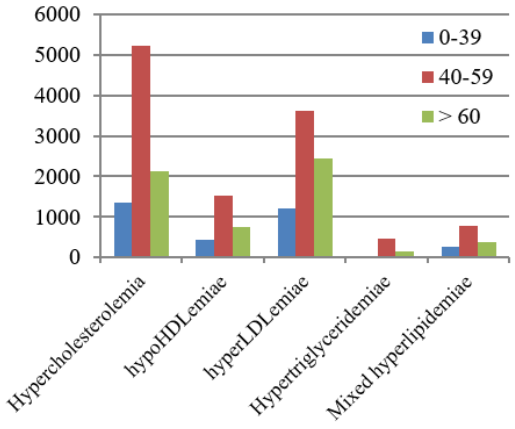

Figure 1. illustrates the number of patients with dyslipidemia across different age groups. The vertical axis represents the number of patients, while the horizontal axis categorizes the age groups. The data indicate that the number of patients with dys.

Table 2.Prevalence of dyslipidemia.

Prevalence	**Effective**	**Percentage (%)**
Dyslipidemia	8962	33.46
hypercholesterolemia	8689	32.44
hypoHDLemiae	2707	10.11
hyperLDLemiae	7285	27.2
Hypertriglyceridemia	627	2.34
Mixed hyperlipidemia	1408	5.26

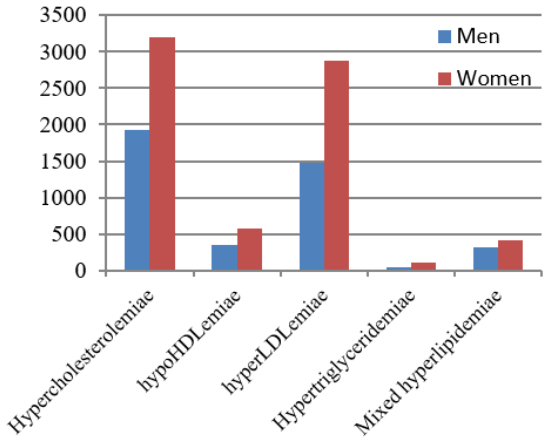

Figure 2. The prevalence of different types of dyslipidemia by sex. The vertical axis represents the number of patients, while the horizontal axis categorizes the types of dyslipidemia. The data reveal a female predominance in certain types

Discussion

Dyslipidemia refers to any abnormality in the distribution of lipids (triglycerides, cholesterol) and the lipoproteins that transport them in the body. Many functions of the human body rely on lipids daily: triglycerides serve as the reserve form of fatty acids for energy, while cholesterol is involved in membrane formation and serves as a precursor for many molecules, particularly steroid hormones. High levels of triglycerides or cholesterol increase the risk of atherosclerotic plaque formation, thereby raising the risk of stroke or myocardial infarction. There is a linear relationship between lipid levels and cardiovascular risk [7-15].

Genetic dyslipidemias are inevitable and cannot be prevented. Screening for secondary dyslipidemias related to underlying pathology must be systematic and prompt. It is essential to conduct a lipid assessment in men over 40 years of age and women over 50 years, as well as in individuals with other cardiovascular risk factors. Our study showed that subjects aged 39 to 59 were the most affected (Figure 1). The primary causes of dyslipidemia include single or multiple genetic mutations that lead to either increased or decreased production of triglycerides or LDL cholesterol or decreased or increased production of HDL cholesterol [2-9].

Diabetes represents a particularly significant secondary cause of dyslipidemia, as patients often exhibit elevated triglycerides, elevated LDL, and reduced HDL levels. Type 2 diabetics are at high risk, with this association potentially stemming from obesity and/or poor diabetic control. These conditions increase circulating free fatty acids, leading to enhanced production of VLDL (very-low-density lipoprotein) rich in triglycerides, which then transfer triglycerides and cholesterol to LDL and HDL. This process promotes the formation of triglyceride-rich LDL, small and dense LDL, and the clearance of triglyceride-rich HDL [6-16]. Dyslipidemia in diabetics is further exacerbated by high caloric intake and a sedentary lifestyle, resulting in a particularly high cardiovascular risk in diabetic women [8-14]. Our study indicates that women are more exposed to hypercholesterolemia (Figure 2). Indeed, most studies have found a predominance of dyslipidemias, particularly hypercholesterolemia, in women [1-4, 6-14, 17-19].

Total cholesterol, triglycerides, and HDL-cholesterol are measured directly. Total cholesterol and triglyceride values reflect the cholesterol and triglycerides present in all circulating lipoproteins. These values can vary by up to 10% for total cholesterol and up to 25% for triglycerides from day to day, even in the absence of disease [1-8]. While total and HDL cholesterol can be measured in non-fasting patients, fasting is preferred for a more accurate and reliable lipid profile.

HDL measurement is not always predictive of cardiovascular risk. High HDL levels caused by certain genetic conditions may not necessarily reduce cardiovascular risk, and conversely, lower HDL levels from other genetic conditions may not necessarily increase cardiovascular risk. Although HDL levels predict cardiovascular risk in the general population, this increased risk may be due to other factors, such as associated lipid and metabolic abnormalities, including hypertriglyceridemia, rather than HDL levels alone [3-9, 15, 18, 19]. Testing should be conducted in the absence of acute illness, as triglyceride and lipoprotein (a) levels increase, and cholesterol levels decrease during inflammatory conditions. Lipid levels may change for up to 30 days after an acute myocardial infarction; however, results obtained within 24 hours of the event are usually sufficient to guide initial lipid-lowering therapy [5-10].

Clinically, only 45% of our patients had an obvious diagnosis (Table 1), highlighting the lack of important clinical information for biologists. The analysis of these data allowed us to find an association between dyslipidemia and other risk factors such as hypertension (RR = 1.38) and obesity (RR = 1.89). This association is consistent with findings from other studies [6, 7, 9, 10, 13]. The presence of cardiovascular complications such as heart failure, coronary syndrome, and ischemic stroke in more than 50% of dyslipidemic patients underscores the need for adequate management of these risk factors.

Our study recommends lifestyle modifications for all at-risk individuals, which include therapeutic education approaches such as smoking cessation, a balanced diet, and regular physical activity, with medical supervision always advised. These measures aim to reduce cardiovascular risk and improve the lipid profile.

Conclusion

This study reveals a high prevalence of dyslipidemia among subjects at the biochemistry laboratory of Mohammed VI University Hospital of Oujda. The findings may be underestimated, as many of these patients were already engaged with the health system and possibly on cholesterol-lowering therapy. This highlights the need for a national epidemiological survey of cardiovascular risk factors. Our results underscore the importance of implementing an information, communication, and education program focusing on the pathology, dietary guidelines, and adherence.

Dyslipidemic patients should be encouraged to adopt a healthy lifestyle and make lifestyle changes. This approach will benefit both individual patients and public health and could reach a significant portion of the Moroccan population.

Declaration

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Conflicts of interest/Competing interests
The authors declare no conflict of interest.

Authors' contributions

IN conceptualized the study, designed the research methodology, and drafted the initial manuscript. Provided critical revisions and finalized the manuscript. DL and ES conducted the data collection and analysis. Assisted in the interpretation of the results and contributed to the drafting of the manuscript. MC Contributed to the study design and analysis. Assisted with data interpretation and provided substantial revisions to the manuscript.

Ethics approval
The study was conducted following ethical guidelines and with approval from the Ethics and Biomedical Research Committee of Oujda.

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