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Prevalence of Dyslipidemia on the Basis of Biochemistry Tests in the Parakou University Teaching Hospital (Benin)

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Authors' contributions

This work was carried out in collaboration between all authors. Author MG designed the study, collected data and wrote the first draft of the manuscript. Author AA performed the statistical analysis. Authors LC and AD managed the literature searches and helped in editing of the manuscript. Author SA reviewed the work and the manuscript. All authors read and approved the final manuscript.

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ABSTRACT

Aims: Determine the prevalence of dyslipidemia in patients attended in the Parakou University teaching Hospital Biochemistry Laboratory (Republic of Benin).
Study Design: Cross-sectional retrospective study.
Place and Duration of Study: Biochemistry Laboratory of the Borgou/Alibori Regional University

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Teaching Hospital (CHUD-B/A) in Parakou (Republic of Benin); period from July 1, 2015 to December 31, 2015.
Methodology: Data were collected on the basis of the biochemical test register; they were related to lipid parameters. The criteria of the National Cholesterol Education Program Adult Treatment Panel III were used to identify dyslipidemia.
Results: The frequency of lipid profile request was 8.38%. Sex ratio (Men/Women) was 0.79. The mean age of the target population was 46.84 ± 13.61 years. The different types of dyslipidemia identified were: hypercholesterolemia (37.60%), HDL hypocholesterolemia (39.20%), LDL hypercholesterolemia (39.40%), hypertriglyceridemia (11.17%), mixed hyperlipidemia (6.30%) and atherogenic dyslipidemia (3.00%). HDL hypocholesterolemia was associated with male sex (*P* = *.000*) whereas LDL hypercholesterolemia was associated with age (*P* = *.03*).
Conclusion: Dyslipidemia prevalence high as identified in the study in the CHUD-B/A Biochemistry Laboratory. Studies among the general population should be conducted in order to identify the extent of those types of dyslipidemia in Benin.

Keywords: Benin; cholesterol; dyslipidemia; triglycerides.

1. INTRODUCTION

Cardiovascular diseases are the leading cause of mortality in the world [1]. Dyslipidemias are a health issue in the developed countries and are associated with increased risk for occurrence of cardiovascular diseases [2,3]. The developing countries are also affected due to the fact that they have adopted the western way of life [4].

Dyslipidemia is a condition in which alteration of lipid metabolism leads to an abnormal concentration of lipid parameters in plasma [5]. It plays a critical role in the expansion and progression of atherosclerosis [6,7].

Dyslipidemia is a modifiable risk factor for cardiovascular diseases. In fact, patients with dyslipidemia present 31% to 46% of high risk for coronary disease [8]. Cohort studies showed that increase of cholesterol level of 10 mg/dL is associated with a 9% increase of cardiovascular mortality [7]. However, prevalence of dyslipidemia is variable from a population to another [9]. The mean value of cholesterol levels among the general population declined over the last five decade. Actually, it dropped from 2.40 g/L in 1960 to 2.03 g/L in 2010 [10,11]. The increase in the proportion of adults using lipid-lowering medication, particularly in older age groups, likely contributed to the decreases in total and LDL cholesterol levels observed.

In Africa and Middle-East, the overall prevalence of dyslipidemia among the general population is still high; it is estimated at 70% [12]. It varies from one country to another. This prevalence is estimated at 60% in Nigeria [13], and 63.8% in Senegal [14].

The prevalence of dyslipidemia was determined in Côte d'Ivoire [15] and Senegal [16] on the basis of lab tests; but very little is known about the issue in Benin.

This study aims to determine the prevalence of dyslipidemia in the patients attended in the Parakou University Teaching Hospital Biochemistry Laboratory (Republic of Benin).

2. MATERIALS AND METHODS

2.1 Type and Period of Study

This work was a cross-sectional and descriptive study with retrospective collection of data in the biochemistry laboratory of the Borgou/Alibori Regional University Teaching Hospital (CHUD-B/A) in Parakou /Republic of Benin. It is carried out during the period from July 1, 2015 to December 31, 2015.

2.2 Data Collection

The data were collected based on the biochemistry test register. We included in the study all the patients with lipid profile during the study period, regardless of the number of biochemistry tests requested.

Serum lipid parameters such as total cholesterol, HDL cholesterol and triglycerides were measured through standard enzymatic methods with an automated multi-parameter analyzer (Rayto Chemray 120). LDL cholesterol level was obtained through calculation by using the formula of Friedewald et al. [17] if triglyceridemia is below 3.4 g/L.

2.3 Operationalization of Variables

The criteria used to determine the types of dyslipidemia are those of the National Cholesterol Education Program Adult Treatment Panel III (NECP ATP III) [18]. Hypercholesterolemia : total cholesterol > 2 g/L; HDL hypocholesterolemia : HDL cholesterol < 0.40 g/L; hypertriglyceridemia : triglycerides > 1.50 g/L; mixed hyperlipidemia : total cholesterol > 2 g/L and triglycerides > 1.50 g/L; LDL hypercholesterolemia : LDL cholesterol > 1.30 g/L; atherogenic dyslipidemia : HDL cholesterol < 0.40 g/L, triglycerides > 1.50 g/L and LDL cholesterol > 1.30 g/L.

2.4 Statistical Analysis

SPSS 17 software (*SPSS for Windows, Version 17.0, IL, USA*) was used to perform data quantitative analysis. The qualitative variables were presented in the form of percentage and the quantitative ones were in the form of average and standard deviation. Student t test helped compare the averages. Chi^2 independence test was used to determine the relationship between the different types of dyslipidemia, age and sex. Significance level was 5%.

3. RESULTS

During the study period, 10 728 tests were requested with the CHUD-B/A biochemistry laboratory, of which 899 were lipid profile requests; frequency of lipid profile request was 8.38%. The monthly frequency of lipid profile request is shown in Fig. 1.

Men represented 44.20% (n=397) of lipid profile request against 55.80% (n=502) for women. Sex ratio (Men/Women) was 0.79.

The mean age of the study target population was 46.84 ± 13.61 years. Men had a mean age (49.21 ± 13.58 years) higher than the one of women (44.93 ± 13.35 years) (*P = 0.00*). The predominant age group was the one of young adults (18 to 50 years), with 62.63% (n=563) of lipid profile requests.

The mean values of HDL cholesterol and triglycerides were significantly different between men and women (*P = .000* and *.030* respectively) (Table 1).

Isolated dyslipidemias were predominant, i.e. LDL hypercholesterolemia (39.40%), hypercholesterolemia (37.60%), HDL hypocholesterolemia (39.20%) whereas atherogenic dyslipidemia (3.00%) was less identified in the study target population (Table 2).

Table 3 shows the distribution of dyslipidemias according to sex and age groups. HDL hypocholesterolemia was associated with male sex (*P = .000*) whereas LDL hypercholesterolemia was associated with age (*P = .03*).

4. DISCUSSION

This research work helped us determine the prevalence of dyslipidemia in the CHUD-B/A, a university teaching hospital located in North-Benin.

The frequency of lipid profile request over a six-month period in the biochemistry laboratory of that hospital was 8.38%. Studies conducted in Côte d'Ivoire [15] and Senegal [16] reported similar frequencies, 5.7% and 9% respectively. The low frequency of lipid profile request in the

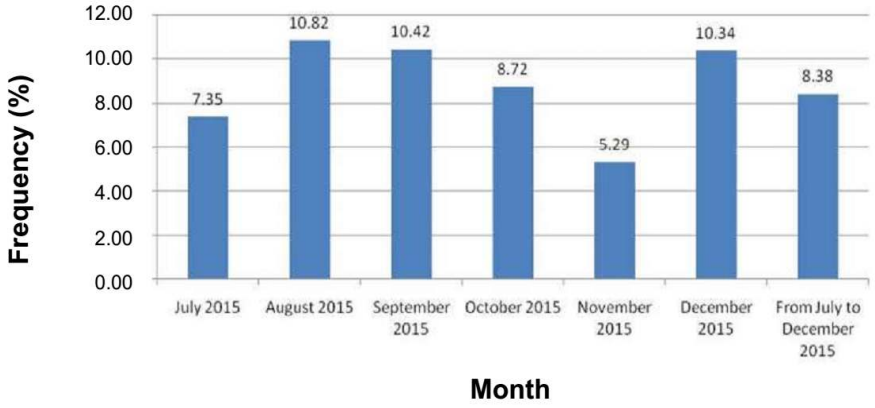

Fig. 1. Frequency of lipid profile request, CHUD-B/A Biochemistry Laboratory, 2015

Table 1. Mean values (g/L) of lipid parameters, CHUD-B/A Biochemistry Laboratory, 2015

	Men (n=397)	Women (n=502)	P	Total
Total cholesterol	1.86±0.54	1.91±0.50	.15	1.89±0.52
HDL cholesterol	0.43± 0.16	0.49± 0.20	.000	0.46±0.19
Triglycerides	1.02±0.58	0.94±0.49	.03	0.97±0.53
LDL cholesterol	1.22±0.48*	1.24±0.42**	.60	1.23±0.45***

**Calculated on the basis of n = 396; ** n = 498; ***n = 894. Because the triglycerides higher than 3.4 g/L and Friedewald formula is not applicable*

Table 2. Prevalence of the different types of dyslipidemia, CHUD-B/A Biochemistry Laboratory, 2015

		Number of normal individuals	Sick individuals			
			Number	Percentage (%)	Mean (g/L)	Standard error (g/L)
Types of dyslipidemia						
Hypercholesterolemia		561	338	37.60		
HDL Hypocholesterolemia		547	352	39.20		
Hypertriglyceridemia		794	105	11.17		
LDL Hypercholesterolemia		545	354	39.40		
Mixed hyperlipidemia		842	57	6.30		
Atherogenic dyslipidemia		872	27	3.00		
Value of the lipids of individuals with dyslipidemia						
Hypercholesterolemia					2.37	0.02
HDL Hypocholesterolemia					0.29	0.00
Hypertriglyceridemia					2.07	0.06
LDL Hypercholesterolemia					1.64	0.02
Mixed hyperlipidemia	Total cholesterol				2.60	0.11
	Triglycerides				2.10	0.09
Atherogenic dyslipidemia	HDL cholesterol				0.31	0.02
	Triglycerides				1.96	0.08
	LDL cholesterol				1.71	0.06

CHUD-B/A could be due to the poor socioeconomic conditions of the patients, since most of them are presented as indigents, and are unable to pay medical prescriptions, even less biological tests. In other hand, dyslipidemias are asymptomatic and the patients are unaware of its health problem, unlike diabetes.

Most subjects were female as regards lipid profile request, with a sex ratio (M/F) of 0.79. This result is significantly different from that of Doupa et al. [16] who found in their study a sex-ratio of 0.6 (*P = .002*). This female predominance in our research work may be due, on the one hand, to female predominance among the population of Parakou in particular and of Benin in general, according to the results of the Third General Census of Population and Housing conducted in 2002, and on the other hand, to predominance of overweight and obesity in women [19].

In our study, the mean age of the target population was 46.84 ± 13.61 years. Doupa et al. [16] reported a mean age of 55.15 ± 16.2 years. In a Mediterranean study conducted among the general population in Jordania, Khader et al. [20] found out a mean age of 46.2 years. The mean age of our study target population and predominance of young adult subjects (18 to 50 years) may be due to the fact that lipid profile requests at CHUD-B/A are mostly submitted by the medicine and specialty unit where care is provided free of charge to young people living with HIV, within the framework of their monitoring.

Table 3. Prevalence of dyslipidemia according to sex and age groups, CHUD-B/A Biochemistry Laboratory, 2015

		Total	Hypercholesterolemia	HDL Hypocholesterolemia	Hypertriglyceridemia	Mixed hyperlipidemia	LDL Hypercholesterolemia	Atherogenic dyslipidemia
Sex	Male	397	141 (35.52)	182 (45.84)	49 (12.34)	29 (7.30)	153 (38.54)	12 (3.02)
	Female	502	197 (39.24)	170 (33.86)	56 (11.16)	28 (5.58)	201 (40.04)	15 (2.99)
	P		.25	.000	.58	.29	.65	.98
Age groups (years)	<18	10	2 (20.00)	6 (60.00)	2 (20.00)	1 (10.00)	2 (20.00)	1 (10.00)
	18-50	563	201 (35.70)	241 (38.01)	59 (10.48)	31 (5.51)	205 (36.41)	14 (2.49)
	51-60	179	70 (39.11)	78 (43.58)	28 (15.64)	17 (9.50)	77 (43.02)	8 (4.47)
	≥61	147	65 (44.22)	54 (36.73)	16 (10.88)	8 (5.44)	70 (47.62)	4 (2.72)
	P							
	Global		.16	.27	.23	.25	.03	.31
	<18 VS 18-50		.30	.16	.33	.54	.28	.14
	<18 VS 51-60		.23	.31	.71	.96	.15	.42
	<18 VS ≥61		.13	.14	.38	.55	.09	.20
	18-50 VS 51-60		.41	.18	.06	.06	.11	.17
	18-50 VS ≥61		.06	.78	.89	.98	.01	.87
	51-60 VS ≥61		.35	.21	.21	.17	.41	.40

Values are n with % in parenthesis

Our study indicated that HDL cholesterol average was significantly higher in women whereas the one of triglycerides was significantly higher in men. This result is different from the one reported by Sun et al. [21] among a Chinese population; these researchers found out that total cholesterol level was significantly higher in women whereas LDL cholesterol was significantly higher in men. A different result was reported in a Tunisian study where averages of total cholesterol and triglycerides were significantly higher in women than in men [22]. The differences noted between dyslipidemia prevalences may be due not only to a difference in lifestyle but also to genetic factors [23].

Isolated dyslipidemias (hypercholesterolemia, HDL hypocholesterolemia and LDL hypercholesterolemia) were the most represented whereas atherogenic dyslipidemia was the less encountered in our study. This result is consistent with the observations made in previous studies, especially in Senegal [16] and in China [24]. According to a study conducted in Iran, predominant dyslipidemias were HDL hypocholesterolemia (34.3%) and hypertriglyceridemia (25.0%) [25]. The most common dyslipidemia in Korea were HDL hypocholesterolemia and hypertriglyceridemia [7]. According to studies, these variable prevalences of dyslipidemia may be due to the diversity of lifestyle, ethnic and racial differences.

Our study highlighted a high prevalence of dyslipidemia in general, but HDL hypocholesterolemia was significantly frequent in men than in their women counterparts. Doupa et al. [16] found that the prevalences of hypercholesterolemia, LDL hypercholesterolemia, hypertriglyceridemia and mixed hyperlipidemia were significantly higher in women compared to men, whereas prevalence of HDL hypocholesterolemia were significantly higher in men. In addition to HDL hypocholesterolemia, hypercholesterolemia was the isolated dyslipidemia significantly identified in women [24].

Hospital-based studies [26] and studies conducted among the general population reported an association between dyslipidemia, particularly hypercholesterolemia, HDL hypocholesterolemia, hypertriglyceridemia and age [20,27-29]. In this research work we noted that LDL hypercholesterolemia is associated with age.

This research work has limitations. As a matter of fact, data collection from the record of tests in the biochemistry lab did not enable to get patients' clinical characteristics. Moreover, we got no information on the indication of lipid profile request since the laboratory also attends both patients and those who have come for health check-up. Therefore, the results obtained may not represent the lipid profile of the general population of Parakou in particular and Benin in general.

5. CONCLUSION

Our study has pointed out a low request of lipid profile and high prevalence of dyslipidemia in the CHUD-B/A Biochemistry Laboratory. HDL hypocholesterolemia is associated with male sex whereas LDL hypercholesterolemia is associated with age. Studies among the general population should be carried out in order to identify the extent of those types of dyslipidemia in Benin.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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