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Factors Associated with Dyslipidemia in Adults Assisted by the Family Health Strategy in a Slum in Northeast Brazil

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Abstract

Among the factors associated with dyslipidemia, sociodemographic characteristics stand out, such as education and income and, from this perspective, less economically favored populations, such as those living in slums, are more likely to be affected by chronic non-communicable diseases when compared higher income populations. Therefore, considering the scarcity of studies related to the prevalence of dyslipidemia and its associated factors in inhabitants of slum areas, the objective of this study was to analyze the factors associated with dyslipidemia in adults assisted by the Family Health Strategy (FHS), living in slum areas, in Recife, Pernambuco. This is a cross-sectional, secondary-based study. Possible associations of dyslipidemia (isolated hypercholesterolemia or isolated hypertriglyceridemia) with demographic, socioeconomic and behavioral variables, body composition, and morbidities were analyzed using Poisson Regression, considering $p<0.05$. Of the 491 adults, 46.2% had dyslipidemia, which was higher in men compared to women (PR=1.70; 95%CI:1.41-2.03), with a progressive increase from the age of 30 and stabilizing around the 40-year-old range. Prevalence was higher among those who were insufficiently active (PR=1.21; 95%CI:1.01-1.45), with greatly increased waist circumference (PR=1.78; 95%CI:1.36-2.34), and with increased blood pressure (PR=1.35; 95%CI:1.11-1.63). It is necessary to reinforce health promotion activities within the scope of the FHS for the investigated population, as well as to encourage the practice of physical activity in health academies, in addition to disseminating information regarding the fight against factors associated with dyslipidemia.

Keywords: Dyslipidemias. Risk factors. Poverty areas. Cross-sectional studies.

INTRODUCTION

The progressive increase in chronic non-communicable diseases (CNCDs), to the detriment of infectious and parasitic diseases, alongside the inversion of malnutrition/excess weight patterns, is the current epidemiological scenario in developed and developing countries, which has been building since the 1980's[1]. In this context, less economically favored populations disproportionately tend to be more affected by such diseases than those with higher incomes[1].

Inserted in the group of CNCDs, dyslipidemias are now considered one of the main factors in the occurrence of cardiovascular diseases, representing an important cause of morbidity and mortality in Brazil and in several other countries[2]. Dyslipidemias are clinically and epidemiologically characterized as

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abnormal concentrations of lipids or lipoproteins in the blood[3].

Among the factors associated with dyslipidemia, sociodemographic characteristics stand out (gender, age group, education, and income), body composition (nutritional status and waist circumference), as well as behavioral factors such as eating habits[4-6]. The monitoring of these and other factors that are specific to each structure and situational circumstance represents a constant and interactive process, which can provide data that subsidize policies for the promotion and recovery of the population's health[2,6].

According to the Ministry of Health, Primary Health Care, through the Family Health Strategy (FHS), is the privileged space for the promotion, prevention, and control of chronic comorbidities, as it is in the local context in which the population is known, associated with, and accompanied over time[7].

In Pernambuco, according to data from the 3rd State Health and Nutrition Survey in 2006, 30.6% of adults had dyslipidemia[8]. Considering this context and the scarcity of studies related to the prevalence of dyslipidemia with measured biochemical data, in inhabitants of slum areas, and because knowledge of the epidemiological picture of these diseases is important for public health, as well as the existence of divergences in the literature on the factors associated with the problem[6,9-10], this study's results may be used for the planning and evaluation of interventions within the scope of the FHS.

The complex reality of these areas is also highlighted, which is marked by inequality, precarious sanitation conditions, unhealthy housing, and lack or insufficiency of health services[7]. Thus, the objective was to analyze the factors associated with dyslipidemia in adults assisted by the FHS, living in a slum area, in Recife, Pernambuco.

METHODS

A cross-sectional study was carried out, using data from the research "Health, nutrition and assistance services in a slum population in Recife: a baseline study". This was a survey proposed to establish the baseline of a cohort study, focused on priority healthcare issues.

The research was carried out in a low-income community/slum (favela), in the Boa Vista neighborhood (Coelhos Community), in the city of Recife, PE. The investigated scenario has a territorial area of 43 hectares[2], with a population of 7,633 inhabitants, represented by 3,571 men (46.78%) and 4,062 women (53.22%) according to the 2010 census. Recife presented, in 2010, a human development index (HDI) of 0.772, which is considered the highest in the Northeast of Brazil[11].

According to the Brazilian Institute of Geography and Statistics (IBGE), the term "favela" is conceptualized as a subnormal urban agglomeration, a term still little known, which consists of areas "arranged in a disorderly way, dense and deficient, for the most part, of essential public services". This reiterates the difference between areas with definitions of normality and, consequently, abnormality, reaffirming them as zones of exclusion. This concept has a certain degree of generalization, in order to encompass the diversity of existing irregular settlements in Brazil, known as favelas, invasions, grotas, baixadas, communities, villages, ressaca, mocambo, palafita, among others[12].

Household-based data collection took place between June and December 2014, in the adult population of the Coelhos commu-

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nity, assisted by two FHS Units.

For the sample calculation, a group of 3,816 adults between 20- and 59-years old residing in the Coelhos community was taken as a reference, estimated by the Primary Care Information System (PCIS) in Recife. A prevalence of 30% of dyslipidemia (hypercholesterolemia/hypertriglyceridemia) was considered among adults in the referred age group, in the Metropolitan Region of Recife[8]. An estimation error of 4 percentage points was assumed, a confidence interval of 95% and a percentage of 10% for possible data losses and/or inconsistencies, reaching a minimum sample of 480 participants.

Since the present study sought to test the association of explanatory variables with dyslipidemia, a posteriori calculations were performed to estimate differences in the set of independent variables. Thus, we considered a 1-α error of 95%, 1-β study power of 80%, an estimated prevalence of 25% among the unexposed group, and 40% in the exposed group. In this statistical condition, the study would have sufficient power to detect prevalence ratios of 1.60 or more as an association factor.

Sampling was of the probabilistic type and adults were referred by a simple random draw from a numbered list of adults in the households, with a probability proportional to the adult population in the ratio of one in four people, without replacement.

Data were obtained through semi-structured questionnaires. Eight interviewers were trained to apply the questionnaires and five professionals collected anthropometric data, measuring blood pressure and weight, height, and waist circumference. Biochemical tests were performed by contracting a private laboratory. A pilot study was carried out to test the collection instrument and the field work logistics.

The dependent variable of the study was the presence of at least one type of dyslipidemia (isolated hypercholesterolemia or isolated hypertriglyceridemia) and confirmed by performing biochemical tests for the LDL-cholesterol and triglycerides. LDL-cholesterol value ≥160mg/dl or triglyceride value ≥150mg/dl were classified as dyslipidemia, according to the Updated Brazilian Guideline for Dyslipidemia and Atherosclerosis Prevention – 2017[3].

The independent variables were grouped into: a) demographic: gender (male and female); age group (20-29, 30-39, 40-49, and 50-59 years old), and reported color/race (white, black, brown, and others - yellow and indigenous); b) socioeconomic: economic class (B1/B2, C1/C2, and D/E); schooling (>8 and ≤8 years of study); occupation (sporadic work, employed/self-employed, not working/unemployed, and collecting social benefits); and basic sanitation (garbage disposal, waste disposal, and water supply - general network/public collection and others); c) behavioral: weekly food consumption (beans, fruits, vegetables, legumes, sweets, and soft drinks or artificial juices - <5 and ≥ 5 times a week); meats with excess fat (no and yes); physical activity (active and insufficiently active); smoking (current smoker/ex-smoker and does not smoke), and alcohol abuse (no and yes); d) body composition: Body Mass Index (<25 kg/m^2 and ≥25kg/m^2) and waist circumference (normal, increased and greatly increased); e) morbidities: diabetes mellitus and arterial hypertension (no and yes).

The economic class was evaluated based on the criteria of the Brazilian Association of Research Companies – BARC[13], defined according to a point system that considers the ownership of assets and the level of education of the head of the family.

Food consumption was investigated using the weekly consumption questionnaire used by the System for Surveillance of Risk and Protection Factors for Chronic

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Diseases by Telephone Survey (VIGITEL)[14], and for statistical analysis purposes, the variables were categorized into: <5 and ≥ 5 times a week. To assess alcohol abuse, consumption of five or more doses (men) and four or more doses (women) on a single occasion, at least once in the last 30 days, was considered. A dose of alcoholic beverage was considered as the amount corresponding to half a bottle or a can of beer, a glass of wine or a dose of liquor, whiskey, or any other distilled alcoholic beverage[14].

The short version of the International Physical Activity Questionnaire (IPAQ) was used to determine the level of physical activity[15]. This instrument measures the frequency and duration of moderate and vigorous physical activity and walking performed in the last week for at least ten continuous minutes, including standardized exercises, sports, occupational and recreational physical activities performed at home, in their free time, as a means of transportation and leisure. The criteria established for this questionnaire refer to four categories of physical activity level: very active, active, irregularly active, and sedentary. For analyses, these variables were re-categorized into "sufficiently active" (very active + active) and "insufficiently active" (irregularly active + sedentary).

The relationship between weight and height was obtained from the body mass index (BMI) and adults were classified according to the recommendations of the World Health Organization (WHO)[16]. Weight was measured using a Seca® 876 digital scale, with a capacity of up to 250 kg and a scale of 100 grams, with individuals being barefoot, wearing minimal clothing, and without any object in their pockets, or on their hands or head. To measure height, a portable stadiometer, brand Altura Exact, Ltd., in millimeters, with precision of up to 1mm was used. The examinees were in an upright position, barefoot, with upper limbs hanging along their body. To obtain the waist circumference (WC), the smallest curvature between the costal margin and the iliac crest was used as a reference, taking measurements using an inextensible tape in centimeters, and classifying the results according to the WHO[16].

Regarding hyperglycemia, biochemical tests of fasting blood glucose were performed, considering those with blood glucose ≥126 mg/dl or with reports of prescribed use of hypoglycemic agents as cases[17]. As for increased blood pressure (BP), BP was measured according to standardized procedures[3]. We considered as cases of increased BP the values of systolic BP ≥140 mmHg and/or diastolic BP ≥90 mmHg, or those who reported the use of antihypertensive medication. Biochemical tests for classification of dyslipidemia and diabetes mellitus (DM) were performed by collecting blood from the cubital vein in a tube with an EDTA-K3E Vacutainer, after a 12-hour overnight fast, and analyzed by an enzymatic colorimetric method (Biosystems BA 400 Biochemistry Analyzer™).

Initially, descriptive analyses of the independent variables were performed in order to characterize the distribution of their frequencies. For the analysis of possible collinearities between the independent variables, Pearson's correlation test was used, considering values of r≥0.50. To assess the possible factors associated with dyslipidemia, crude analyses were performed using the Wald test. The variables that were p<0.20 in the crude analyses were selected for multivariate regression analysis, in a hierarchical way. Following a block modeling, the socioeconomic variables were considered more distal variables and were included in the first block, keeping the variables that showed a statistically significant association with dyslipidemia in the model (p<0.05). This

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procedure was repeated for the following blocks, as follows: second block (behavioral variables), third block (variables related to body composition and morbidities), and fourth block (demographic variables). The analyses were performed using Poisson Regression, with robust adjustment of the standard error.

Results were expressed as Prevalence Ratio (PR) and 95%CI. Statistical analyses were processed using the Statistical Package for Social Sciences software, version 13.0 (SPSS Inc., Chicago, United States) and Stata, version 14.0 (Stata Corp., College Station, United States).

The primary research was approved by the research ethics committee of the Prof. Fernando Figueira Institute of Integral Medicine, opinion no. 3.201 – 12 in accordance with the precepts of CNS Resolution 466/12. The investigated adults, informed about their voluntary participation in the study, signed the informed consent form.

RESULTS

The demographic and socioeconomic characteristics of the 491 participants are shown in Table 1. Most were female (66.8%), aged between 50 and 59 years old (28.1%). Most had >8 years of study (55.9%) and belonged to economic classes C1/C2 (58.2%).

The prevalence of dyslipidemia in adults residing in the studied community was 46.2%. When analyzing possible associations with demographic and socioeconomic variables, there was a predominance among men (58.3%) in relation to women (40.2%), increasing progressively and proportionally with the increase in age group.

No difference was observed in the prevalence of dyslipidemia between the categories of race/ethnicity variables, in the stratifications by economic classes and years of schooling. As for professional occupation, there was a greater probability of dyslipidemia among adults with social benefits and for variables related to basic sanitation among adults who had a general water supply network (Table 1). However, only water supply was statistically associated with the outcome in the crude analysis.

There were no differences in the prevalence of dyslipidemia between the categories of variables related to food consumption and alcohol abuse (Table 2). There was a greater probability of dyslipidemia among adults who preferred to consume meat with excess fat (PR: 1.20; 95%CI: 0.99-1.46), "insufficiently active" adults (PR: 1.29; 95%CI: 1.05-1.58), the group of smokers and former smokers (PR: 1.12 - 95%CI: 0.91-1.39), and individuals with BMI ≥ 25kg/m^2 (PR: 1.62 - 95%CI: 1.24-2.12). In relation to WC, a predictor of central obesity, dyslipidemia probability increased among cases with increased (PR: 1.33 - 95%CI: 0. 96-1.85) and greatly increased WC (PR: 1.70 - 95%CI: 1.31-2.21). For morbidities, the outcome was higher among those with hyperglycemia (PR: 1.43 - 95%CI: 1.18-1.74) and increased BP (PR: 1.67 - 95%CI: 1.39-2, 01). Such variables were statistically associated with dyslipidemia in the crude analysis.

After adjustment through hierarchical multivariate analysis (Table 3), five variables remained that were statistically associated with the outcome ($p<0.05$): insufficiently active (PR=1.21; 95%CI: 1.01; 1.46), greatly increased WC (PR=1.73; 95%CI: 1.32; 2.27); increased BP (PR=1.35; 95%CI: 1.11; 1.64), male gender (PR=1.67; 95%CI: 1.39; 2.01), and age group of 50-59 years old (PR:1.49; 95% CI:1.01; 2.22).

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Table 1 – Prevalence and Crude Prevalence Ratio of dyslipidemia in adults (20-59 years old) enrolled in the Family Health Strategy, according to demographic and socioeconomic variables. Recife, PE, 2014.

Variables	Sample		Dyslipidemia		Crude PR	p[a]
	N	%	N	%	(95% CI)	
Demographics						
Sex	**491**					<0.001
Female	328	66.8	132	40.2	1.0	
Male	163	33.2	95	58.3	1.45 (1.20-1.74)	
Age group (years)	**491**					<0.001
20-29	85	17.3	22	25.9	1.0	
30-39	133	27.1	55	41.4	1.60 (1.06-1.41)	
40-49	135	27.5	75	55.6	2.15 (1.45-3.17)	
50-59	138	28.1	75	54.3	2.10 (1.42-3.10)	
Race/Skin Color	**488[b]**					0.971
White	93	19.1	42	45.2	1.0	
Brown and others	342	70.1	158	46.2	1.03 (0.79-1.31)	
Black	53	10.9	25	47.2	1.04 (0.73-1.50)	
Socioeconomic						
Economic class	**491**					0.927
B1 / B2 (3½ - 7 MWc)	28	5.7	12	42.9	1.0	
C1 / C2 (1½ -2 MW)	286	58.2	132	46.2	1.08 (0.70-1.68)	
D / E (1MW)	177	36.0	83	46.9	1.09 (0.69-1.73)	
Education (years)	**483**					0.297
>8	270	55.9	119	44.1	1.0	
≤8	213	44.1	104	48.8	1.11 (0.91-1.34)	
Occupation	**491**					0.428
Occasional workd	88	17.9	36	40.9	1.0	
Employee/Self Employed	225	45.8	104	46.2	1.13 (0.85-1.51)	
Not workinge Unemployedf	154	31.4	73	47.4	1.16 (0.86-1.57)	
Social Benefíciaryg	24	4.9	14	58.3	1.42 (0.93-2.17)	
Basic Sanitation						
Waste collection	**491**					0.320
General network	447	91.0	210	47.0	1.0	
Other[h]	44	9.0	17	38.6	0.82 (0.56-1.21)	
Waste destination	**491**					0.851
General network	238	48.5	109	45.8	1.0	
Other[i]	253	51.5	118	46.6	1.02 (0.84-1.23)	
Water supply	**491**					0.122
General network	464	94.5	219	47.2	1.0	
Other[j]	27	5.5	8	29.6	0.63 (0.35-1.13)	

PR: Prevalence Ratio; 95% CI: 95% Confidence Interval. a: Wald test p-value; b: Differences in sample values for some variables are due to loss of observations, due to incomplete questionnaires and/or data inconsistency; c: MW: minimum wage; d: sporadic work/handyman/street vendor; e: Never worked and housewives; f: Has already worked, but was unemployed for 30 days or more; g: retiree, pensioner, provisional benefits; h: burned, vacant land, deposited in a bucket for collection and other situations; i: pit with and without cover, water course, open air, and other situations; j: well, cistern, fountain, and other situations.
Source: Direct survey data.

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Table 2 – Prevalence and crude prevalence ratio of dyslipidemia in adults (20-59 years) enrolled in the Family Health Strategy, according to behavioral variables, body composition and morbidities. Recife, PE, 2014.

Variables	Sample		Dyslipidemia		Crude PR	p[a]
	N	%	N	%	95% CI	
Behavior						
Weekly food intake						
Beans	**491**					0.482
≥ 5 times	336	68.4	159	47.3	1.0	
< 5 times	155	31.6	68	43.9	0.93 (0.75-1.14)	
Greens and vegetables	**491**					0.736
≥ 5 times	208	42.4	98	47.1	1.0	
< 5 times	283	57.6	129	45.6	0.97 (0.80-1.17)	0.093
Fruit	**491**					
≥ 5 times	160	32.6	65	40.6	1.0	
< 5 times	331	67.4	162	48.9	1.20 (0.97-1.50)	
Soda or artificial juice	**491**					0.886
< 5 times	338	68.8	157	46.4	1.0	
≥ 5 times	153	31.2	70	45.8	0.98 (0.80-1.21)	
Candy	**491**					0.201
< 5 times	403	82.1	192	47.6	1.0	
≥ 5 times	88	17.9	35	39.8	0.83 (0.63-1.10)	
Meats with excess fat	**491**					0.065
No	342	69.7	149	43.6	1.0	
Yes	149	30.3	78	52.3	1.20 (0.99-1.46)	0.378
Excessive alcohol consumption	**491**					
No	315	64.2	141	44.8	1.0	
Yes	176	35.8	86	48.9	1.09 (0.89-1.33)	
Smoking	**491**					0.289
Non-smoking	376	76.6	169	44.9	1.0	
Smoker/Ex-smoker	115	23.4	58	50.4	1.12 (0.91-1.39)	
Physical activity	**491**					0.014
Sufficiently active	386	78.6	168	43.5	1.0	
Insufficiently active	105	21.4	59	56.2	1.29 (1.05-1.58)	
Body composition						
BMI[b] (kg/m²)	**491**					<0.001
<25	135	27.5	43	31.9	1.0	
≥25	356	72.5	184	51.7	1.62 (1.24-2.12)	
CC[c]	**489[d]**					<0.001
Normal	142	29.0	46	32.4	1.0	
Increased	93	19.0	40	43.0	1.33 (0.96-1.85)	
Greatly Increased	254	51.9	140	55.1	1.70 (1.31-2.21)	
Morbidities						
Hyperglycemia	**488**					<0.001
No	391	80.1	166	42.5	1.0	
Yes	97	19.9	59	60.8	1.43 (1.18-1.74)	

to be continued..

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continuation table 2...

Variables	Sample		Dyslipidemia		Crude PR	p[a]
	N	%	N	%	95% CI	
Increased Blood Pressure	**491**					<0.001
No	298	60.7	109	31.6		
Yes	193	39.3	118	61.1	1.67 (1.39-2.01)	

PR: Prevalence ratio; CI95%: Confidence Interval = 95%; a: Wald test p-value; b: BMI - Body Mass Index; c: WC - Waist Circumference; d: Differences in sample values for some variables are due to loss of data due to incomplete questionnaires/or data inconsistency.
Source: Direct survey data.

Table 3 – Final model - hierarchical multivariate analysis of dyslipidemia in adults (20-59 years old) enrolled in the Family Health Strategy. Recife, PE, 2014.

Block[a]	Variables	PR adjusted	95% CI	P[c]
I	**Water supply**			
	General network	-	-	
	Others	-	-	
II	**Fruit**			**-**
	≥ 5 times	-	-	
	< 5 times	-	-	
	Meats with excess fat			**-**
	No	-	-	
	Yes	-	-	
	Physical activity			**0.038**
	Sufficiently active	-	-	
	Insufficiently active	1.21	1.01-1.46	
III	**BMId (kg/m2)**			**-**
	< 25	-	-	
	≥ 25	-	-	
	CCe			**<0.001**
	Normal	-	-	
	Increased	1.28	0.93-1.75	
	Greatly Increased	1.73	1.32-2.27	
	Increased Blood Pressure			**0.002**
	No	-	-	
	Yes	1.35	1.11-1.64	
	Hyperglycemia			**-**
	No	-	-	
	Yes	-	-	
IV	**Sex**			**<0.001**
	Female	-	-	
	Male	1.67	1.39-2.01	
	Age group (years)			**0.056**
	20-29	-	-	
	30-39	1.33	0.89-1.98	
	40-49	1.63	1.11-2.40	
	50-59	1.49	1.01-2.22	

PR: Prevalence ratio CI95%; 95% Confidence Interval; a: Block 1 composed only of water supply, but it did not remain because it was not significant. Block 2 was controlled by fruit consumption and meat consumption. Block 3 controlled by physical activity. Block 4 controlled for physical activity, waist circumference and increased blood pressure; b: Wald test p-value; c: p-value from the Poisson Regression test; d: BMI – Body Mass Index; e: WC - Waist Circumference.

Source: Direct survey data.

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DISCUSSION

There was a high prevalence of dyslipidemia among adults, higher in males. A growth gradient in prevalence with increasing age was also highlighted, in addition to associations with the presence of dyslipidemia and with increased waist circumference and blood pressure.

Comparing with other data in the literature, the high prevalence of dyslipidemia was also found in the study by Valença et al. (64, 25%) in adults from Vicosa, Minas Gerais. However, contrary to the results of the present study, adults between 20 and 29 years old had higher percentages of inadequate intake of saturated fats, and therefore more dyslipidemia than the other age groups; a fact that may be related to the presence of a dietary pattern rich in ultra-processed foods.

The prevalence of dyslipidemia among 46.2% of the adults interviewed reveals a worrying situation, which until now was little known, regarding special populations such as indigenous peoples, quilombolas, and those in vulnerable situations like slum residents. This result is similar to that presented in the Brazilian Longitudinal Study of Adult Health[18], which identified 45.5% with dyslipidemia. Data released by VIGITEL, in 2016, for the Brazilian population point to a lower prevalence of dyslipidemia (22.6%)[19]. This result was also observed in the State of Pernambuco, in 2006, with a 30% prevalence of dyslipidemia[8].

Considering a more appropriate cut (keeping in mind that indigenous populations and residents of slums present situations of vulnerability as mentioned above), a survey on the lipid profile of Suyá Indians, in Mato Grosso, showed a prevalence of 63.9% of dyslipidemia in the investigated population[20]. This result is greater than that found in the Coelhos community, object of the present study.

International studies carried out with adults in a rural population in China (2014) and in a population-based survey in Spain (2008-2010) found a prevalence of 45.8%[21] and 44.9%[22], respectively, corroborating with the results found in the population of Coelhos, in Recife, PE.

The most vulnerable populations are undergoing a nutritional transition, even if later than other more economically favored Brazilian populations, possibly due to increased purchasing power and increased sedentary lifestyle. The increase in purchasing power, resulting from national public policies, such as the Bolsa Família, which, associated with the installation of electricity and access to technologies at home, contributed to the reduction of energy expenditure in work activities. In addition, the diet that used to be mostly composed of in natura products is being changed by the consumption of industrialized foods such as sausages and frozen foods, causing an increase in the occurrence of overweight, obesity, and consequently, dyslipidemia and cardiovascular risk.

It can be inferred, based on existing and limited data obtained from a low-income community, that dyslipidemia has already reached, in this community, the highest levels of epidemiological occurrence, demonstrating an important process in terms of collective health. An initial question to be considered is the appreciation of the methodology used to assess the collective levels of dyslipidemia. In fact, laboratory dosage techniques for serum lipids and the cut-off points adopted in their classification can substantially hinder the validity of comparisons.

It is necessary to correct these possible deviations, either through normative standardization that can reframe these discrepancies, or by considering each author's own justification for their criteria. The present study considered dyslipidemia as the presence of at

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least one type of disease (isolated hypercholesterolemia or isolated hypertriglyceridemia, according to the classification of the Updated Brazilian Guideline for Dyslipidemia and Atherosclerosis Prevention – 2017[3]. In the research by Moraes *et al.*[5], dyslipidemia was considered as the presence of at least one lipid alteration according to the recommendations of the National Cholesterol Education Program NCEP-ATPIII. Moreover, Nunes Filho *et al.*[23] considered the criteria of the 1st Brazilian Guideline for the diagnosis and treatment of the metabolic syndrome for the determination of dyslipidemia[23].

Within this perspective, it is opportune and pertinent to consider the results produced by VIGITEL, which represents the most widespread, systematized, and updated source of Brazilian information on CNCDs, although with self-reported data. Therefore, the low values of prevalence of dyslipidemia (22.6%) in Brazil, in 2016[19], seem somewhat underestimated when compared to other national and international studies on the problem. It would be admissible to conceive that the expression dyslipidemia could not yet be widespread among popular thought or language, as is the case of DM and SAH, or even "high cholesterol", which in a way is incorporated into the concept of dyslipidemia, but in fact is not an equivalent.

In the present study, no significant associations were observed between socioeconomic variables and dyslipidemia, probably because the group was homogeneous in terms of these characteristics. However, it is likely that adults living in poor communities are more likely to develop chronic diseases because they are more exposed to different risk factors, since this is a more vulnerable population. More investigations are needed to reach more conclusions about this fact.

The higher prevalence of insufficiently active adults and their statistically significant association with dyslipidemia, observed in the present study, was also demonstrated by Moraes *et al.*[5], in Ribeirão Preto-SP, and by Lee *et al.*[24], in Texas. According to a report by Fernandes *et al.*[25] in eight studies in the city of São Paulo, the continued practice of physical exercises throughout life was associated with a lower occurrence of dyslipidemia in adults. The literature highlights that the regular practice of physical activity reduces the risk for cardiovascular diseases and other chronic diseases, since physical exercise improves the lipid profile of different parts[9,25].

In the present study, there was an association between dyslipidemia and increased WC, corroborating the results obtained by Souza *et al.*[9], in Campos dos Goytacazes, RJ, and by Sanin, Pfetsch, and Wolfgang[26] in a cohort study with adults over 20 years old conducted in Iran between 2009-2014, observing the correlation between WC, i.e., central obesity and the incidence of dyslipidemia. Increased WC, which predicts central obesity, is a risk factor for several metabolic disorders, like abdominal adipose tissue having greater metabolic activity, releasing large amounts of free fatty acids that cause an increase in the blood concentration of lipids[23].

The prevalence of dyslipidemia was also high among adults with increased BP, corroborating another study carried out in the Brazil[4], as well as research in China[21]. Dyslipidemia expresses a pathophysiological mechanism that provides high and sustained levels of BP, due to the atherosclerotic process initiated by high lipid levels[4].

Gender is a factor that can estimate the risk of vascular disease[23]. In the present study, the prevalence of dyslipidemia differed significantly according to gender, being higher in men, corroborating results from research carried out in Brazil[9,23] and in a study carried out in Colombia[10]; this fact may determine the higher incidence of atherosclerotic disorders in males[9]. In contrast, Pereira *et al.*[6] in a study in the Midwest region of Brazil and Tripathy

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et al.[27] in India, did not observe differences in prevalence between genders; thus, they show that the difference between genders for dyslipidemia does not yet define a homogeneous trend for different realities.

Age is an important factor in the onset of cardiovascular diseases, exposure to risk for consecutive years represents a cumulative effect that naturally correlates with years of life[28]. A significant increase in the prevalence of dyslipidemia with increasing age was demonstrated through the distribution by age groups; however, the association was at the limit of statistical significance (p=0.056). Similar findings were found in other national[4,6] and international studies like in Iran[29] and in a review that demonstrated a high prevalence of hypercholesterolemia at older ages in different countries of the world[28].

The cross-sectional design of the present study constitutes a limitation in the analysis of the association between the predictive variables and the outcome, as it makes it impossible to infer a causal relationship. The limitation of comparability between national and international studies should also be considered, in view of the differences in population profiles, sociodemographic conditions, lifestyle, etc., among such populations.

One of the potentialities of this study is the fact that it was carried out based on data obtained from biochemical analyses, since studies on dyslipidemia are usually carried out with self-reported data. Furthermore, this research was carried out in a poor community where there are still few studies.

The high prevalence of dyslipidemia found in the studied population and its associated factors indicates the need for planning and implementing control and prevention actions capable of effectively intervening in this reality.

CONCLUSION

It is concluded that in this representative sample of the low-income community, assisted by the FHS and residing in the Coelhos slum, in the city of Recife, PE, there is a high prevalence of dyslipidemia. Isolated hypercholesterolemia or isolated hypertriglyceridemia was higher in men, with a progressive increase from the age of 30, in those who were insufficiently active, with a greatly increased waist circumference, and with increased blood pressure.

It is necessary to reinforce health promotion activities within the scope of the FHS for the investigated population, as well as to encourage the practice of physical activity in health academies, in addition to disseminating information regarding the consequences of increased WC and increased BP. More studies are needed in this and other vulnerable populations, further expanding the understanding of this topic in urban populations with precarious living conditions.

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