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Lipidogram Study for a Group of Individuals with Different Pathologies in the Population of Shijak

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Abstract: ***The aim of the study was to evaluate the change in lipids value, depending on age group and gender, in a population with 413 individuals (242 female and 171 male), with various pathology, separated in age groups. Lipids play a key and dynamic role in the growth of the organism, in reproduction and in health. High levels of lipids are associated with cardiovascular disease as HTA (Hypertension arterial), Arteriosclerosis and myocardial infarction. In the study of population are observed the higher value of cholesterol in IV age group, with average value of 197.9 mg/ dl. Triglycerides in VI age group with average value of 161.6 mg/ dl. LDL - Cholesterol in VI, VII age group with average value 114.3 mg/ dl. Phospholipids in IV age group with average value 207.9 mg/ dl. HDL - Cholesterol has the lowest value in I age group, while for older age groups after the III age group, the lowest values are in V, VII age group. Correlation values are positive between increasing age and increasing lipid values, increasing the risk for cardiovascular disease. Lipid values also vary by gender. Knowledge gained from this study are important to determine the risk of increased lipid levels depending from age and gender, to prevent cardiovascular disease by implementing a balanced diet and physical activity, a medical check - up and a regular treatment.***

Keywords: Cardiovascular Disease, Cholesterol, HTA, Lipidogram, Triglycerides

1. Introduction

Lipids are common components of food and may perform essential roles. Their types may be more important with regard to health and disease than their amount [3]. Lipids are the causes of Cardiovascular diseases. Cardiovascular disease particularly coronary diseases are the leading cause of mortality throughout the world. Atherosclerosis or atherosclerotic disease affects the central and peripheral blood vessels and can be described as an active inflammatory state, characterized by altered inflammatory markers and risk factors [10]. Lipids are classified into: Triglycerides, Cholesterol, HDL - Cholesterol, LDL - Cholesterol, VLDL - Cholesterol, Phospholipids. Triglycerides - also called *triacylglyceride* or *triacylglycerol*, major storage form of lipid in the body, composed of a glycerol backbone and 3 esterified fatty acids [11]. Cholesterol - Cholesterol is a waxy material produced by the body and is also found in animal products. It has several uses in the body and is an important part of cells. Cholesterol, this term actually includes 2 components: low - density lipoprotein (LDL) and high - density lipoprotein (HDL). Lipoproteins carry cholesterol through the blood stream. Low - density lipoprotein (LDL) is harmful (think *L* for lousy) because it can lead to the build - up of cholesterol in arteries to form plaques. High - density lipoprotein (HDL) is good (think *H* for healthy) because it helps the body to get rid of cholesterol [12]. Various risk factors for atherogenic development have been described, including increased levels of triglycerides (TG), total cholesterol (TC) and LDL - cholesterol (LDL - C); reduced levels of HDL - cholesterol (HDL - C), hypertension, diabetes, smoking and a sedentary lifestyle [10]. A number of diseases are associated with non - optimal cholesterol levels. Cholesterol is thought to amplify and accelerate atherosclerosis, and ischaemic stroke events. Data on global cholesterol levels were collated from three major sources. The first source was the MONICA study, which collected cholesterol data from 39 collaborating centres in 22 countries and was carried out between 1979 and 1987. This study provides important information about cholesterol patterns, but does not provide a truly global overview of cholesterol distributions [2], [4]. Lipoproteins - These packages differ from one another by the amounts of protein, fat, and related compounds they contain. Higher levels of HDL have been associated with a lower risk of cardiovascular disease. Emerging research suggests that actual levels of HDL in the blood may not be as important as how well it functions to remove cholesterol from the body. The relationship of CHD prevalence to the plasma HDL - cholesterol concentration has been the subject of two reports. In the Cooperative Lipoprotein Phenotyping Study data were analysed from 6859 men and women aged 40 years or more, living in five centres of the United States. In the combined data, CHD prevalence increased from 8 to 18 per 100 as HDL - cholesterol decreased from > 45 to < 25 mg/dl. This association was independent of the plasma triglyceride and LDL cholesterol concentrations [13], [5]. Low - density lipoprotein - this is the largest portion of circulating cholesterol. Because this form of cholesterol may contribute to the formation of plaque in blood vessels. LDL - cholesterol is often referred to as the “bad” cholesterol. Very low - density lipoprotein (VLDL) - VLDL is very high in triglycerides and does not carry cholesterol in the blood. Emerging research suggests that classifying LDL - cholesterol as “bad and HDL - cholesterol as “good” cholesterol may be an oversimplification in relation to CVD risk [15]. Triglycerides - The amount of triglycerides (or blood lipids) in blood are one important barometer of metabolic health, high levels are associated with coronary heart disease, diabetes and fatty liver disease. Metabolism refers to the chemical process that converts the food we eat into the energy our cells need [1]. Triglycerides provide unique information as a marker associated with the risk, for heart disease and stroke, especially when an individual also has low HDL - cholesterol (the good cholesterol) and elevated levels of LDL - cholesterol (the bad cholesterol) [11]. Phospholipids - The PLs found in most cell membranes

are basically glycerophospholipids (GPLs), which consist of fatty acids (FAs) esterified to a glycerol backbone, a phosphate group and a hydrophilic residue [6]. Age was found to be an independent factor extensively associated with lipid levels in both sexes when adjusted for serum glucose, body mass index, lifestyle, drinking and smoking [9]. Men and women have differences in the distribution of lipoprotein lipids as well as some enzymes that control lipoprotein metabolism. In women the activity of hepatic lipase, one of the most important determinants of high density lipoprotein (HDL) cholesterol levels, is about 60 - 70% of the activity in men. Before puberty, HDL - cholesterol is similar in boys and girls but then falls in boys and remains unchanged in girls [14].

2. Materials and Methods

Analysis data were obtained from the laboratory of Shijak State Hospital, Durrës, Albania, in the time period January – December 2020.

Data on the geographical position of Shijak:

Figure 1: Map of Shijak municipality

Shijak municipality is located in the part of central Albania and is part of administrative district of Durres and is bordered by Xhafzotaj, Gjepalaj and Maminas municipalities. In its composition there are respectively 3 neighborhoods: 1. Popular neighborhood; 2. Erzen neighborhood; 3. Kodra neighborhood. . [16].

For the study of lipidogram in the selected population, are analyzed the values of triglycerides, cholesterol, HDL - Cholesterol, LDL - Cholesterol, VLDL and phospholipids. In the study are taken 413 individuals (242 female dhe 171 male), with various pathologies, to a group of individuals in the Shijak population. For the study of lipidogram was used the statistical processing with excel program. Individuals are divided in age groups. First age group (0 - 14 years old), second age group (15 - 24 years old), third age group (25 - 34 years old), fourth age group (35 - 44 years old), age group five (45 - 54 years old), age group six (55 - 64 years old), age group seven (over 65 years old). By means of calculations is found the average value of each analytical component. For the description of statistical analyzes is used graphic construction. For changing analytical values between components and for the study of dependence between them is realized correlation method.

Table 1: Normal value of lipids

Lipids	Normal values
Triglycerides	Male (60 - 165 mg/ dl) Female (40 - 140 mg/ dl)
Cholesterol	(180 - 220 mg/ dl)
HDL - Cholesterol	(> 35 mg/ dl)
LDL - Cholesterol	(130 - 190 mg/ dl)
VLDL	(2 - 30 mg/ dl)
Phospholipids	(170 - 270 mg/ dl)

Biochemical Analysis from laboratory manuals: Triglycerides measurements are used in the diagnosis and treatment of hyper - lipidemia. Cholesterol measurements are used in the diagnosis and treatment of disorders involving excess cholesterol in the blood and of lipid and lipoprotein metabolism disorders. HDL - Cholesterol, LDL - Cholesterol, VLDL Method: The Chylomicrons VLDL (very low density lipoproteins) and LDL (low density lipoproteins) are precipitated by addition of phosphotungstic acid and magnesium chloride. After centrifugation the supernatant fluid contains the HDL (high density lipoproteins) fraction, which is assayed for HDL - Cholesterol with the Cholesterol liquicolor test kit [7], [8].

Triglycerides (liquid reagent)

	Blank	*STD (standard)*	*Sample*
Reagent R1	800 µL	800 µL	800 µl
Distilled water	10 µl	-	-
Sample	-	-	10 µl
Standard	-	10 µl	-
Mix, incubate at 37º C for 1' and then add:			
	Blank	STD (standard)	Sample
Reagent R2	200 µl	200 µl	200 µl

For this procedure (triglycerides liquid reagent): Mix, then incubate for 5' at 37º C. Measure the absorbance of sample and standard against the reagent blank.
Same procedure is and for cholesterol.

3. Results and Discussion

From statistical processing graphs were constructed showing the change in lipid values based on age and gender.

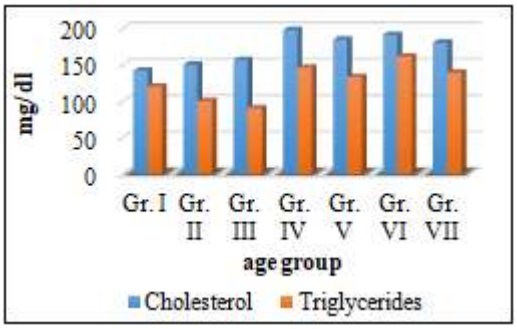

Figure 2: Cholesterol and Triglycerides values

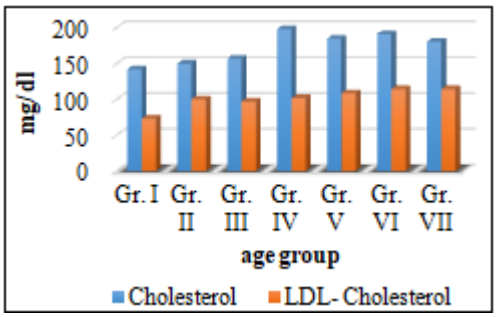

Figure 3: Cholesterol and LDL - Cholesterol values

The higher value of triglycerides is in VI age group, and there is a slight decline in values in age group VII. The higher value of Cholesterol is in IV age group and there is a slight decline in values in age group V, VI, VII. The higher values of LDL - Cholesterol are in VI and VII age group. LDL - Ch characterized by higher values in older age groups compared to the values of Cholesterol and triglycerides.

Table 3: Average values of lipids (Cholesterol; Triglycerides)

Components	*Gr. I*	*Gr. II*	*Gr. III*	*Gr. IV*	*Gr. V*	*Gr. VI*	*Gr. VII*
Cholesterol	142	150	156.6	197.9	184.8	191.2	180.4
Triglycerides	120	100	90.6	146.2	133.3	161.6	139.2
Components	*Gr. I*	*Gr. II*	*Gr. III*	*Gr. IV*	*Gr. V*	*Gr. VI*	*Gr. VII*
Cholesterol	142	150	156.6	197.9	184.8	191.2	180.4
LDL - Cholesterol	73	100	97	101.8	108.6	114.3	114.3

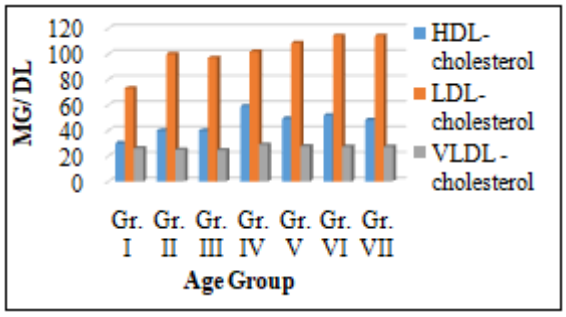

Figure 4: HDL - Ch; LDL - Ch; VLDL values

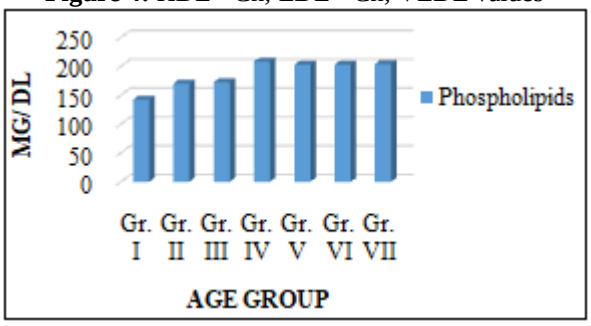

Figure 5: Phospholipids value

The higher value of VLDL is in IV and there is a slight decline in values in age group V, VI, VII. The lowest value of HDL - Cholesterol is for I, II, III age group. For other age groups, that are at higher risk, the lowest value of HDL - Ch is for VII age group. The higher values of Phospholipids are in IV and there is a slight decline in value in age group V, VI, VII. VLDL not characterized by large value fluctuations.

Table 4: Average values of lipids (HDL - Cholesterol; LDL - Cholesterol; VLDL; Phospholipids)

Components	*Gr. I*	*Gr. II*	*Gr. III*	*Gr. IV*	*Gr. V*	*Gr. VI*	*Gr. VII*
HDL - cholesterol	30	40	39.8	59	49.4	51.9	48.3
LDL - cholesterol	73	100	97	101.8	108.6	114.3	114.3
VLDL	26	25	24.5	28.8	27.6	27.1	27.2
Component	*Gr. I*	*Gr. II*	*Gr. III*	*Gr. IV*	*Gr. V*	*Gr. VI*	*Gr. VII*
Phospholipids	142	170	172.5	207.9	202.8	202.5	203.7

Graphic presentation by gender

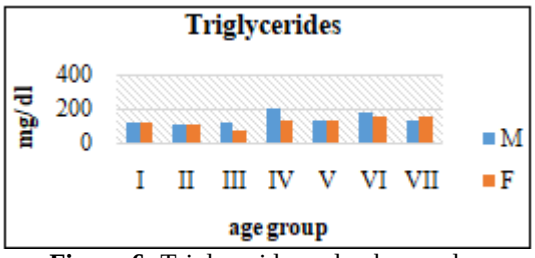

Figure 6: Triglycerides value by gender

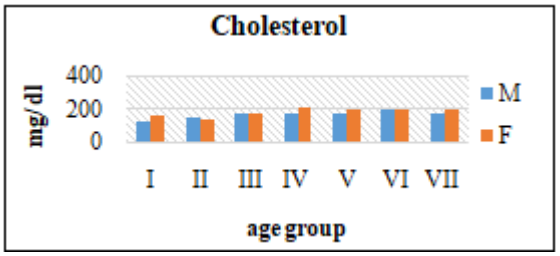

Figure 7: Cholesterol value by gender

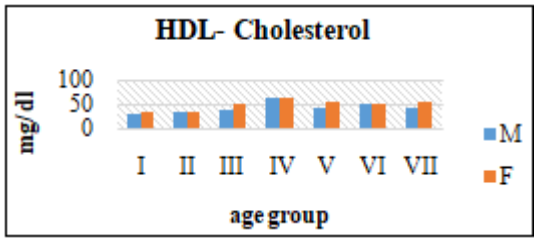

Figure 8: HDL - Ch by gender

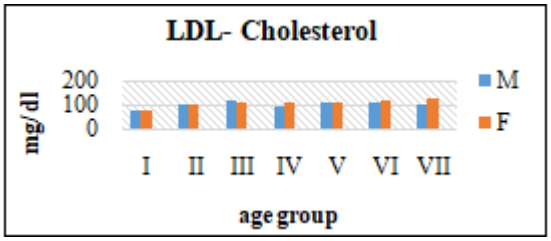

Figure 9: LDL - Ch by gender

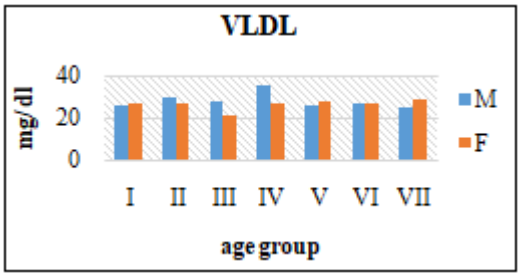

Figure 10: VLDL value by gender

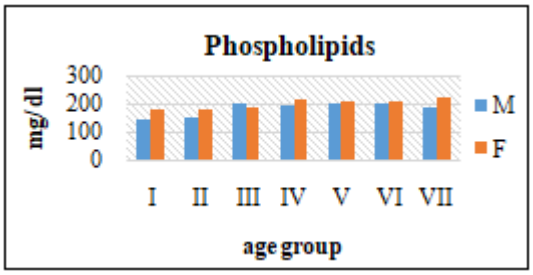

Figure 11: Phospholipids value by gender

For Triglycerides: Male gender by age groups characterized by higher triglyceride value than the female sex. The highest value of triglycerides is observed in IV age group with average value 201 mg/ dl. For each age group the male sex has higher triglyceride values compared to the female sex except the VII age group. For Cholesterol: Female gender by age groups characterized by higher cholesterol value than the male sex. The highest value of cholesterol is observed in IV age group with average value 208 mg/ dl. For each age group the female sex has higher cholesterol values compared to the male sex except the II age group. For HDL - Ch: Male gender is characterized by lower values compared to female gender except the IV age group. The lowest average value for age groups V, VII is 42 mg/ dl. LDL - Ch: Female gender is characterized by higher value of LDL - Ch than male gender, In VII age group, with higher average value 123 mg / dl. VLDL: Male gender characterized by higher average value of VLDL than female gender in IV age group, with average value of VLDL 35 mg/ dl. In V, VII age group VLDL are with higher values for male gender. Phospholipids: Female gender characterized by higher value of phospholipids than male gender, with higher average value 218 mg/ dl, in VII age group.

Table 5: Average values of lipids for male and female (Triglycerides, Cholesterol, HDL - Cholesterol, LDL - Cholesterol, VLDL, Phospholipids)

Age group	*Triglycerides*		*Cholesterol*		*HDL - Cholesterol*	
	Male	Female	Male	Female	Male	Female
I	120	120	127	157	30	35
II	100	100	147	130	35	35
III	119	70	164	173	38	48
IV	201	131	174	208	64	61
V	131	134	164	193	42	53
VI	177	154	189	194	52	52
VII	177	149	168	191	42	54
Age group	LDL - Ch		VLDL		Phospholipids	
	Male	Female	Male	Female	Male	Female
I	73	75	26	27	142	180
II	100	100	30	27	150	180
III	113	108	28	21	200	184
IV	88	110	35	27	194	211
V	111	108	26	28	197	205
VI	106	114	27	27	201	204
VII	103	123	25	29	186	218

Table 6: Correlation values for age - lipid components

Age - Components	*Correlation value*
Age - Triglycerides value	0.83
Age - Cholesterol value	0.79
Age - HDL - Cholesterol value	0.7
Age - LDL - Cholesterol value	0.89
Age - VLDL value	0.55
Age - Phospholipids Value	0.87

With age the value of lipids in the blood increase, showing a positive correlation between age and parameter values. For HDL - Ch passing from age group IV to age group VII, there is a decrease in values, showing a negative correlation with increasing age. With correlation value – 0.79. Higher correlation value respect to age has LDL - Cholesterol.

Table 7: Diagnosis for male and female in the VI age group

Diagnosis for VI age group	*Number of female*	*Number of male*
Anemia	6	1
HTA	22	10
Diabetes Mellitus	27	26
Lupus Eritematos Sistemic	1	-
Rheumatoid Arthritis	5	-
Dyslipidemia	-	3
Cyrrosis Hepatis	-	6
Glaucoma et Cefalae Forte	1	-
Osteoporosis	2	-
Ca Mammae	1	-
Urinary Infection	3	
Calcul Biliar	-	1
Chronic Renal Insuficience	1	-

Table 8: Diagnosis for male and female in the VII age group

Diagnosis for VII age group	*Number of female*	*Number of male*
Diabetes Mellitus	48	53
Astma Bronchialis	1	-
Rheumatoid Arthritis	-	1
Laryngitis	1	-
Anemia	6	4
HTA	51	23
Mieloma Multiple	-	2
Ca Cutis	-	2
Urinary Infection	3	4
Dyslipidemia	5	2
Chronic Renal Insuficience	1	2
Colitis	-	1
Melanoma Malignia	-	2
Parkinson	1	-

Pathologies for the group of individuals taken in the study vary with each age. These pathologies reflect and increasing the values of the lipidogram parameters passing from the first age group to the seventh age group. In the I, II, III, IV, V age group there are individuals with different pathologies, but the number of individuals is small. In the VI and VII age group there are individuals with different pathologies and the number of individuals increases. Pathologies with the largest number of individuals for VI and VII age group are HTA, Diabetes Mellitus, Anemia, Dyslipidemia. Two pathologies with the largest number of individuals are HTA and Diabetes Mellitus. Individuals with hypertension have high levels of lipids on the blood. Increase in blood lipid values with age is also reflected in the appearance of pathologies characterized by high values of lipids like HTA and Diabetes Mellitus.

4. Conclusions

Among the factors that determine the changes in lipids values are age and gender. With increasing age the values of

lipids also increase. With higher values of lipids are age groups VI and VII (55 - 65 and over 65 years old), however there is a slight decrease in triglyceride values in the VII age group compared to the VI age group and a slight drop in cholesterol, VLDL and phospholipids levels in V, VI, VII age group compared to the IV age group (35 – 45 years old), where they reach the highest values. There is a positive correlation between increasing age and increasing lipid values. The highest correlation values between increasing age and increasing lipid values are for LDL - Ch. HDL - Ch values with increasing age (from V - VII age group) show significant negative correlation, playing defensive function for female compared to males, as '' good cholesterol ''. Blood lipid values vary with gender. Males characterized by higher triglyceride values than females. Females characterized by higher cholesterol, LDL - Ch and phospholipids values compared to males. Males characterized by lowest HDL - Ch values, compared with females, this is observed in V, VI, VII age group (over 45 years old). With age the number of individuals with higher lipid values increases, where and the largest number of the individuals with HTA and Diabet Mellitus disease observed in VI, VII age group.

5. Importance of the study

Is the recognition of factors (as age, gender, genetic factors), which lead to increased values of lipids, in order to prevent cardiovascular diseases as arteriosclerosis, myocardial infarction and hypertension. Knowledge of family history for the detection of genetic factors and disease history. Treatment of diseases at an early stage, medical care by controlling the balanced diet, avoiding sedentary living, performing physical activity, taking the right medication by age and the stage of the disease.

6. Acknowledgement

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