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VARIABILITY STUDY OF BIOCHEMICAL INDICATORS WITH DIAGNOSTIC VALUE IN WOMEN WITH HYPERTENSION

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Key words: *hypertension in women, biochemical indicators, statistical calculation cardiovascular risk*

INTRODUCTION

Cardiovascular disease remains the leading cause of death both in Romania and in Europe, according to the latest European Society of Cardiology. The report published in 2012 revealed that 60% of deaths annually in Romania were caused by cardiovascular disease.

In Romania are annually 250,000 deaths, of which 150,000 are caused by cardiovascular disease, most of atherosclerosis, a disease that can be prevented. The number of patients is much higher, in the millions.

We can talk about six to seven million people suffering from heart disease and we know that over five million have hypertension. Alarming is the fact that decreased the age at which the disease occurs, because all this is caused by atherosclerotic our way of life.

Hypertension, chronic medical problems, is a major risk factor for heart attack cases (heart attack), heart failure, arterial aneurysms (eg aortic aneurysm), peripheral arterial disease and is the cause of chronic kidney disease. Even a moderate increase in blood pressure is associated with a reduced life expectancy

Knowing the physiological and biochemical changes by determining the various indicators and their interpretation allows for accurate diagnosis and treatment strategy.

Most blood pressure studies that have been conducted in different populations show a rise in blood pressure with age. This disease can have "roots" in childhood and adolescence as shown by some studies, but not sufficiently investigated and diagnosed. Also, there may be significant differences in the occurrence and progression of the disease by sex.

After several series of tests, scientists have observed that 30-40% of women suffer more than men from cardiovascular problems, although both sexes these diseases are caused by high blood pressure. In addition, researchers have found significant differences in women of the cardiovascular system.

They affect the types and levels of hormones, and the manner in which regulates blood pressure.

In this work we aimed to determine some biochemical compounds organic (triglycerides, total cholesterol, HDL, LDL, creatinine, troponin T) and the activity of certain enzymes diagnostic value (lactate dehydrogenase, aminotransferases, creatine kinase) in women with hypertension stage I untreated (MMH systolic 140-159, diastolic 90-99 mmHg), of Bacau, Romania.

MATERIALS AND METHODS

The research was conducted in the clinical laboratory Bacau County Emergency Hospital. Studies were carried out on a total of 30 women diagnosed with hypertension. In these subjects we studied the biochemical response of the heart, pursuing diagnostic value of biochemical indicators: *triglycerides*, *cholesterol*, *HDL*, *LDL, creatinine*, *troponin T*, *lactad dehydrogenase*, *aminotransferases* (*SGOT*, *SGPT*), and *creatine* which causes changes the circulatory system and blood pressure increase. Investigated subjects were grouped by sex and three age categories: 36-50 years, 51-65 years and above 65 years.

Determination of biochemical compounds organic: *triglycerides*, *cholesterol*, *HDL*, *LDL*, *creatinine*, was performed using the apparatus of medical tests Cobas Integra 400 Plus, determination of troponin T was performed using the analyzer Cardiac Reader and enzymes lactate dehydrogenase, aminotransferases (SGOT and TGP) and creatine were determined spectrophotometrically.

Applying statistical methods mathematics can calculate a value as close to the real one and can estimate the degree of certainty of these results, it is hard in practice to make a very large (infinite) determinations or even more determinations than usually denoted by n.

To characterize the value obtained for a biological sample (in this case the number of tests is quite small) was calculated from measurements averaged (x), standard deviation (σ), standard error (SE) and coefficient of variation (CV).

These values will give us an insight into the dispersion of results that will help us to discern which is the nearest to the real value.

The results of the measurements obtained were compared to each other and a lot considered as a control to ensure that the differences which are obtained are high.

To appreciate the real nature or accidental changes in mean values of indices differences situated in experimental models, has become calculating, for each case, the test of significance (Student test).

After calculating the value of "t" to determine the number of degrees of freedom and probability "p" setting the level of significance as follows:

P <0.001 - very significant

0.001 <p <0.005 - significantly distinct

0.01 <p <0.05 - significantly

p <0.5 - insignificant.

RESULTS AND DISCUSSIONS

The investigations covered this study were conducted on a sample of 30 women.

- ***The level of cholesterol in blood serum***

The reference values are cholesterol under 220 mg / dl. Following cholesterol is found that in women (Table 1, Figure 1) are the highest values in the age group 36-50 years, where the average is 210.4 mg / dl. Minimum values are found in the patients of> 65 years, at which the average is 198.1 mg / dl falling within the normal range.

Cholesterol level gradually declines with age, but falling within normal limits.

- ***The level of triglycerides in blood serum***

Reference values of triglycerides are ≤150mg / dl.

Following triglyceride levels in women (Table 2, Figure 2), the maximum is recorded at 51-65 years, where the average is 158.3 mg / dl, normal value exceeds the limit.

Minimum values of the patients is> 65, where the average is 97.9 mg / dl, that is within normal limits, as the values recorded in the age group 36-50 years.

- ***The level of HDL in the blood serum***

HDL reference values are 35-75 mg / dl.

Following HDL levels in women (Table 3, Figure 3), the maximum is recorded at 36-50 years, where the average is 53.8 mg / dl, a value that falls within the normal range. The minimum values are in the patients of 51-65 years, where the average is 47.2 mg / dl, fits also within the normal range.

Table 1. Cholesterol levels in female patients

Biochemical indicator	Normal values	Statistical indices	Age group (years)		
Cholesterol	<220 mg/dl	n	36-50	51-65	> 65
		x	210,4	208	198,1
		ES	13,5575	24,0435	17,3080
		CV%	20,3766	36,5592	27,6288
		t	-	- 0,0870	- 0,5595
		p			
		%	-	98,86	94,15
		±Δx	-	-1,14	-5,85

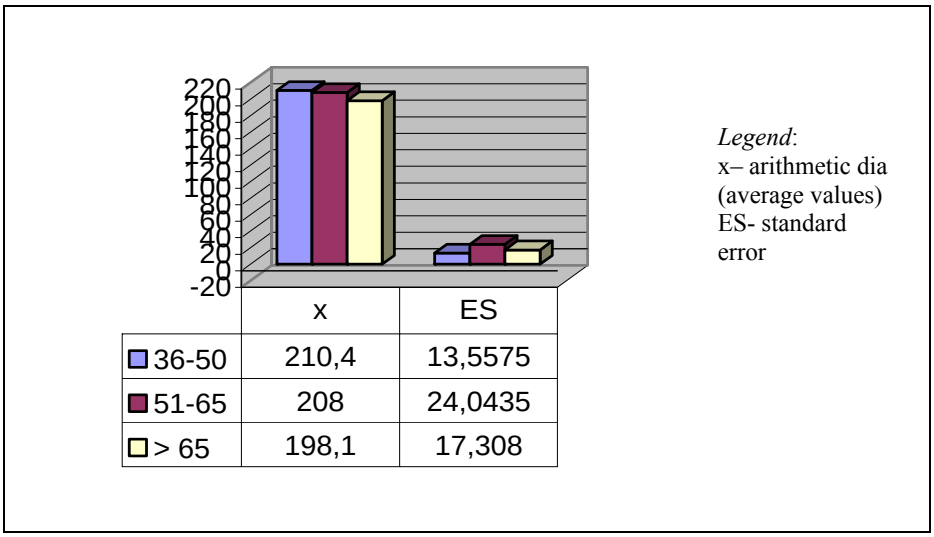

Fig. 1. Cholesterol values in female patients

Table 2. Triglycerides values in female patients

Biochemical indicator	Normal values	Statistical indices	Age group (years)		
Triglycerides	≤150mg/dl	n	36-50	51-65	> 65
		x	105,2	158,3	97,9
		ES	8,3211	49,4638	12,4877
		CV%	25,0128	98,8113	40,3367
		t	-	1,0586	-0,4865
		p			
		%	-	150,48	93,06
		±Δx	-	50,48	-6,94

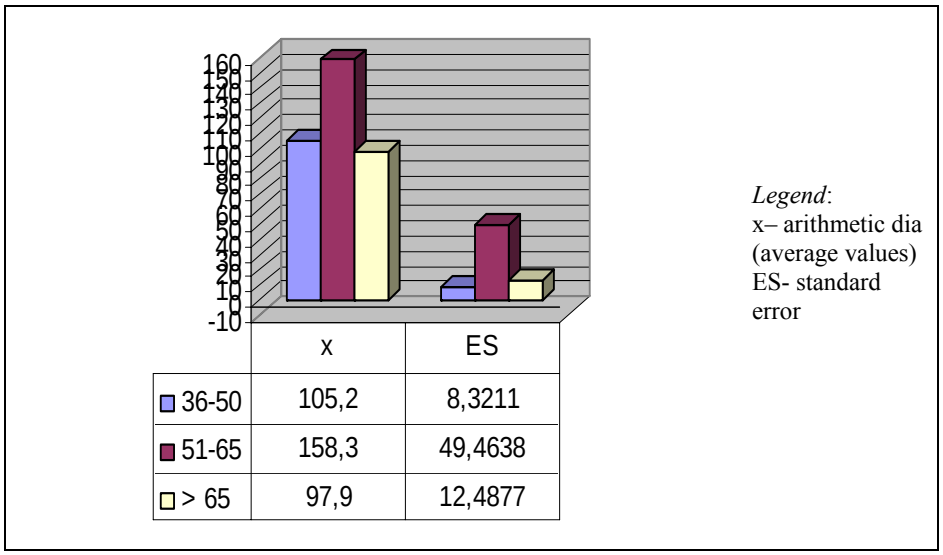

Fig. 2. Triglycerides values in female patients

Table 3. HDL values in female patients

Biochemical indicator	Normal values	Statistical indices	Age group (years)		
HDL	35-75 mg/dl	n	36-50	51-65	> 65
		x	53,8	47,2	49,1
		ES	4,6303	5,2213	2,2923
		CV%	27,2164	34,9820	14,7633
		t	-	-0,946	-0,9097
		p			
		%	-	87,73	91,26
		±Δx		-12,27	-8,74

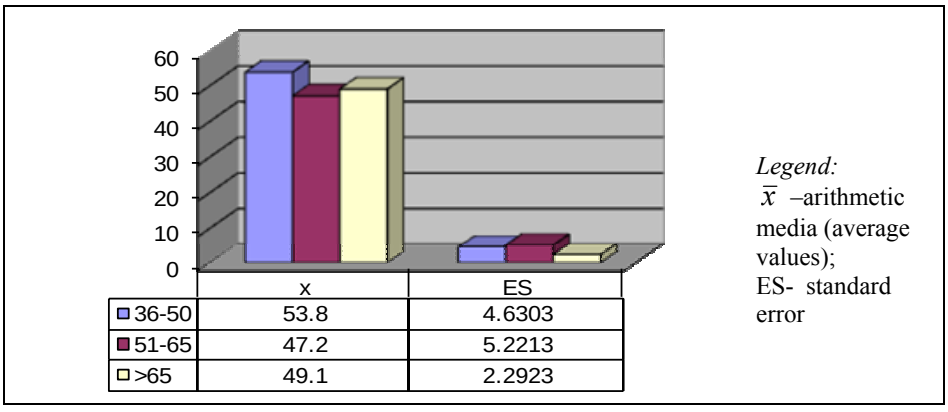

Fig. 3. HDL values in female patients

- ***The level of LDL in serum***

The reference values are LDL <100 mg / dl.

LDL levels in women (Table 4, Figure 4), ranks high in all groups of vârstpă. Maximum values are recorded in 36-50 years, where the average is 134.8 mg / dl, normal value exceeds the limit. Minimum values of the patients is 51-65 years, where the average is 111.2 mg / dl, and they exceed limits. At the age> 65 values are also pose above the normal.

- ***The level of creatinine in blood serum***

Creatinine reference values 0.50-1.30 mg / dl.

The level of creatinine in women (Table 5, Figure 5), the maximum values recorded creatinine to> 65de years, where the average is 0.947 mg / dL, but amount not exceeding the normal limit. Minimum values of the patients is 36-50 years, where the average is 0.82 mg / dL, within limits.

Table 4. LDL values in female patients

Biochemical indicator	**Normal values**	**Statistical indices**	**Age group (years)**		
LDL	<100 mg/dl	n	36-50	51-65	> 65
		x	134,8	111,2	127,3
		ES	11,4288	13,5177	14,3496
		CV%	28,8109	38,4414	35,64615
		t	-	-1,3332	-0,4088
		p			
		%	-	82,49	94,44
		±Δx	-	-17,51	-5,56

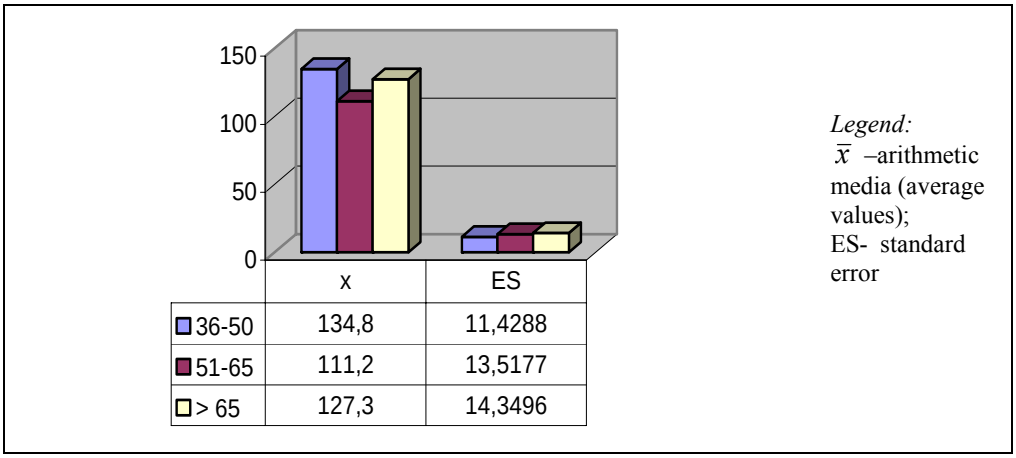

Fig. 4. LDL values in female patients

Table 5. Creatinine values in female patients

Biochemical indicator	**Normal values**	**Statistical indices**	**Age group (years)**		
Creatinine	0.50-1.30 mg/dl	n	36-50	51-65	> 65
		x	0,82	0,766	0,947
		ES	0,0359	0,0485	0,0874
		CV%	13,85	20,04	29,17
		t	-	0,8944	1,3447
		p			
		%	-	93,42	115,49
		±Δx		-6,58	15,49

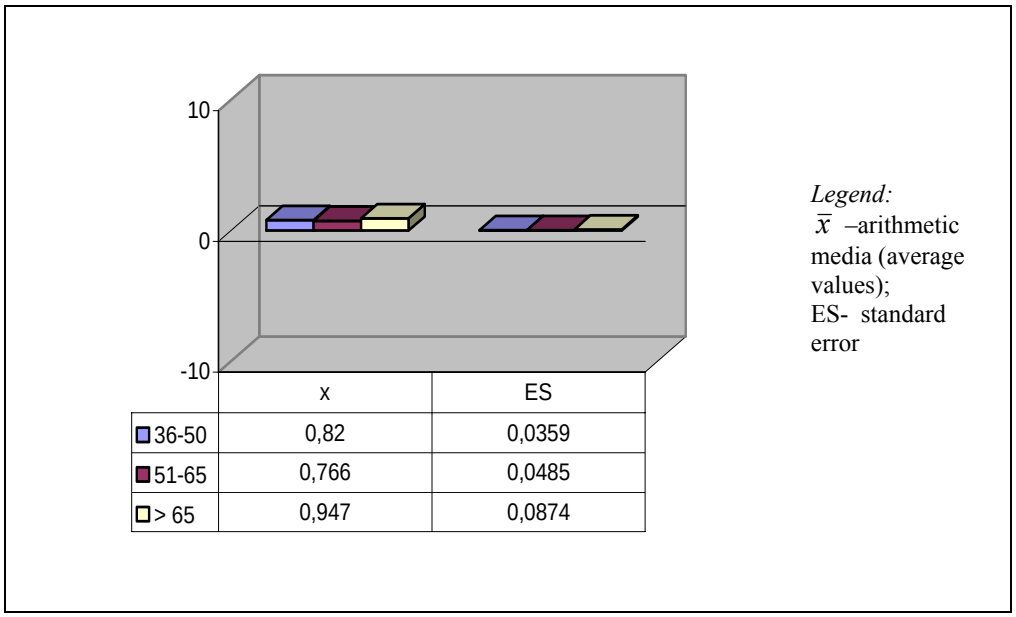

Fig. 5. Creatinine values in female patients

- ***The level of the serum troponin T***

The reference values are negative Troponin T or 0-0.1 mg / l.

It is found that in women (Table 6, Figure 6), troponin T values fall within normal limits in all age groups. The maximum amounts of troponin T are recorded in 36-50 years, where the average is 0.07 mg / l, the minimum is for the patients> 65 years, where the average is 0 mg / l.

In women, troponin T level increases progressively with age.

Table 6. Troponine T values in female patients

Biochemical indicator	Normal values	Statistical indices	Age group (years)		
Troponine T	Negative or 0,1 µg/l	n	36-50	51-65	> 65
		x	0,07	0,02	0
		ES	0,0664	0,0190	0
		CV%	300	300	0
		t	-	0,7240	1,0541
		p			
		%	-	28,57	0
		±Δx	-	-71,43	-100

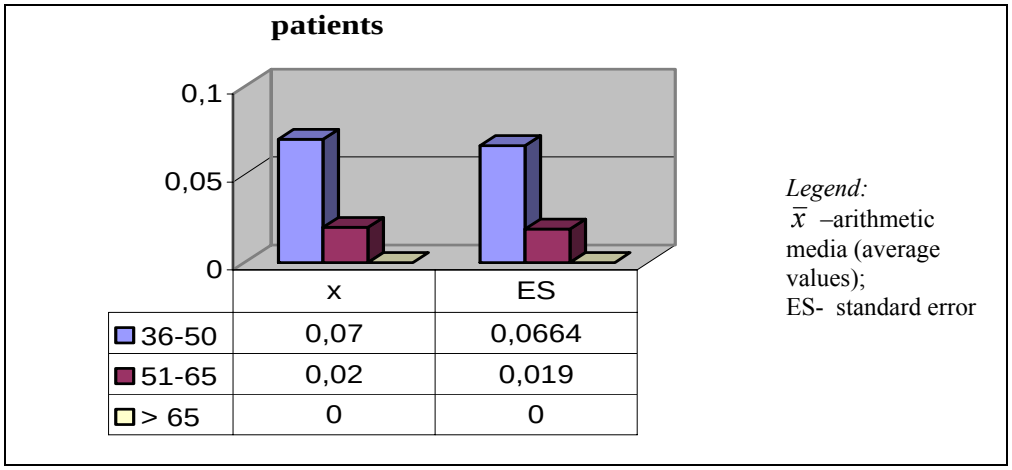

Fig. 6. Troponine T values in female patients

- ***The level of LDH in blood serum***

LDH reference values are 135-225 U / L.

Following LDH levels in women (Table 7, Figure 7), the maximum is recorded at> 65, where the average is 372,7U / L, which is above the normal value. Minimum values of the patients is 36-50 years, where the average is 208.9 U / L and therefore fall within the normal range.

LDH level increases progressively with age, approaching peaks in the third age.

- ***The level of GOT in the blood serum***

TGO reference values are 0-38 U / L.

Following the TGO women (Table 8, Graph 8), records the maximum values> 65, where the average is 32,7U / L, a value that is within normal limits. Minimum values of the patients is 36-50 years, where the average is 32.6 U / L.

In women, the TGO values are normal in all three age groups.

- ***GPT level in blood serum***

TGP reference values are 0-41 U / L.

It is found that in women (Table 9, Chart 9), TGP values fall within normal limits in all age groups. TGP maximum values are recorded in 36-50 years, where the average is 40,7U / L and minimum values of the patients is 51-65 years, where the average is 28.7 U / L.

In women, the TGP values are normal in three age categories.

Table 7. LDH values in female patients

Biochemical indicator	Normal values	Statistical indices	Age group (years)		
LDH	135-225 U/L	n	36-50	51-65	> 65
		x	208,9	235,6	372,7
		ES	19,3117	33,5229	68,3073
		CV%	57,9573	44,9952	29,2337
		t	-	0,6902	2,3075
		p			
		%	-	112,78	178,41
		±Δx	-	12,78	78,41

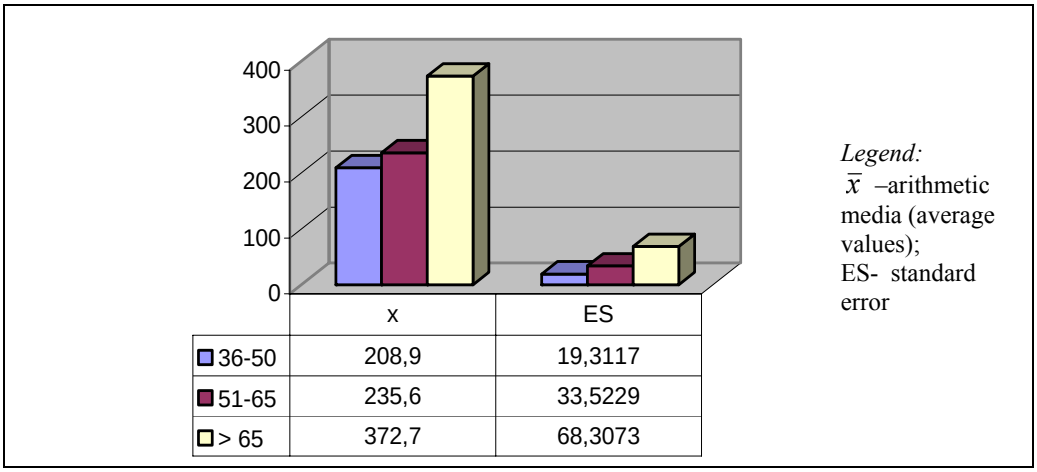

Fig.7. LDH values in female patients

Table 8. GOT in female patients

Biochemical indicator	Normal values	Statistical indices	Age group (years)		
GOT	0-38 U/L	n	36-50	51-65	> 65
		x	32,6	23,9	32,7
		ES	6,9669	4,4459	6,1789
		CV%	67,5807	58,8243	59,7535
		t	-	-1,0527	0,0107
		p			
		%	-	73,31	100,31
		±Δx	-	-26,69	0,31

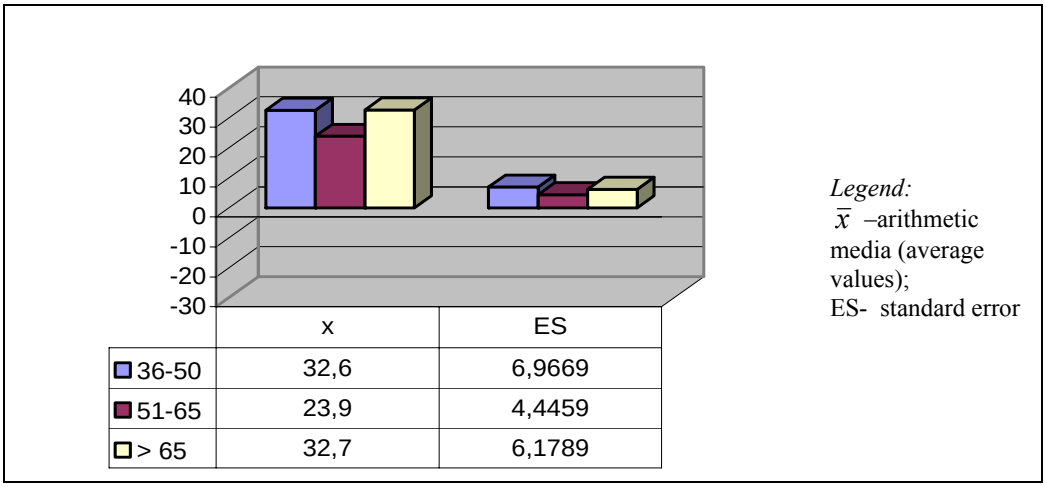

Fig. 8. GOT values in female patients

Table 9. GPT values in female patients

Biochemical indicator	Normal values	Statistical indices	Age group (years)		
GPT	0-41 U/L	n	36-50	51-65	> 65
		x	40,7	28,7	29,6
		ES	10,4030	6,1138	6,2025
		CV%	80,8288	67,3645	66,2637
		t	-	0,9945	0,9165
		p			
		%	-	70,51	72,73
		±Δx	-	-29,49	-27,27

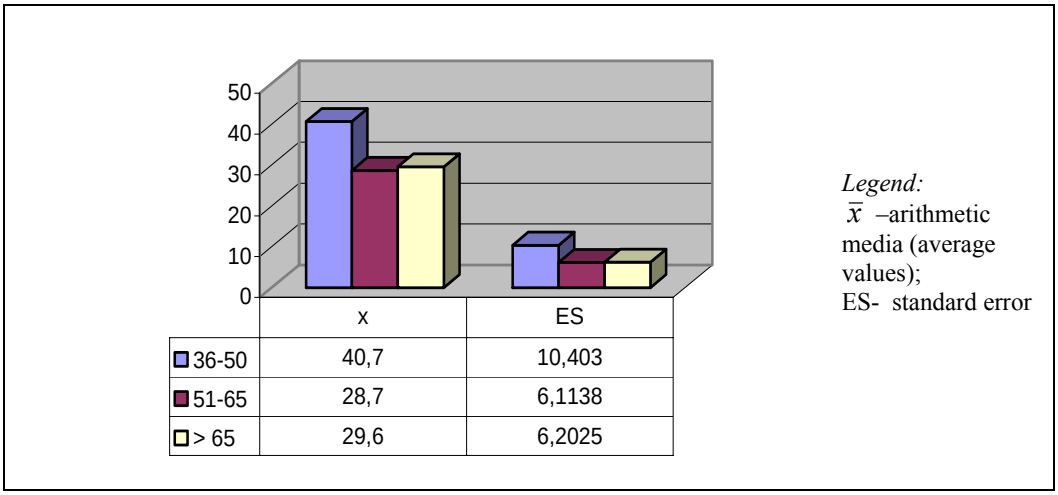

Fig. 9. GPT values in female patients

- ***The level of creatinekinase in the blood serum***

CK reference values are 0-190 U / L.

Following the CK women (Table Nr. XIX), the maximum is recorded at 36-50 years, where the average is 114,6U / L, amount not exceeding the normal limit. Minimum values of the patients is> 65, where the average is 76.5 U / L fits within limits.

Normal CK levels recorded in two age categories.

Table 10. Creatinekinase levels in female patients

Biochemical indicator	Normal values	Statistical indices	Age group (years)		
Creatinekinase	0-190 U/L	n	36-50	51-65	> 65
		x	114,6	112,2	76,5
		ES	20,6442	43,8107	16,7818
		CV%	56,9657	123,4772	69,3707
		t	-	-0,0496	1,4321
		p			
		%	-	97,91	66,75
		±Δx	-	-2,09	-33.25

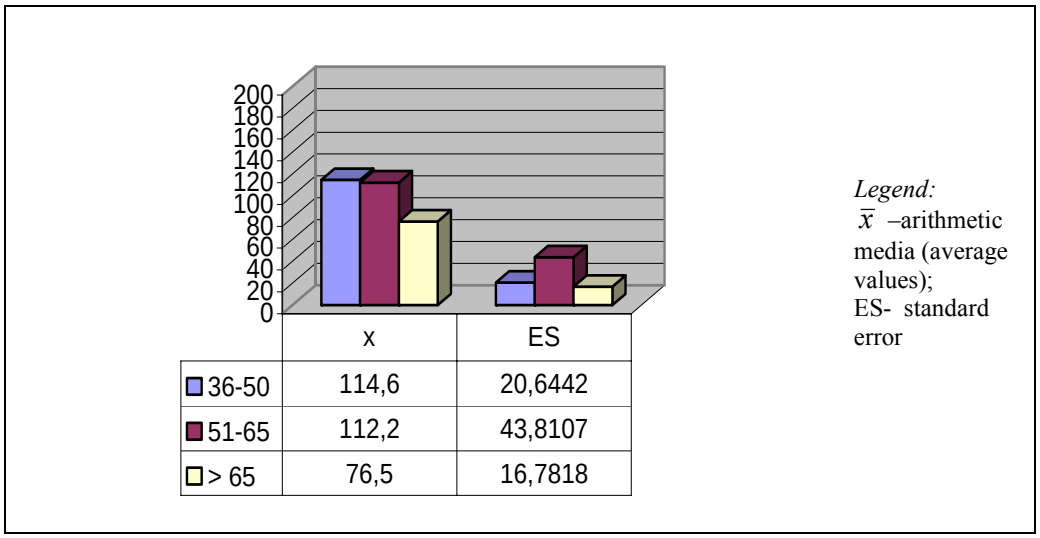

Fig. 10. Creatinekinase values in female patients

CONCLUSIONS

Using our earlier data summarized in tables, data representing a number of analyzes performed on 30 patients, we list below the main conclusions drawn from the analysis of recorded data interpretation.

Changes pathological upside, there is only three biochemical parameters of the study - triglycerides, LDL cholesterol and LDH. The remaining investigated parameters are normal in all age groups.

Triglycerides values are above normal in the age group 51-65 years. Other age groups had values within normal limits.

The separation fractions, LDL cholesterol registered higher values than normal, in all age grupelede maximum values recorded in the age group 36-50 years, which expresses an increased atherogenic risk in this age range.

Lactate dehydrogenase (LDH) recorded increased in the age group> 65 years. Although LDH increases are non-specific enzyme having a wide distribution in the body, this test is useful for retrospective confirmation of the diagnosis of heart attack or lung. The persistence of myocardial infarction increased LDH level is longer than the other enzymes.

There are significant differences between men and women with hypertension. Women better tolerate high blood pressure than men. Pathological biochemical changes in direction are reduced at all ages. - up to 50 years.

Age category most affected, in our case, is over 50 years old and between 51-65 and over 65, confirming other studies that claim incidence and severity of hypertension is lower in women before menopause. With menopause, women are no longer protected by their hormones estrogen. However, lifestyle changes, hypertension association with physical inactivity, smoking, hyperlipidemia, obesity, stress, contraceptive use, lower the age at which you can install and increase the risk of coronary arterial hypertension.

ABSTRACT

There were investigated 30 women with a diagnosis of hypertension. These subjects were studied biochemical response of the heart, aiming biochemical indicators of diagnostic value: triglycerides, cholesterol, HDL, LDL, creatinine, troponin T, lactat dehydrogenase, aminotransferase

(SGOT, SGPT) and creatine that cause changes to the circulatory system and increased blood pressure. The subjects investigated were grouped by gender and three age categories: 36-50 years, 51-65 years and over 65 years. Age category most affected, in our case, is over 50 years old and between 51-65 and over 65, confirming other studies that claim incidence and severity of hypertension is lower in women before menopause. With menopause, women are no longer protected by their hormones estrogen. However, lifestyle changes, hypertension association with physical inactivity, smoking, hyperlipidemia, obesity, stress, contraceptive use, lower the age at which you can install and increase the risk of coronary arterial hypertension.

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