

THE USE OF ENZYMATIC LABORATORY INDICES GGT AND ALP CONCERNING MONITORING LIVER DISEASES FOR ARGES COUNTY POPULATION

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Abstract

Monitoring of patients with liver diseases, infectious and non-infectious, is very important both for the sick, to improve their quality of life, but also for the society.

Our study was aimed at the way in which the GGT and FA enzymes are used in monitoring liver diseases in people with chronic illnesses (unspecified hepatitis and non-infectious hepatitis) hospitalized in Pitesti County Emergency Hospital, in 2014. Ill people coming from both urban and rural areas are aged between 18 and 97 years old.

Increased GGT enzyme activity is found in association with chronic alcoholism, different toxic liver damages, intra hepatic and extrahepatic cholestasis, acute viral hepatitis, pancreatitis, neoplasm disease of the liver and pancreas, myocardial infarction, as well as with diabetes mellitus.

The increase in FA (ALP) enzyme activity is prevalent in various hepatic and bone decrease states. The level is also increased in certain diseases of the thyroid gland, intestinal tract and in several bacterial infections.

By analyzing how laboratory indices are used in the diagnosis and monitoring of liver diseases, we aim to warn the level would significantly reduce the number of those sick and, at the same time, it would decrease the costs of treatment.

Keywords: liver diseases, hepatitis, enzyme, GGT, FA

1. INTRODUCTION

OMS places Romania on the 4th place worldwide in point of mortality rate caused by liver diseases: 44,5 deaths per 100.000 inhabitants, while the European average is 15 deaths per 100.000 inhabitants (W.H.O., 2014).

Worldwide, viral hepatitis occupy the 8th place among the major causes of death.

An estimated 1.4 million deaths / year are the result of acute liver infections, cirrhosis and liver cancer, a number which is comparable for HIV and tuberculosis (Popovici et al., 2016). Of the total of these deaths, a percentage of 55% is determined by the hepatitis B virus (HBV), 35% by the hepatitis C virus (HCV) and 10% by the hepatitis A and E viruses (W.H.O., 2014).

Apart from viral liver diseases, non-alcoholic fatty liver (NAFLD), hepatic brand of metabolic syndrome is the most common cause of liver distress among the population (Adams et al., 2005).

For the assessment of liver diseases, many of these indicating hepatocyte integrity rather than its function (transferases ASAT and ALAT, alkaline phosphatase) are usual common liver tests generically called functional liver tests (Rosen and Keefe, 2000). These tests provide important information regarding the outcome of acute and chronic liver diseases (Stremmel et al., 1992) and the efficiency of the treatment chart in patients suffering from such conditions.

2. MATERIALS AND METHODS

Our study was achieved through prospective descriptive epidemiological investigation, based on the clinical data recorded in a selected population group from the general population. The study was conducted in the Pitesti County Emergency Hospital, during 01.01.2014 - 31.12.2014.

484 subjects were examined, men and women, from urban and rural areas, aged between 18 and 97 years old, having already established diagnoses of non-infectious liver diseases and also unspecified chronic hepatitis.

These conditions constitute a special nosological group - the group of dystrophic inflammatory chronic hepatopathies, which is desirably to be looked upon the whole, a trend that manifests strongly on the medical plan and to which adhere most of the researchers and authors (Lefkowitz, 2006).

Inclusion in the study criteria:

- monitored patients were hospitalized in Pitesti County Emergency Hospital, between 01.01.2014 - 31.12.2014;
- the study making was performed under observation sheets, after a complete investigation, the subjects suffering from non-infectious liver diseases (fibrosis, cirrhosis, toxic liver disease) and unspecified chronic hepatitis;
- age: over 18 years old;

Exclusion from the study criteria:

- liver diseases, other than dystrophic inflammatory chronic hepatopathies (chronic viral hepatitises, hepatocellular carcinoma);
- subjects who suffered from other chronic diseases, clinically, biochemically, serologically and radiologically confirmed;
- liver transplantation.

The patients were monitored by determining the activity of γ -glutamyl transpeptidase enzymes (γ -GT, GGT) and alkaline phosphatase (FA, ALP).

The γ -GT enzyme present in the serum is mainly of hepatobiliary origin.

Determination of the biological activity of the enzyme γ -GT was performed by the spectrophotometric method, using the biochemical analyzer Konelab. The normal values of the enzyme are 11 - 50 U / l.

The increase in the activity of this enzyme is closely related to: chronic alcoholism, various liver damage, pancreatitis, intra- and extrahepatic cholestasis, acute viral hepatitis, liver and pancreas neoplasm diseases and also diabetes.

FA is an enzyme present in most tissues. It presents three isoenzymes: bone, hepatobiliary and intestinal. To these, is added the placental shape predominating during pregnancy.

The determination of the biological activity of the FA enzyme was achieved by kinetic method, using the biochemical analyzer Konelab. FA catalyzes the hydrolysis of p-nitrophenyl-phosphate (pNPP), a colourless compound, in phosphate and p-nitrophenol, a coloured compound in an alkaline environment (ph = 9,8). After mixing the serum with the reagents, is allowed to incubate 60 seconds and the change in optical density is read.

The enzyme's normal values are: 98-279 U / l. (Mitrică - Kondi, 1981).

High levels of this enzyme occur in various liver and bone diseases, as well as in diseases of the thyroid gland, intestinal tract and in some bacterial infections.

3. RESULTS AND DISCUSSIONS

Of the 484 subjects hospitalized with chronic liver diseases, 245 suffer from unspecified hepatitis and 239 from non-infectious hepatitis.

Regarding the residence environment, it appears that, of these, a number of 276 patients come from rural areas and a number of 208 patients, from urban areas.

The data analysis in the chart shows that most patients come from rural areas, with a percentage of 57.02%, compared to those in urban areas, with a percentage of 42.98%.

Table 1. The distribution of subjects suffering from chronic liver diseases, according to the environment of residence

Residence	No. subjects	Structure (%)
Rural	276	57.02
Urban	208	42.98
Total	484	100

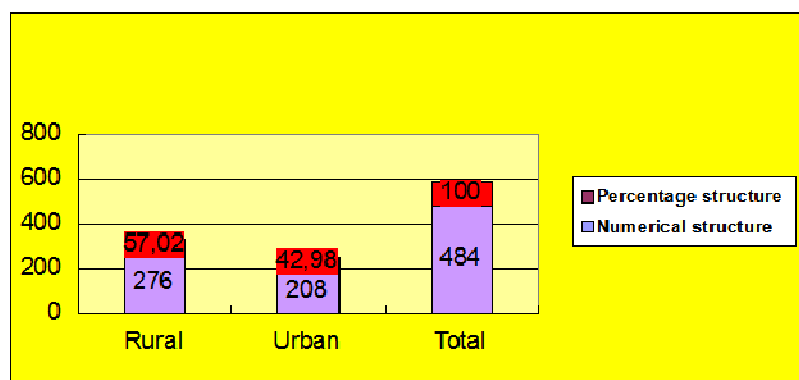


Figure 1. Percentage and numerical structure of the batch of subjects suffering from chronic liver diseases, according to the environment of residence

Regarding the gender of the monitored patients, 132 subjects are female and 352 subjects are male. Thus, it appears that men predominate, with a percentage of 72.73%, compared to women, with a percentage of 27.27%.

Table 2. The distribution of subjects suffering from chronic liver diseases, by gender

Gender	No. subjects	Structure (%)
Female	132	27.27
Male	352	72.73
Total	484	100

Of all patients monitored by testing γ -GT, namely 328, 235 were registered with elevated values of γ -GT, 92 were within normal limits and one person had a lower value.

Of the 235 subjects with elevated values, the men number is 186 and the women number is 49. From the analysis of these data it appears that the percentage of men who have elevated values of γ -GT – 79.15% is dominant compared to the percentage of women who develop elevated values of γ -GT – 20.85%.

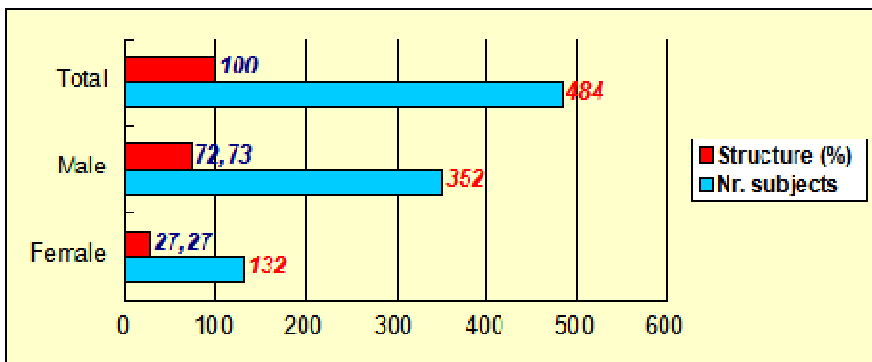


Figure 2. The structure of numerical and percentage of the batch of subjects suffering from chronic liver diseases, by gender

Table 3. The distribution of the batch of patients with elevated value of γ -GT, by gender

Gender	No. subjects	Structure (%)
Female	49	20.85
Male	186	79.15
Total	235	100

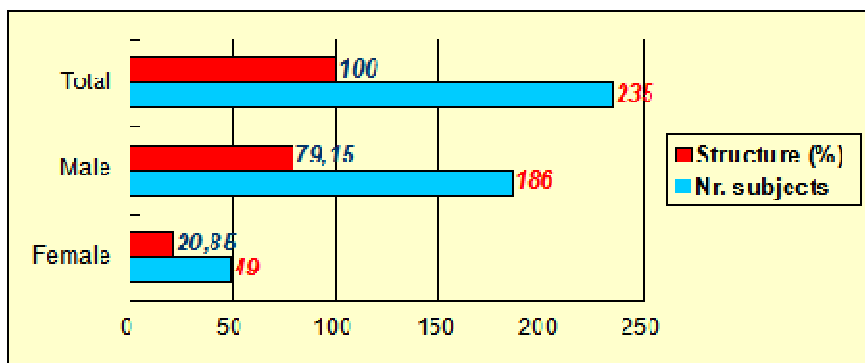


Figure 3. The structure of numerical and percentage of the batch of patients with high value of γ -GT, by gender

Of all patients tested for FA, namely 186, 43 subjects showed elevated FA values (> 279 U / l) and the rest of 145 recorded values less than 98 U / l (7 subjects) and normal values (136 subjects) . Thus it appears that the number of those in which there are no changes in the ALP values is 3.16 times higher than the number of those with values beyond the limit of 279 U / l.

Table 4. The distribution of patients with chronic liver diseases, depending on the values of ALP

Values of the ALP	No. subjects	Structure (%)
< 98 U/l	7	3,76
98 - 279 U/l	136	73,12
> 279 U/l	43	23,12

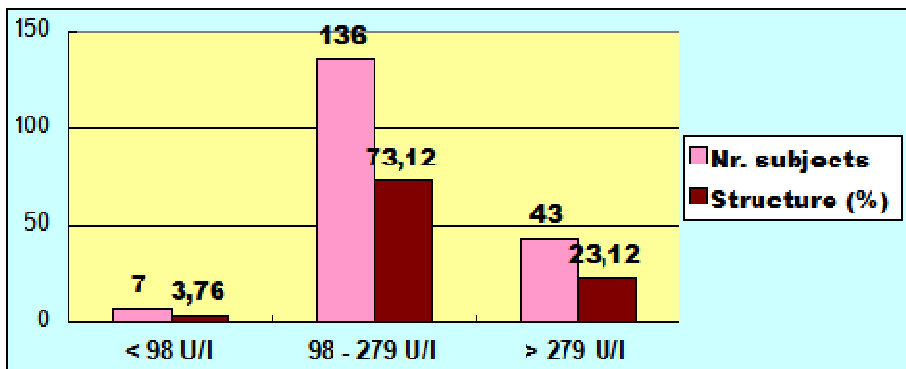


Figure 4. The structure of the batch of patients according to the values of the FA (ALP)

Of the 43 patients with elevated values, the number of men is 31 and the number of women is 12. The analysis of these data leads to the same conclusion as above, namely that the percentage of sick men - 72,09% is dominant, compared to the percentage of sick women – 27,91%.

Table 5. The distribution of patients with high value of ALP, by gender

Sex	No. subjects	Structure (%)
Female	12	27,91
Male	31	72,09
Total	43	100

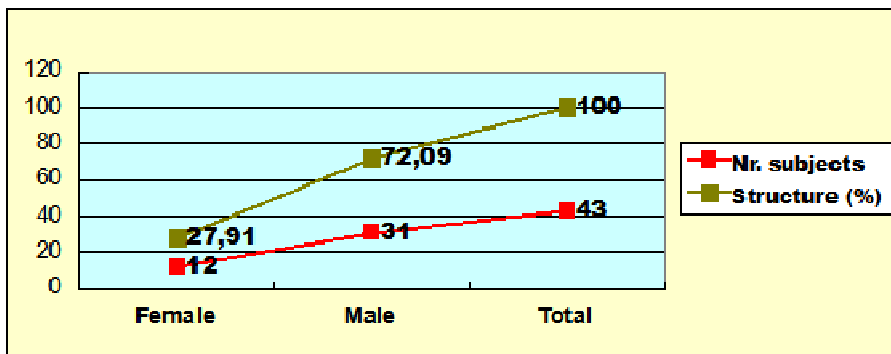


Figure 5. The structure of numerical and percentage of the batch of patients with high value of ALP, by gender

4. CONCLUSIONS

The rural population dominates as number of cases with liver diseases the urban one and masculine the feminine gender.

Using enzymes γ -GT and FA in monitoring patients with liver diseases is of special importance for them and for society, helping the early detection of diseases and guiding therapy, costs being lower for the Romanian State.

Prevention through enzymatic laboratory tests is less expensive than drug and surgical treatments!

5. ACKNOWLEDGEMENTS

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6. REFERENCES

- Adams, L.A. et al. (2005). The natural history of non-alcoholic fatty liver disease: a population-based cohort study. *Gastroenterology* 129 (1), 113-21.
- Lefkowitz, J.H. (2006). Liver biopsy histopathology. In Zakim and Boyer's Hepatology a textbook of liver disease, fifth edition, Elsevier, 205-234.
- Mitrică - Kondi, N. (1981). Clinical laboratory, Medical Publishing House, Bucharest, 298-299.
- Popovici, O., Molnar, G., Popovici, F., Janță, D., Pistol, A., Azoicăi, D. (2016). An Aeroprevalence Study of Hepatitis B and C Virus Infections in hospitalized Population in Romania, an Opportunity or a Better National Prevention and Control Strategy. *Journal gastrointestinal and liver diseases*, 25(1), 25-32.
- Rosen, H.R., Keefe, E.B. (2000). Evaluation of abnormal liver enzymes, use of liver tests and the serology of viral hepatitis. In: Bacon BR, Di Bisceglie AM, eds. *Liver Disease: Diagnostic and Management*. New York: Churchill Livingstone, 24 – 35.
- Stremmel, W., Wojdar, R., Grotguth, R., et al. (1992). Liver function tests in a clinical comparison. *Gastroenterology* 30, 784-790.
- World Health Assembly approves resolution on hepatitis and mechanism to coordinate non-communicable disease response (2014). Accessed at: http://apps.who.int/gb/ebwha/pdf_files/WHA64/A67_R6-e.pdf