

## THE USE OF LABORATORY INDICES TBil AND DBil CONCERNING MONITORING LIVER DISEASES FOR ARGES COUNTY POPULATION

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### Abstract

*Infectious and non-infectious liver diseases are the cause of many deaths around the globe. Viral hepatitis is a major public health problem worldwide, with hundreds of millions of infected people and millions of deaths. Following a long-term inflammation, hepatocytes begin to die, to necrosis and liver cirrhosis is installed. The consequences of cirrhosis are serious, involving ascites, brain dysfunction, gastric or esophageal haemorrhage and even hepatocellular carcinoma. Apart from viral hepatitis, the hepatic function is also affected by a number of non-infectious, chronic diseases, some of which are unspecified. Our study looked at the use of laboratory TBil (bilirubin) and DBil (direct bilirubin) in the monitoring of patients suffering from chronic hepatitis, unspecified and non-infectious hepatitis, hospitalized in the Pitesti County Emergency Hospital in 2014. They come from urban and rural areas and their age is between 18 and 97 years. Values greater than 1.2 mg/dl of TBil and over 0.52 mg/dl of DBil are recorded in various chronic and unspecified liver diseases. The increase in the values of the two types of bilirubin is observed in both genders. By early diagnosis and by establishing an appropriate treatment, chronic processes can be prevented and treatment costs will not be so great.*

*Keywords: direct bilirubin, hepatitis, liver diseases, laboratory indices.*

### 1. INTRODUCTION

At the 2014 level, our country ranked 4th in the world concerning the average mortality rate of liver disease: 44.5 deaths per 100.000 inhabitants, when the European average is 15 deaths per 100.000 inhabitants (WHO, 2014).

It is estimated that there are 1.4 million deaths / year, due to cirrhosis, liver cancer, and acute liver infections. These data are comparable to those for HIV and tuberculosis.

In this study, we aim to monitor patients with noninfectious liver disease through TBil and DBil laboratory biological parameters.

### 2. MATERIALS AND METHODS

This study included a total of 485 subjects, both men and women, from urban and rural areas aged between 18 and 97 who had already established diagnoses of liver disease other than infectious diseases. The study was conducted in the period 01.01.2014 - 31.12.2014, within the Pitesti County Emergency Hospital.

Patients were monitored by determining the activity of total bilirubin (TBil) and direct bilirubin (DBil).

Bilirubin is the result of the hem catabolism, with daily production being 250-300 mg. Approximately 85% of the total bilirubin comes from hem degradation from the hemoglobin released from aged red blood cells that are destroyed in the reticuloendothelial cells of the liver, spleen and bone marrow (Murali, 2014). The remaining 15% is produced by precursors of red blood cells destroyed in the bone marrow and by way of the catabolism of other hem-containing proteins such as myoglobin, cytochromes and peroxidases. The bilirubin from the serum is composed of three fractions: unconjugated bilirubin, which is highly apolar and practically insoluble in water at physiological pH and body temperature, conjugated bilirubin, which is linked to carbohydrates and  $\delta$ -bilirubin, which is covalently bound to albumin.  $\delta$ -bilirubin is not excreted in the bile or urine; it slowly disappears, reflecting the half-life of albumin (Mihele, 2003).

A number of hereditary and acquired diseases affect one or more steps involved in the production, assimilation, storage, metabolism and excretion of bilirubin. Depending on the disease, unconjugated, conjugated bilirubin or both are major contributors to hyperbilirubinemia.

Hyperbilirubinaemia is a symptom and leads to jaundice when bilirubin is greater than 68  $\mu\text{mol/l}$  (4 mg/dl) in neonates and infants and greater than 43  $\mu\text{mol/l}$  (2.5 mg/dl) in children and adults.

Determination of the two types of bilirubin, total and direct, was performed by spectrophotometric method, using the biochemical analyzer Konelab.

For the determination of TBil the following reagents were used: HCl mmol/l and p-nitrobenzene diazonium salt 4.4 mmol/l to give the corresponding azobirubin (azopigment) (Kuenzle et al., 1973). The colour intensity of this dye in solution is proportional to the total bilirubin concentration. The normal TBil values are 0.3 – 1.2 mg dl (Mitrică - Kondi, 1981).

For determination of DBil, the following reagents were used: sulphanilic acid 10 mmol/l, 144 mmol/l sodium nitrate and 100 mmol/l HCl. The normal DBil values are 0.0 – 0.52 mg/dl (Mitrică - Kondi, 1981).

For inclusion in the study, the following were considered:

- the monitored subjects were admitted to the Pitesti County Emergency Hospital, between 01.01.2014 - 31.12.2014;
- monitoring was performed on the basis of the observation sheets, following complete investigation, subjects being diagnosed with non-infectious hepatitis (fibrosis, cirrhosis, toxic liver disease) and chronic unspecified hepatitis;
- age: over 18 years old.

Exclusion conditions from study:

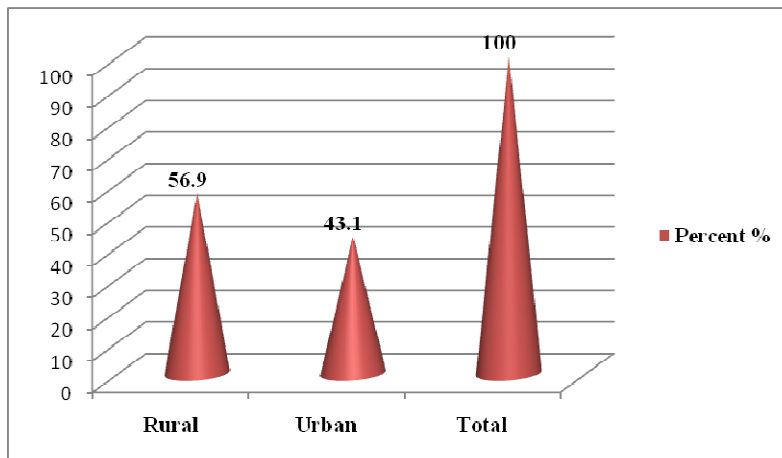
- liver disease, other than chronic inflammatory - dystrophic hepatopathy;
- subjects suffering from other chronic diseases, clinically, biochemical, serological and radiological;
- transplant of liver.

### 3. RESULTS AND DISCUSSIONS

Of the 485 subjects hospitalized with chronic liver disease, chronic hepatitis diagnosis 246, and 239 unspecified non-infectious hepatitis. Regarding the residential environment, 276 patients come from rural areas and 209 were urban patients. Analyzing the data in the graph, it is observed that the majority of the patients is from the rural area (56.90%), compared to the urban ones 43.10%.

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

Residence	Nr. subjects
Rural	276
Urban	209
Total	485

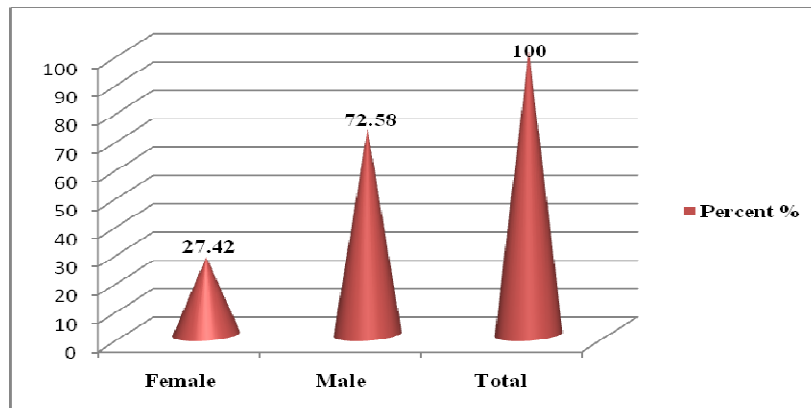


**Figure 1. The structure of percentage of the batch of subjects suffering from chronic liver diseases, according to the environment of residence**

Regarding the sex of the studies patients, 133 subjects were female and 352 subjects were male. Thus, it is noticed that men dominate, with 72.58%, compared to women, with 27.42%.

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

Gender	Nr. subjects
Female	133
Male	352
Total	485

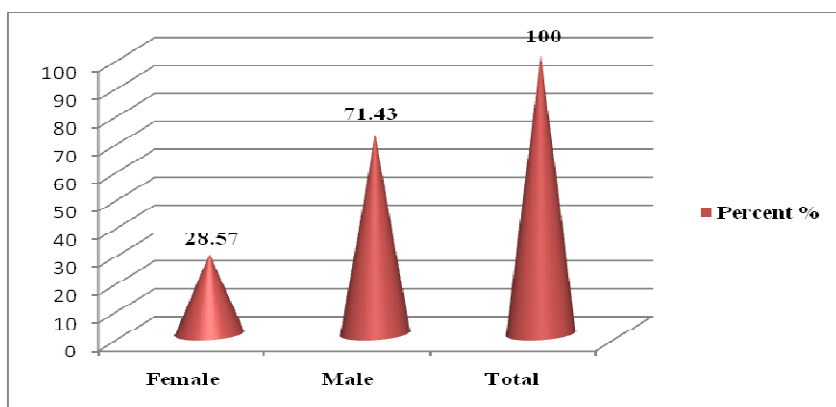


**Figure 2. The structure of percentage of the batch of subjects suffering from chronic liver diseases, by gender**

Out of the total number of patients tested for TBil, which is 294, representing 60.62% of the total number of patients with non-infectious hepatitis and chronic, unspecified hepatitis, the number of males is 210, and the number of women is 84. And from the analysis of these data, it appears that the percentage of sick males –71.43% is dominant, compared to the percentage of sick women – 28.57%.

**Table 3. The distribution of the batch of patients with elevated value of TBil, by gender**

Gender	Nr. subjects
Female	84
Male	210
Total	294



**Figure 3. The structure of percentage of the batch of patients with high value of TBil, by gender**

Out of the 294 patients tested for TBil, only 64 (21.77%) had values above 1,2 mg/dl, 230 subjects (78.23%) with normal values. Out of the 64 patients, men represent 67.19% (43 patients), and women 32.81% (21 patients).

DBil laboratory index was tested on a number of 200 patients with non-specified chronic hepatitis and non-infectious hepatitis in the Pitesti County Emergency Hospital, which accounted for 41.23% of the 485 total.

Out of the 200 subjects, 52 were female, 26%, and 148 were male, 74%.

**Table 4. The distribution of patients with high value of TBil, by gender**

Gender	Nr. subjects
Female	21
Male	43
Total	64

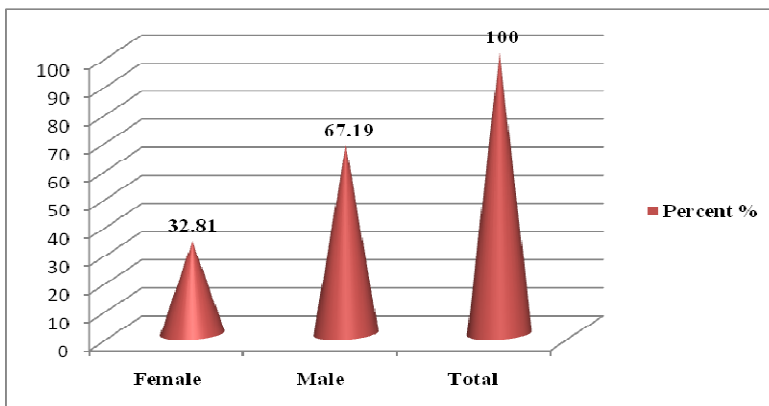


Figure 4. The structure of percentage of the batch of patients with high value of TBil, by gender

Table 5. The distribution of the batch of patients with elevated value of DBil, by gender

Gender	Nr. subjects
Female	52
Male	148
Total	200

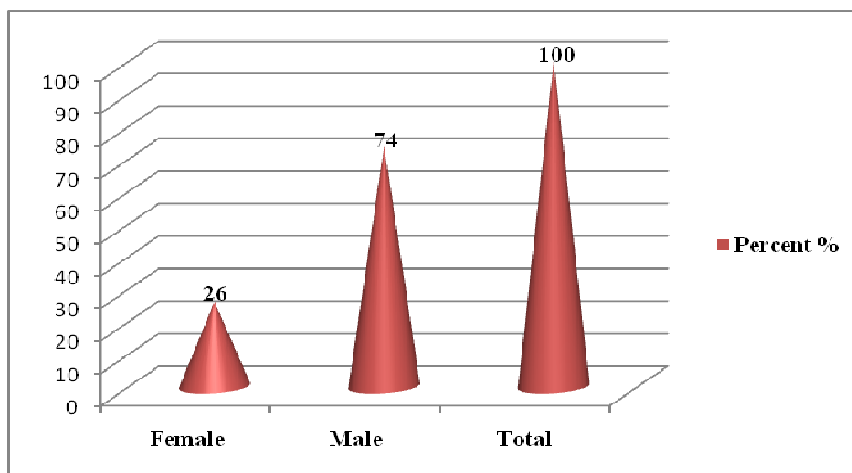


Figure 5. The distribution of the batch of patients with elevated value of DBil, by gender

Normal DBil values were recorded on 98 patients. The other 102 subjects recorded values greater than 0.52 mg/dl. Out of these, men represent 80.39% (82 patients) and women 19.61% (20 patients), according to the data in the table below.

Table 6. The distribution of the batch of patients with high value of DBil, by gender

Gender	Nr. subjects
Female	20
Male	82
Total	102

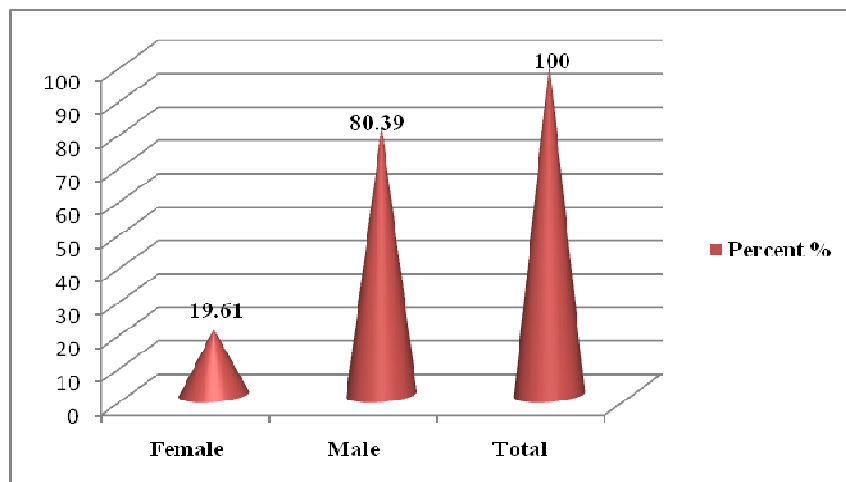


Figure 6. The structure of percentage of the batch of patients with high value of DBil, by gender

#### 4. CONCLUSIONS

Based on the analysis of the data presented, it is highlighted that in chronic, unspecified and noninfectious hepatitis, TBil values above 1.2 mg/dl are recorded at 21.77% (out of 294 tested patients).

Analyzing the recorded DBil values in patients with non-infectious and chronic, unspecified liver disease, 49% (out of the 200 patients tested) showed increases above 0.52 mg/dl.

Patients recording TBI values greater than 1.2 mg/dl were men, at 67.19%, which is also observed in DBil values above 0.52 mg/dl with 80.39%.

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#### 6. REFERENCES

- Kuenzle, C.C., Weibel, M.H., Pelloni, R.R. (1973). *The reaction of bilirubin with diazomethane*, *Biochem J*, 133, 357-368.
- Mitrică - Kondi, N. (1981). *Laboratorul clinic* [Clinical laboratory]. București: Ed. Medicală.
- Mihele, D. (2003). *Biochimie clinică* [Clinical biochemistry]. Bucuresti: Ed. Medicală.
- Murali, A.R., Carey, W.D. (2004). *Liver Test Interpretation - Approach to the Patient with Liver Disease: A Guide to Commonly Used Liver Tests*, *Cleveland Clinic Journal of Medicine*. Retrieved October, 2017, from <http://www.clevelandclinicmeded.com>
- World Health Assenbly approves resolution on hepatitis and mechanism to coordinate noncommunicable disease response, 2014. Retrieved October, 2017, from <http://apps.who.int>