

Relationship between infant jaundice- children with viral hepatitis and hepatic enzymes levels

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Abstract

There are different reasons of jaundice, the most important reasons are the viral infection. current study included a comparison between some important hepatic enzymes of the newborn were suffering from pathological jaundice and young children, with age under fourteen years, who are suffering from the virus hepatitis. The study includes (82) patients suffering from jaundice from both genders which divided into four groups. G1(newborns patients age 1-14 days), G2 (newborns control 1- 14 days), G3 (young children age 1-14 years) G4 (young children age control 1-14 years). All samples were obtained from the children's parlors of the children's hospital in Karbala Province . The present study focus on hepatic enzymes which effected with jaundice. The levels of enzymes activities (ALT, AST, and ALP) in their normal were: (10 ± 2.4IU / L, 9.9 ± 1.79 IU/L, 19.6 ± 2.05 K. A. U / 100 ml) for G1 (group one) respectively wasn't different from the control group , which were (9.8 ± 1.7 IU / L , 8.4 ± 1.49 IU/L , 19 ± 0.9 K . A. U / 100 ml). Which it be noticed that there is significant rising in the activity of enzymes (ALT , AST , ALP) in the case of the third group where the average were (170 ± 15.9 IU / L , 59.3 ± 7.6 IU/L , 57.5 ± 6.9 K . A. U / 100 ml) respectively , Comparing with the control group , average activity of these enzymes were (7.4 ± 2.0 IU / L , 4.3 ± 1.4 IU/L , 12.3 ± 2.0 K . A. U / 100 ml) .(King Armstrong Unite /100 ml).

Keyword: Alkaline phosphatase; hepatic enzymes; Pathological jaundice; Transaminase.

1. Introduction

Jaundice is the appearance of yellow on the skin, mucous membranes of the eyes, and mouth due to increased production of bilirubin in blood stream to level higher than 2 - 3 mg / dL [1-4]. Its' the clinical type of inflammatory disease that changes the color of the plasma, skin and mucosa to yellow [5]. Because of the liver not absorbing bilirubin resulting from the degradation of end-of-life red blood cells [1, 4] . Approximately 60% of term babies and 85% of preterm babies will develop clinically apparent Jaundice. Most of these babies have so-called 'physiological jaundice', which typically becomes clinically apparent on day 3, peaks on day 5 to 7 and resolves by day 14 [6]. Jaundice can be classified into four types include Physiologic jaundice, Jaundice from hemolysis, Pathologic jaundice and viral hepatitis. Studies found that four enzymes control on liver function these include Transaminase which responsible for the transfer of the amine group from amino acids to ketoacids [7, 8] are used to detect the damage that occurs in the liver [2]. The second enzyme is Alanine transaminase (ALT) also called Glutamate Pyruvate transaminase (GPT) [9, 10] (The third enzymes is Aspartate transaminase (AST):also called Glutamate oxaloacetate transaminase. This enzyme is finding in high concentrations in the heart, liver, skeletal muscle, kidneys, and red blood cells. Breaking down in any of these tissues leads to an increase in the level of AST in plasma [11-13] The last

enzyme is Alkaline phosphatase (ALP) this enzyme found in the tissues and responsible of hydrolyze phosphates at high pH [11]. The molecular weight varies according to the source of the tissue in which the enzyme is. a As a result of increase of jaundice between Iraqi children the current study aimed to identify the effect of hepatic enzymes on patients with jaundice .

2. Materials and Methods

Blood samples were collected from 80 patients attended Children's Teaching hospital at Karbala Province from October 2021 till March 2022. The patient included four groups. G1(newborns patients age 1-14 days), G2 (newborns control 1- 14 days), G3 (young children age 1-14 years) G4 (young children age control 1-14 years) [14] .

1. Determination of the activity of amino group transfer enzymes:

1.1 Estimation of the activity of the enzyme (ALT=GPT):

The concentration of glutamic-pyruvic transaminase enzyme was measured by observing the concentration of pyruvate hydrazine formed with 2,4-dinitrophenyl hydrazine using colorimetric method according to the manufacture instruction (Randox Laboratories, England).

1.2 Estimation of the activity of the enzyme (AST=GOT)

The colorimetric method used to determine the concentration of the enzyme aspartate or glutamic-oxaloacetate transaminase in the blood serum was measured by observing the concentration of pyruvate hydrazine formed with 2,4-dinitrophenyl hydrazine (Randox Laboratories, England).

1.3 Estimation of the activity of the enzyme ALP

The colorimetric method is use to estimate the activity of alkaline phosphatase according to the following equation: Phenyl Phosphate → Phenol + Phosphate
Released phenol is measure in the presence of Amino-4-antipyrine and Potassium ferricyanide. The presence of sodium arsenate in the reagent stops the enzymatic reaction (Bio Merieux , France).

ALP

→

PH10

1.4 Analytical analyses

SPSS Program Version 20 was used to analyses the results.

3. Results and Discussion

As a result of jaundice distribution in Iraqi community the current study aimed to found the relation between the jaundice and liver enzyme. Three enzymes related to liver infection were including in this study using spectrophotometer.

Evaluated the activity of enzymes transporting the amine group (AST, ALT) and the base phosphatase enzyme (ALP) for both the patient group and the control group (Mean ± S. D) as shown in table 1.

T test	ALP K . A . U / 100 ml	T test	AST IU / L	T test	ALT IU/ L	No	
P> 0.05	19.6 ± 2.05	P> 0.05	9.9 ± 1.79	P> 0.05	10.2 ± 2.4	36	G ₁
	19 ± 0.9		8.4 ± 1.49		9.8 ± 1.7	13	G ₂
P< 0.05	57.5 ± 6.9	P< 0.05	59.3 ± 7.6	P< 0.05	170 ± 15.9	17	G ₃
	12.3 ± 2		4.3 ± 1.4		7.4 ± 2.0	16	G ₄

G1= newborns, G2 control group,
G3= young children, G4 control group

Estimation of Alanine transaminase

Present study found that ALT enzyme was high 170 IU/L in young children (group 3), While the concentration of this enzyme was very law in other patient’s groups as shown in table 1

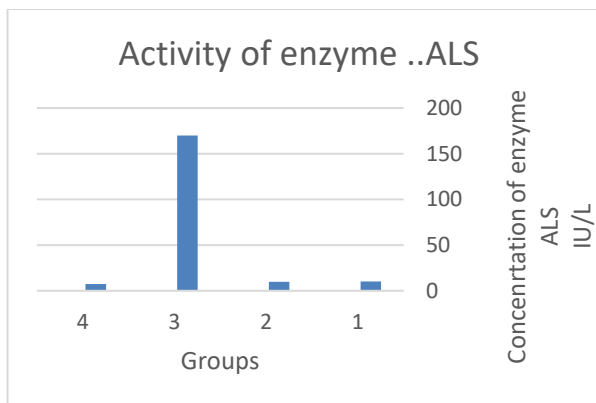


Figure NO.1: Enzyme activity (ALT) in serum in children through patients groups

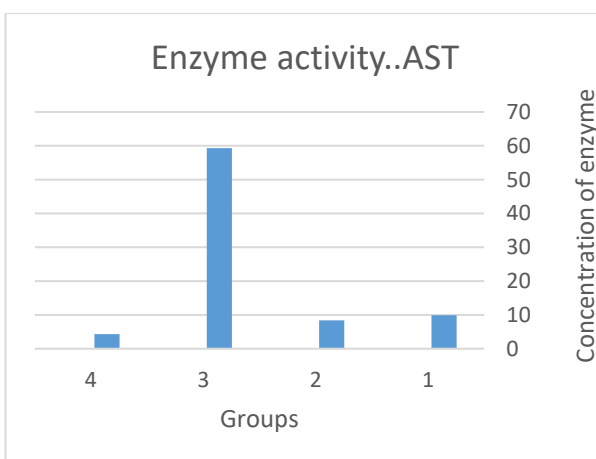


Figure NO. 2: Enzyme activity (AST) in serum in children

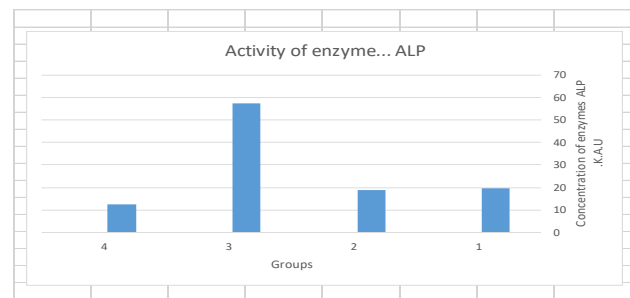


Figure NO .3: Enzyme activity (ALP) in serum in children.

The activity of enzymes transporting the group of amines (AST, ALT) and the enzyme base phosphatase (ALP) in the blood serum.

1. The enzymes transporting the amine group (AST, ALT) work to transfer the amine.
2. Group from the amino acids to the ketone acids and these enzymes are used to.
3. Detect the damage that occurs in the liver cells, Evaluate the activity of enzymes.
4. Transporting the amine group (AST, ALT) and the base phosphatase enzyme (ALP) for each patient group and control group (Mean ± SD).

* Effectiveness of amine transporter enzymes in congenital jaundice

When measuring the activity of enzymes transporting the amine group, AST, ALT in newborns whose ages range from 1-14 days, with pathological congenital jaundice as in Table (1), we noticed that the activity of the enzyme ALT as in Figure (1) remains at its normal level. It does not differ much from the control group, as the rate reaches (10.2 ± 2.4 IU / L) in the patient group compared with (9.8 ± 1.7 IU / L) in the

control group. When measuring the activity of the AST enzyme in the same children with pathological congenital jaundice, we note as In Table (1) and in Fig. (2), the activity of this enzyme remains at its normal level and does not differ much from the control group, as the rate reaches $(9.9 \pm 1.79 \text{ IU / L})$ in the patient group and reaches $(8.4 \pm 1.49 \text{ IU / L})$ in a control group. The reason that these enzymes (AST, ALT) remain in their normal level is that there is no breakdown or disturbance in the liver cell.

The efficacy of amine transporter enzymes in viral hepatitis

When measuring the activity of enzymes transporting the amine group AST, ALT in children with viral hepatitis whose age ranges between (1 - 14) years, as in Table (1) and Fig. (1), a significant increase in the activity of the enzyme ALT, as the rate reaches $(170 \pm 15.9 \text{ IU / L})$ compared with the control group, and when measuring the activity of the enzyme AST in the same children with viral hepatitis, we noticed, as in Table (1) and Fig. (2), a significant increase in the concentration of this enzyme, as the rate reached $(59.3 \pm 7.6 \text{ IU / L})$ compared to a control group.

The reason for the increase of these enzymes in children with viral Hepatitis is that.

These enzymes are found in the liver cells and when the liver cells are affected by Viruses, it will lead to the breakdown of the liver cells and then it leads to an increase in the effectiveness of these enzymes, and when comparing the activity of the Enzyme ALT and the activity of the enzyme AST In the same children with viral Hepatitis, we note that the activity of the enzyme ALT increases more compared to the enzyme AST and the reason for this is that the enzyme ALT is found mainly in the liver compared to the enzyme AST and this is what

Efficacy of the enzyme ALP in congenital jaundice:

When measuring the activity of the enzyme ALP in newborns aged (1-14) days with

Pathological congenital jaundice, we noticed, as in Table (1) and in Figure (3), that.

The activity of the enzyme ALP remains at its normal level and does not differ from

The control group, the rate reaches $(19.6 \pm 2.05 \text{ K. A. U / 100 ml})$ in the patient.

Group and up to $(19 \pm 0.9 \text{ K. A. U / 100 ml})$ in the control group, and the reason for

its' survival to its normal level is that there was no breakdown or A disorder of the liver cells.

Effectiveness of ALP in viral hepatitis:

When measuring the activity of the enzyme ALP in children with viral hepatitis whose ages range between (1-14) years, we noticed, as shown in Table (1) and Figure (3), a significant increase in the activity of the enzyme ALP, as the rate reached $(57.5 \pm 6.9 \text{ K. A. U / 100 ml})$ compared to the control group $(12.3 \pm 2 \text{ K.A.U.})$. The reason for the high effectiveness of the enzyme ALP is that the enzyme ALP is found in the liver, and when jaundice occurs in the case of viral hepatitis, it leads to the blockage

of the bile ducts inside the liver, and then the activity of the enzyme ALP increases, and this is confirmed by research [7, 13, 15]

4. Conclusion

The results found that hepatic enzymes including alanine transaminase, aspartate transaminase, and alkaline phosphatase were increased of jaundice patients compared to control group of young children age (1-14) years old.

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