

THE EFFECT OF CAMPHOR (CINNAMOMUM CAMPHORA) ON CONCENTRATION OF LIVER ENZYMES IN FEMALE RATS

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Abstract- ALT and AST are two important enzymes in liver that high level of them indicates liver damage. There are some factors that cause increase in these enzymes in blood such as drugs or diseases. Camphor as a herbal medicine is used for its effects on reproductive system, kidney, liver, aborting etc. In this research we have examined the effect of camphor on concentration of enzymes in liver. 40 female rats with average weight 180 ± 20 gram and age 80-90 days are used. They are divided into 5 groups randomly. The control group received no injection. The sham group received olive oil as camphor solvent. The experimental groups 1, 2 and 3 received camphor solution in doses of 25, 50 and 100 mg/kg. Daily injection was done intraperitoneally and amount 0.2 cc. All of them received drug for 14 days. At the end of the injections a sample of serum was taken and was examined by Eliza method in order to determine the concentration of enzymes. The results showed no significant difference between control group and examined groups. Although there were no significant differences but it showed an increase in amount of enzymes in experimental groups compared to control. Maybe by using camphor in higher doses it leads to significant increase in concentration of enzymes. So it suggests that camphor has an stimulating effect on liver enzymes.

Keywords- camphor; liver; enzyme; rat.

I. INTRODUCTION

Camphor as a herbal medicine has many various physiological effects. It affects respiratory system, circulatory system, skin, reproductive system, liver and kidney [1 & 2]. Alanin aminotransferase (ALT) and aspartate aminotransferase (AST) are the most important enzymes in group of trans-amines. They transfer the amin group and then catalyze the process of transforming α -keto acids into amino acids. ALT is a specific factor in liver for defining the liver damage. It is only increased in the liver of patients. But AST acts not only as a factor in liver damage but also is increased in heart damages [3 & 4]. So far scientists have done many researches about the various effects of camphor. Some of them will be mentioned here. Camphor can stop the effect of α toxin B1 and acts as a herbal fungi toxicant [5]. α toxin B1 is a compound that causes liver injuries. But camphor protects the liver by repressing the effects of α toxin B1 [6]. Scientists found that camphor affects liver tissue and changes it. In fact camphor causes vasodilation in central liver veins. So these results may cause teratogen in newborn whose mothers were exposed to camphor treatment [7]. Camphor acts as an anti-oxidative and anti-inflammatory [8]. Gyoubu showed that (-)-Camphor was oxidized to 5-exo-hydroxyfenchone by human liver microsomal cytochrome (P450) enzymes. CYP2A6 was the major enzyme involved in the hydroxylation of (-)-camphor by human liver microsomes.

There was a good correlation between CYP2A6 contents and (-)-camphor hydroxylation activities in liver microsomes [9]. Camphor causes the thickness of the myometrium in uterus. But in low dose, the glands of uterus were disappeared and led to abortion [10]. Camphor heals the fracture bone and is useful for this matter [11 & 12]. Therefore due to the important action of liver we have investigated the effect of camphor on concentration of enzymes in liver of rats.

II. METHODS

This is an experimental study. The animal for this experiment was female rat. We used 40 female rats with Average weight 180 ± 20 gr and age 80-90 days.

The temperature was 23 ± 2 C° and photoperiodic was 12 hours lightness and 12 hours darkness. Their diet was special rat's food. They were kept in the cage for two weeks for adaptation before starting the injection. The powder of camphor was bought. 10 gr from this powder added to 100 cc hydro alcohol 70%. Then that solution was warmed into 40 C° and was evaporated. The sediment was filtered and amount of 7.1 gr pure powder was produced. This powder was dissolved in olive oil and produced concentrations of 25, 50 and 100 mg/kg. Lethal dose in intraperitoneally injection way is 3000 mg/kg [13]. The animals randomly were divided into 5 groups. The control group received no injection. The sham group received olive oil as camphor's dissolver. The

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experimental groups of 1, 2 and 3 received camphor solution in doses of 25, 50 and 100 mg/kg. Daily injection was done intraperitoneally and amount 0.2 cc. All of them received drug for 14 days. After finishing the injection they were sacrificed and sampled blood from ventricle of heart. The samples of serum were investigated by ELISA method for determining concentration of enzymes. The results were explained by using of SPSS statistical software and Duncan and T-test method and one way analytical variance. Analysis and mean comparison was carried out ($p < 0.05$).

III. RESULTS

The result showed that there was an increase in concentration of ALT (table 1) and AST (table 2) compared to control and sham groups. But it was not significant.

TABLE 1: the effect of camphor on mean of ALT concentration (IU/L). (X±SE) among control, sham and treated groups

Groups	Number	Mean ± SEM of ALT (IU/L)
Control	n=8	41.33 ± 1.838 a
Sham	n=8	42.60 ± 3.723 ab
Exp.1 : 25 mg/kg	n=8	48.80 ± 2.939 ab
Exp.2 : 50 mg/kg	n=8	52.80 ± 1.685 b
Exp.3 : 100 mg/kg	n=8	52.40 ± 6.055 ab

TABLE 2: The effect of camphor on mean of AST concentration (IU/L). (X±SE) among control, sham and treated groups

Groups	Number	Mean ± SEM of AST (IU/L)
Control	n = 8	274.3 ± 26.52 a
Sham	n = 8	312.8 ± 12.65 a
Exp.1 : 25 mg/kg	n = 8	329.4 ± 18.15 a
Exp.2 : 50 mg/kg	n = 8	331.4 ± 12.89 a
Exp.3 : 100 mg/kg	n = 8	293.2 ± 13.69 a

IV. CONCLUSIONS

One of the most important components in camphor is cinnamaldehyde [14]. Cinnamaldehyde, significantly decreases the aspartate aminotransferase (AST), alanine aminotransferase (ALT), tumor necrosis factor- α (TNF- α), and interleukin 6 (IL-6) levels in serum. These results suggest that cinnamaldehyde acts as a hepatoprotection against lipopolysaccharide/D-galactosamine (LPS/D-GalN)-induced liver damage in mice and their hepatoprotective effects may be due to the modulation of anti-inflammatory activities [15]. In this study the reason for increasing the enzymes is probably because of different doses of camphor

which is used. Alanine is changed to pyruvate and glutamate by ALT. ALT is a factor for recognizing the liver damage. Necrosis or membrane damage releases this enzyme into blood. Toxicity of camphor probably can affect to increase this enzyme [16]. Findings by Aliye suggested hemolysis or more generalized tissue damage in liver due to camphor toxicity. Hepatotoxicity occurs because of camphor toxicity. A high serum LDH level and a high AST-ALT ratio have been observed because of camphor poisoning. Camphor is metabolized in the liver and is excreted as an inactive glucuronide compound in the urine [17]. According to researches by Mereto high doses of cinnamaldehyde may induce genetic alterations at the chromosomal level, and suggest that the liver is the preferential target of its undesirable effects [18]. But this thesis is different from Muguruma's theory. He found that the genotoxicity effect of cinnamaldehyde on liver is very low [19]. But it is certain that camphor is deeply dependent on the level of dose and probably in some doses causes damage of liver cells [20&21]. PRL added to a preservation solution significantly decreased the quantity and slowed the release rate of ALT and AST aminotransferases from the preserved rabbit liver, implying that this hormone has hepatoprotective properties [22]. The obtained results indicate that the addition of PRL to the HTK (histidine-tryptophan-ketoglutaric acid) solution significantly lowers the amount of aminotransferases released from hepatocytes and also lessens their release rate [23]. On the other side Linjawi proved that camphor inhibits the secretion of PRL [24]. So may be low concentration of PRL in this study affects the concentration of ALT. Camphor raises the activity of cytochrome P450. It not only balances the activity of enzymes in liver but also causes to decrease the glutation [25]. According to obtained results there is no significant difference in AST concentration between groups. In fact there was an increase in the level of enzymes but it wasn't significant. However to recognize the liver damage, it's enough to consider ALT concentration and the increase of it means the damage of liver cells [3 & 4]. The findings of the present study indicate that camphor affects the liver and by dose's increase, the concentration of enzymes is increased. So it may lead to significant increase in the enzyme's concentration in higher doses. However it is better to do more investigations in the future.

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