

The Effect of Smoking on Some Liver Enzymes in the City of Diwaniyah

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Annotation: The results indicated the effect of smoking on liver enzymes. A significant increase ($P < 0.01$) was observed for each enzyme ALT, AST, and ALP compared with the control group. However, the GGT enzyme did not show significant differences. Regarding the effect of the type of smoking on liver enzymes, a significant increase ($P < 0.05$) was observed for each of the ALP and AST enzymes, and the highest concentration was in hookah smokers, respectively, compared to the control group. However, the GGT and ALT enzymes did not show significant differences.

Introduction

Smoking contains toxic chemicals such as nicotine, carbon monoxide, and tar, which increase the detoxification burden on the liver. This may lead to increased oxidative stress and chronic hepatitis(1)

Cigarette smoke contains harmful and toxic substances that lead to the formation of free radicals in the liver, which leads to the destruction of its cells, which reduces the liver's ability to perform its functions properly, such as purifying the body of toxins, digesting fats, and producing proteins necessary for the body. Therefore, smoking can harm the health of the liver and cause problems in its functions in the long term (2).

Although smoking contains harmful chemicals, and the liver is the primary organ responsible for breaking down and processing these chemicals within the body, liver doctors usually do not give smoking-related diseases a high priority because there are many other risk factors that affect the liver, such as alcohol, viruses, obesity, and some medications.(3)

Many evidences indicate that cigarette smoking leads to the development of fatty liver disease for

reasons related to cardiovascular disease and cancer. Therefore, most hepatologists advise patients suffering from fatty liver disease and liver transplant recipients to quit smoking(4)

Many people know that smoking harms the heart and lungs, but its effect on the liver is no less dangerous. Every cigarette contains toxic substances that enter the body and move to the liver, which is the organ responsible for purifying toxins. These substances cause continuous inflammation in the liver, which leads over time to damage to its cells and the appearance of scars in it. With continued smoking, the risk of contracting serious diseases increases, such as cirrhosis of the liver, viral hepatitis (C, B), and even liver cancer(5)

Smoking affects liver function, increasing the pressure on liver cells as they must filter out the toxic substances in cigarette smoke, which may lead to a weakening of their functions over time(6)

Keywords: AST, ALP, GGT, ALT

Research Objectives Study

Study of the effect of smoking and the type of smoking on liver enzymes ALT, AST, GGT, ALP

Materials and methods

Study design

85 venous blood samples were collected from males and females from the center, districts and suburbs of Diwaniyah city. They were divided into two main groups. The first group included 75 samples from smokers and the second group included 10 healthy non-smokers as a control group. They were classified into five age groups: the first group from (20-29), the second group from (30-39), the third group (40-49), the fourth group (50-59), and the fifth group (60-67).

GGT in serum was determined using a spectrophotometer and the results were expressed in units of U/L. Mix reagent R1 & R2 in the ratio of 4:1 respectively to prepare the desired volume of working reagent. The working reagent is stable for 21 days at 2-8 °C. The reagent kit should be stored at 2-8 °C and is stable till the expiry date indicated on the label.(7)

AST is measured by monitoring the concentration of oxaloacetate hydrazone formed with 2, 4-dinitrophenyl-hydrazine according to Mixed, the absorbance of sample was recorded against the reagent blank after 5 minutes at 546 nm (530-550 nm) (8)

Determination Serum ALP was determined by colorimetric method according to Using a spectrophotometer Mixed. Incubated 10 min at room temperature and away from light. Absorbance recorded for blank specimen, standard, and assay at 510 nm against reagent blank (9)

Determination of Serum Alanine Aminotransferase (ALT) Using a spectrophotometer Mixed, the absorbance of the sample was recorded against the reagent blank after 5 minutes at 546 nm (530-550 nm) (10)

Statistical analysis

The data were analyzed using the Statistical Package for the Social Sciences (SPSS) program, where the One-way Analysis of Variance (ANOVA) test was used to test the differences in the concentration of the study criteria according to the effect of each smoking factor. The Duncan test was also used to determine the source of significant differences, in addition to using the simple Pearson correlation coefficient to reveal the relationships between the different study criteria. The differences were considered significant at a significance level of less than 0.05.

Results and discussion

The results of the current study also showed a significant increase ($P < 0.01$) in the studied liver enzymes ALT, ALP, AST in the smoking group, where they were at a level of (28.093±9.507) (97.320±22.140) (34.133±18.100) compared to the non-smokers group (18.700±5.397),

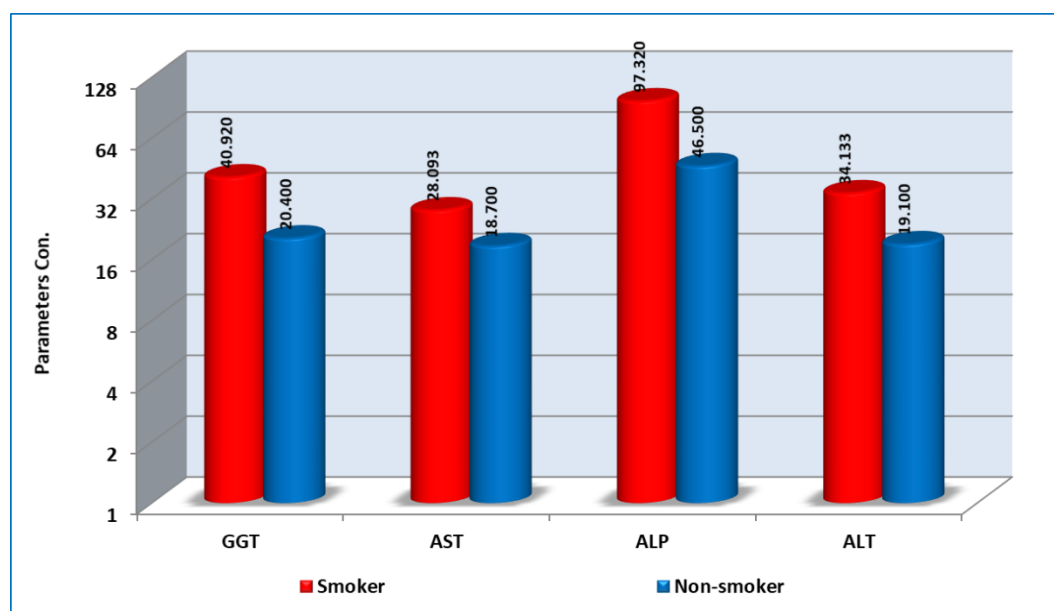
(46.500±14.269), (19.100±5.238). As for the GGT enzyme level, the increase was not significant in smokers (40.920±33.385) compared to non-smokers (20.400±5.661). These results are consistent with the findings of the study (11), which showed a significant increase in the levels of ALT and AST enzymes in smokers, indicating the possibility of damage to liver cells as a result of continuous exposure to toxic substances. These results are(12) found in cigarette smoke and confirm that there is an increase in the levels of ALT and AST in smokers compared to non-smokers, indicating damage to liver cells.

An increase in the levels of ALP, AST, and ALT enzymes may be due to the harmful effects of chemicals in cigarette smoke, such as nicotine, as tobacco compounds affect liver cells, leading to inflammatory responses that contribute to stimulating the secretion of these enzymes into the bloodstream.(13)

Smoking Parameters	Smoker (n=75) Mean±S.D.	Non-smoker (n=10) Mean±S.D.	T-Value	Sig.
GGT	40.920±33.385	20.400±5.661	1.930	0.057
AST	28.093±9.507	18.700±5.397	4.629	<0.001**
ALP	97.320±22.140	46.500±14.269	9.799	<0.001**
ALT	34.133±18.100	19.100±5.238	5.637	<0.001**

S.D. = Standard Deviation

** The differences are significant at the 0.01 level.



The effect of smoking type on liver enzymes

1-GGT (Gamma-Glutamyl Transferase)

The results showed that there were no significant differences ($P>0.05$) when studying the effect of smoking types on the GGT enzyme. This may be attributed to several factors such as the nature of the smoking pattern, the number of sessions, the duration of inhalation, the amount of smoke inhaled, or the liver's ability to tolerate the effect without this appearing clearly at the level of this enzyme.

2-AST (Aspartate Aminotransferase)

The study showed a significant difference at the probability level of $P<0.05$, and it was higher in the group of hookah smokers (30.067±10.826) compared to the control group (18.700±5.397).

This is consistent with the findings of a study conducted by (14) that hookah smoking is

associated with increased inflammatory markers and changes in liver enzymes compared to non-smokers. The study (15) also showed that a single session of hookah smoking can lead to the absorption of large amounts of nicotine and carbon monoxide that exceed what is absorbed from smoking several cigarettes, which confirms the danger of this habit to public health.

3-ALP (Alkaline Phosphatase)

The results of the current study showed a significant difference at the probability level of $P < 0.01$, and it was higher in the group of hookah smokers (105.267 ± 24.835) compared to the control group (46.500 ± 14.269).

The current results are consistent with the study (16), where a significant increase in the levels of the enzyme alkaline phosphatase (ALP) was observed in hookah smokers compared to non-smokers. This increase is attributed to repeated exposure to high concentrations of toxic substances such as carbon dioxide, polycyclic aromatic hydrocarbons (PAHS), and heavy metals such as lead and cadmium, which are found in large quantities in hookah smoke. These toxins stimulate an inflammatory response and damage to liver cells, in addition to a disturbance in bile secretion, which is reflected in an increase in the activity of the enzyme ALP. These results indicate a significant impact on liver functions in hookah smokers, which reinforces the need to educate the community about the dangers of this type of smoking and its negative impact on liver health.

4-ALT (Alanine Aminotransferase)

As for the ALT enzyme, the study results indicated that there were no significant differences below the probability level of $P > 0.05$. This result is supported by the study (17) which showed that the ALT enzyme is affected less than AST in smokers, especially in the early stages of liver fibrosis. The lack of statistical significance may be attributed to the variation in the duration of smoking or to the fact that ALT requires deeper liver damage for its increase to appear clearly.

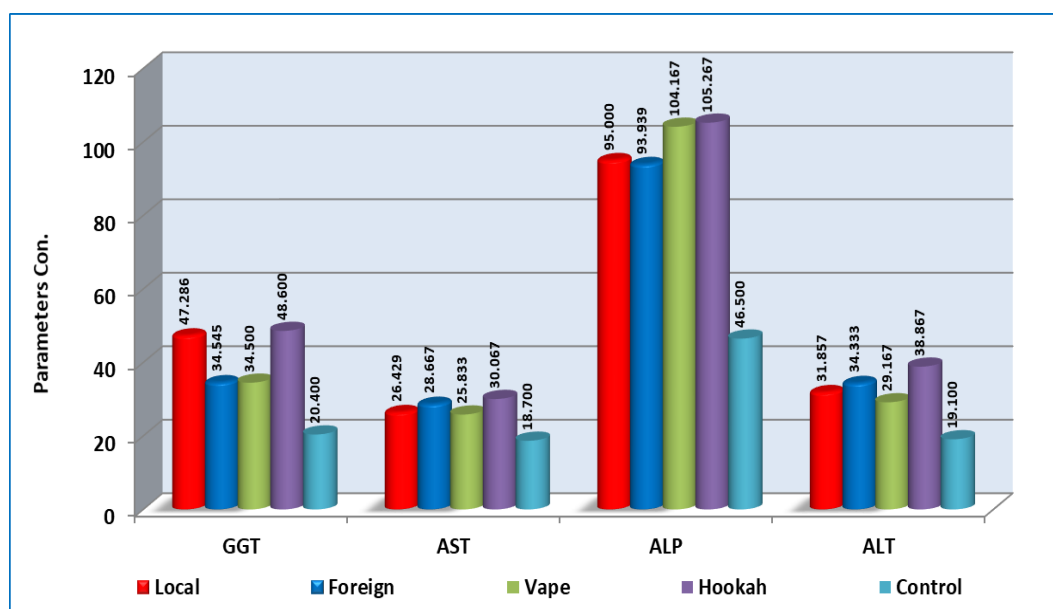
Smoking types Parameters	Local (n=21) Mean±S.D.	Foreign (n=33) Mean±S.D.	Vape (n=6) Mean±S.D.	Hookah (n=15) Mean±S.D.	Control (n=10) Mean±S.D.	P-Value
GGT	47.286 ^a ±45.043	34.545 ^a ±18.283	34.500 ^a ±33.816	48.600 ^a ±39.785	20.400 ^a ±5.661	0.143
AST	26.429 ^{ab} ±8.658	28.667 ^a ±9.961	25.833 ^{ab} ±6.555	30.067 ^a ±10.826	18.700 ^b ±5.397	0.033*
ALP	95.000 ^a ±21.033	93.939 ^a ±22.330	104.167 ^a ±14.932	105.267 ^a ±24.835	46.500 ^a ±14.269	<0.001**
ALT	31.857 ^a ±15.755	34.333 ^a ±19.004	29.167 ^a ±17.555	38.867 ^a ±19.975	19.100 ^a ±5.238	0.080

-S.D. = Standard Deviation.

-Averages that share the same alphabet are not significantly difference between them according to the Duncan test.

* The differences are significant at the 0.05 level.

** The differences are significant at the 0.01 level.



Conclusion

1-The study results showed a clear significant effect of smoking on most liver enzymes, as significant differences were observed in the levels of AST, ALP, and ALT enzymes between smokers and non-smokers, indicating a negative effect of smoking on liver function. In contrast, no significant differences were observed in the concentration of the GGT enzyme, which may indicate that this enzyme is less affected by smoking factors or is affected by other types of factors.

2-As for the type of smoking, it was found that hookah smoking had a significant effect in raising the levels of some liver enzymes compared to other types of smoking, while the differences were not significant for the enzymes ALT and GGT, which indicates that the effect of the hookah may be selective for some enzymes and not others.

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