

Original Research

Association between serum liver enzymes and hypertension

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ABSTRACT:

Background: The present study was conducted to assess the association between serum liver enzymes and hypertension.

Material and methods: This study was conducted to assess the association between serum liver enzymes and hypertension. The study comprised of 100 subjects of which 50 were normotensive and 50 were hypertensive. All the subjects were informed about the study procedure and were asked to give consent. The subjects who agreed to give consent were included in the study. The serum liver enzymes were assessed among normotensive subjects and hypertensive subjects. The findings were tabulated and statistical analysis was conducted using SPSS software.

Results: In this study, there were 50 normotensive subjects in group 1 and 50 hypertensive subjects in group 2. The values of ALT enzyme and AST enzyme amongst normotensive and hypertensive subjects were 26.5 ± 13.7 U/l, 24.7 ± 8.3 U/l and 34.7 ± 19.5 U/l, 30.2 ± 13.5 U/l, respectively. The values of GGT enzyme and ALP enzyme amongst normotensive and hypertensive subjects were 21.4 ± 9.1 U/l, 97.0 ± 24.6 U/l and 43.8 ± 33.5 U/l, 97.8 ± 36.9 U/l, respectively. Among normotensive patients, triglycerides values were 129.4 ± 60.0 mg/dl and among hypertensives, the triglycerides values were found to be 222.1 ± 113.7 mg/dl. Among normotensive patients, total cholesterol values were 191.7 ± 69.6 mg/dl and among hypertensives, total cholesterol values were found to be 249.3 ± 101.6 mg/dl.

Conclusion: From the findings of this study, it can be concluded that serum liver enzymes were raised among subjects with hypertension as compared to normotensive subjects.

Keywords: serum liver enzymes, hypertension.

Received: 22 December, 2018

Accepted: 25 January, 2019

Published: 11 February, 2019

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This article may be cited as: Y Sumana, Irkal LJ. Association between serum liver enzymes and hypertension. J Adv Med Dent Scie Res 2019; 7(2): 303-306.

INTRODUCTION

Hypertension is a significant risk factor for cardiovascular disease (CVD) and ranks among the primary causes of mortality globally.^{1,2} In the year 2000, the global prevalence of hypertension was recorded at 26%, with projections indicating an increase to 29.2% by 2025.³ The prevalence of hypertension is on the rise in both developing and developed nations.⁴ Within the Asian region, hypertension has emerged as a critical issue, impacting over 35% of adults, with countries in South-East Asia particularly grappling with the escalating burden of this condition.^{5,6}

The rate of hypertension has surged dramatically in recent years.^{7,8} The complications associated with hypertension contribute significantly to the mortality rate among the Bangladeshi population and pose a considerable strain on the national economy. Timely diagnosis and management of elevated blood pressure

prior to the onset of hypertension could be economically advantageous by mitigating premature morbidity and mortality among the general populace.⁹ The connection between liver dysfunction and the onset of hypertension is gaining increasing acknowledgment. The liver serves as a crucial organ in metabolism, fulfilling various functions such as the synthesis, degradation, storage, and biotransformation of biomolecules within the human body. Liver enzymes, including alanine and aspartate aminotransferase (ALT and AST), γ -glutamyltransferase (GGT), and alkaline phosphatase (ALP), are commonly utilized as reliable indicators of liver health. Elevated levels of ALT, AST, and GGT indicate excessive fat accumulation in the liver, a condition known as nonalcoholic fatty liver disease (NAFLD).^{10,11} These enzymes are believed to possess significant clinical and epidemiological relevance as practical surrogate markers for NAFLD and

associated liver dysfunction.¹² Several epidemiological studies have shown a correlation between ALT and GGT levels with metabolic syndrome, cardiovascular disease (CVD), and type 2 diabetes. Previous research has identified CVD as a primary cause of mortality in individuals with NAFLD, with increased rates of liver-related deaths observed during follow-up studies.^{13,14} The present study was conducted to assess the association between serum liver enzymes and hypertension.

RESULTS

Table 1: Group-wise distribution of subjects.

Gender	Number of subjects	Percentage
Group 1 (Normotensive)	50	50
Group 2 (Hypertensive)	50	50
Total	100	100

In this study, there were 50 normotensive subjects in group 1 and 50 hypertensive subjects in group 2.

Table 2: Serum liver enzymes in hypertensive and normotensive subjects.

Serum liver enzymes	Normotensive subjects	Hypertensive subjects
Alanine aminotransferase (ALT) (U/l)	26.5 ± 13.7	34.7 ± 19.5
Aspartate aminotransferase (AST) (U/l)	24.7 ± 8.3	30.2 ± 13.5
Gamma-glutamyl transferase (GGT) (U/l)	21.4 ± 9.1	43.8 ± 33.5
Alkaline Phosphatase (ALP) (U/l)	97.0 ± 24.6	97.8 ± 36.9
Triglycerides (TG) (mg/dl)	129.4 ± 60.0	222.1 ± 113.7
Total Cholesterol (TC) (mg/dl)	191.7 ± 69.6	249.3 ± 101.6

The values of ALT enzyme and AST enzyme amongst normotensive and hypertensive subjects were 26.5 ± 13.7 U/l, 24.7 ± 8.3 U/l and 34.7 ± 19.5 U/l, 30.2 ± 13.5 U/l, respectively. The values of GGT enzyme and ALP enzyme amongst normotensive and hypertensive subjects were 21.4 ± 9.1 U/l, 97.0 ± 24.6 U/l and 43.8 ± 33.5 U/l, 97.8 ± 36.9 U/l, respectively. Among normotensive patients, triglycerides values were 129.4 ± 60.0 mg/dl and among hypertensives, the triglycerides values were found to be 222.1 ± 113.7 mg/dl. Among normotensive patients, total cholesterol values were 191.7 ± 69.6 mg/dl and among hypertensives, total cholesterol values were found to be 249.3 ± 101.6 mg/dl.

DISCUSSION

Hypertension (HTN) stands as a significant risk factor for cardiovascular diseases (CVDs) globally. Typically, HTN is asymptomatic and arises from various underlying causes; however, it can be managed effectively through medication.¹⁵ The occurrence of HTN differs across nations, ranging from 10% to over 60%¹⁶, with an average global prevalence estimated at approximately 22% in 2021. Evidence suggests that the prevalence of HTN is projected to rise to 29.2% by 2025.^{17,18} Risk factors for hypertension (HTN) can be categorized into

MATERIAL AND METHODS

This study was conducted to assess the association between serum liver enzymes and hypertension. The study comprised of 100 subjects of which 50 were normotensive and 50 were hypertensive. All the subjects were informed about the study procedure and were asked to give consent. The subjects who agreed to give consent were included in the study. The serum liver enzymes were assessed among normotensive subjects and hypertensive subjects. The findings were tabulated and statistical analysis was conducted using SPSS software.

unmodifiable elements, including gender, age, and family history, as well as modifiable elements, such as obesity, a sedentary lifestyle, stress, and poor dietary habits, among others. Previous research indicates a notable correlation between age, smoking, obesity, high-calorie diets, salt consumption, sedentary behavior, literacy levels, and alcohol use with HTN.¹⁹ Nevertheless, the impact of liver enzymes as a potential risk factor for HTN remains inadequately understood.²⁰ The serum concentrations of liver enzymes, including alanine aminotransferase (ALT), gamma-glutamyl transferase (GGT), aspartate aminotransferase (AST), and alkaline phosphatase (ALP), serve as indicators of liver function, and are also elevated in cases of liver dysfunction and various metabolic disorders. GGT is particularly utilized to evaluate alcohol consumption and oxidative stress.²¹ Aminotransferases (ALT and AST) are crucial for liver gluconeogenesis and the metabolism of amino acids. ALP is employed in the diagnosis of gallbladder and bile duct disorders. This study was conducted to assess the association between serum liver enzymes and hypertension.

In this study, there were 50 normotensive subjects in group 1 and 50 hypertensive subjects in group 2. The values of ALT enzyme and AST enzyme amongst normotensive and hypertensive subjects were

26.5 ± 13.7 U/l, 24.7 ± 8.3 U/l and 34.7 ± 19.5 U/l, 30.2 ± 13.5 U/l, respectively. The values of GGT enzyme and ALP enzyme amongst normotensive and hypertensive subjects were 21.4 ± 9.1 U/l, 97.0 ± 24.6 U/l and 43.8 ± 33.5 U/l, 97.8 ± 36.9 U/l, respectively. Among normotensive patients, triglycerides values were 129.4 ± 60.0 mg/dl and among hypertensives, the triglycerides values were found to be 222.1 ± 113.7 mg/dl. Among normotensive patients, total cholesterol values were 191.7 ± 69.6 mg/dl and among hypertensives, total cholesterol values were found to be 249.3 ± 101.6 mg/dl. Fard MT et al²² conducted this study to evaluate the association of liver enzymes with HTN. This prospective cohort study was a part of the 5-years (2017-2021) follow-up phase of the Ravansar Non-Communicable Disease (RaNCD) cohort study in Kermanshah province, western Iran. The association between alanine aminotransferase (ALT), aspartate aminotransferase (AST), gamma-glut amyl transferase (GGT), and alkaline phosphatase (ALP) and HTN was investigated by Cox proportional-hazard model (CPHM). They used one-to-one Propensity score matching (PSM) analysis to minimize the effects of confounding factors on the relationship between liver enzymes and HTN. The full population included a total of 8267 participants. According to PSM, for liver enzyme GGT a total of 3664 participants were analyzed. The results of multivariate CPHM showed there is a relationship between participants with high level of GGT and had a higher risk of HTN (HR 1.34; 95% CI: 1.11-1.63). After PSM analysis, the effect of GGT on HTN remained positive and significant (HR 1.48; 95% CI: 1.22-1.78). The 5-years incidence rate of HTN in men and women were 1.27 and 0.81 (person-year), respectively. GGT had the greatest accuracy, which demonstrated an AUROC of 0.7837. Results of this study showed GGT could be a potential biomarker among liver enzymes for early detection of HTN. Therefore, monitoring GGT levels is helpful in the early detection of HTN. Park EO et al.²³ assessed the compounding relationship between liver enzymes and cardiovascular risk factors in subjects with mild dyslipidemia. The present analysis was performed among 438 participants who had enrolled in at least one of the nine clinical studies done at the Chonbuk National University Hospital between 2009 and 2019. Significant linear increasing trends were observed in blood pressure level and other cardiovascular risk factors across quartiles of serum γ -glutamyltransferase (GGT) or alanine aminotransferase (ALT), with the increment in hypertension prevalence occurring across the quartiles of GGT and ALT. On multivariate logistic regression analyses, the odds ratios for hypertension, adjusted for smoking, drinking and obesity, in the highest quartiles of GGT, ALT, aspartate aminotransferase, and alkaline phosphatase were 3.688, 1.617, 1.372, and 1.166, respectively. Their study indicates that GGT is a superior marker for predicting CVD risk among liver enzymes.

Routine screening of plasma GGT levels in patients with mild dyslipidemia will allow for early detection of CVD.

CONCLUSION

From the findings of this study, it can be concluded that serum liver enzymes were raised among subjects with hypertension as compared to normotensive subjects.

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