Original Article

Assessment of Pentraxin 3 and Some Biomarker in Patients with Nonalcoholic Fatty Liver Diseases.

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Abstract

Background: Globally, one of the most frequent causes of chronic liver disease is non-alcoholic fatty liver disease (NAFLD). About 30% of the general population suffers from nonalcoholic fatty liver disease (NAFLD), a highly widespread condition. In some populations, however, such as those with type 2 diabetes mellitus (T2DM) and obesity, the prevalence is significantly higher, reaching 60% and 90%, respectively. **Objective:** this research was to assess the concentrations of particular biomarkers, such as pentraxin 3, and liver enzyme, in serum from individuals with and without fatty liver disease, nonalcoholic steatohepatitis, and nonalcoholic fatty liver disease (NAFLD). **Material and Method:** In this investigation, 90 participants in total were divided into three groups: 30 patients with NAFLD, 30 patients with NASH, and 30 people in the control group. The severity of the condition was evaluated by analyzing biomarker levels, such as pentraxin 3 and liver enzyme. Microsoft Excel 2019 and SPSS software were used to assess the data gathered between November 2023 and April 2024. **Result:** Serum PTX3 level was increased in the NAFLD group and NASH compared to the control but increased particularly in NAFLD patients. **Conclusion:** serum PTX3 level is a useful tool to assess and diagnose fatty liver diseases.

Keyword: Non -alcoholic fatty liver disease, NAFLD, Pentraxin-3, NASH

Introduction

In Western society, fatty liver disease is the most prevalent chronic liver condition. One of the most prevalent causes of chronic liver disease globally is non-alcoholic fatty liver disease (NAFLD). About 30% of the general population suffers from non-alcoholic fatty liver disease (NAFLD), a highly widespread condition. In some populations, however, such as those with type 2 diabetes mellitus (T2DM) and obesity, the prevalence is significantly higher, reaching 60% and 90%, respectively [1]. Non-alcoholic fatty liver disease (NAFLD) is a group of phenotypes that includes simple hepatic steatosis, NASH hepatic degeneration, inflammation, and varying degrees of hepatic fibrosis. Another group of phenotypes that includes cirrhosis related to NAFLD that can be either compensated or decompensated, as well as hepatocellular carcinoma (HCC) in a subset of patients [2]. Hepatic steatosis does not show signs of inflammation in NAFLD, but it is linked to lobular inflammation and apoptosis in NASH, which can result in fibrosis and cirrhosis [3]. A severe form of non-alcoholic fatty liver disease (NAFLD), non-alcoholic steatohepatitis (NASH) is defined by the build-up of fat causing hepatocyte damage (ballooning) and liver inflammation [4]. In early 2020, By an international panel, utilizing a 2-stage Delphi consensus, the term proposed was “metabolic dysfunction- associated fatty liver disease,” or /

MAFLD [5]. NAFLD affects an estimated 25% of the global population [6]. The most prevalent liver disease in western industrialized nations, it affects people of all ages and demographics [7]. Type 2 diabetes and cardiovascular disease (CVD) are two extrahepatic diseases that are associated with NAFLD, a multisystem disease [8]. Patients with NAFLD are twice as likely to develop type 2 diabetes as people without the condition; this risk may increase in cases of more severe liver disease [9,10]. The presence of hepatic steatosis, as determined by imaging, biomarkers, or histology, along with at least one feature of overweight/obesity, type 2 diabetes, or metabolic dysregulation, are the foundations for the diagnosis of MAFLD [11].

A novel method called Fibro Scan, which uses ultra-sonication, enables quick and noninvasive assessment of both fibrosis and steatosis at the same time. Liver fibrosis and steatosis are measured using the median values. FibroScan cut-offs for fibrosis and steatosis are being studied by several studies, but the majority of NAFLD cases are often less than 50% [12].

When diagnosing NAFLD and associated conditions, liver biopsies can be highly helpful. Triglyceride buildup as droplets in the hepatocyte and widespread types of non-alcoholic steatohepatitis (NASH) are possible outcomes of these biopsies. The aforementioned lipid droplets in hepatocytes, along with concurrent inflammation and varying degrees of hepatic fibrosis, are typical characteristics of nonalcoholic steatohepatitis (NASH).Most people with hepatic steatosis have a "non-progressive" condition; nevertheless, a small proportion of these patients develop the previously mentioned NASH, which can lead to liver failure and even hepatocellular carcinoma [13]. NAFLD is typically first suspected when the results of liver function tests, measured as part of routine testing, are abnormal. . Alanine aminotransferase (ALT) levels are higher than aspartate aminotransferase (AST) levels in hepatic steatosis caused by non-alcoholic fatty liver disease (NAFLD), which is commonly associated with elevated transaminase levels. This classical pattern is especially helpful in discriminating between alcoholic liver injury, which is typically linked to a high AST: ALT ratio, and hepatic steatosis from NAFLD. When hepatic steatosis advances to NASH and the concomitant hepatic fibrosis, the AST: ALT ratio increases, even if AST levels also increase [14].

The pentraxin super-family member Pentraxin-3 (PTX-3) is a traditional modulator of inflammation and an acute-phase response marker. Studies have shown a strong correlation between PTX-3 and the emergence of diseases such as type II diabetes, atherosclerosis, and septicaemia [15]. PTX-3 shows a substantial positive correlation with the degree of liver fibrosis, the degree of fatty degeneration, and the disease activity index in adult NAFLD patients [16,17]. This research was to assess the concentrations of particular biomarkers, such as pentraxin 3, and liver enzyme, in serum from individuals with and without fatty liver disease, nonalcoholic steatohepatitis, and nonalcoholic fatty liver disease (NAFLD).

Materials and Methods

Study design and setting

Case-control study of 90 participants who grouped 60 of them patients ,30 of them healthy. We collected Samples from Babylon gastroenterology α hepatology centre between November2023 to April 2024.

Sample Selection

The study included patient with non- alcoholic fatty liver disease , NASH and apparently healthy subject, who served as control group.

Exclusion criteria Current or past consumption of alcohol, Patients with malignancy especially Hepatocellular Carcinoma or history of malignancy, Autoimmune hepatic disease or celiac disease, chronic hepatic diseases, Taking medicines for established diabetes and dyslipidaemias, having chronic and acute liver disease including viral hepatitis C, B. Chronic or acute kidney disease, Pregnancy.

Data collection and outcome measurement

We documented demographic data such as age and BMI. Each patient and control had their blood samples taken. Five ml of venous blood were collected aseptically using a plastic syringe and the usual venepuncture safety precautions. The five millilitres were then transferred into a gel tube to measure liver enzyme (AST, ALT) and markers Pentraxin-3. Liver enzyme (AST,ALT) was measure automatically by DIRUI (Auto Chemistry Analyzer CS_ T180) and Pentraxin-3 was measured by ELISA technique. NAFLD usually has no symptoms this disease has been diagnosis by liver Fibro Scan or elastography.

Statistical analysis

All data were analyzed using SPSS software (V.28 Inc., Chicago, USA) and Microsoft Excel 2019. Table analysis of variance (ANOVA Table) and the least significant difference [T-test and chi-square] below the significant level of ($P \leq 0.05$).

Ethical consideration

The University of Karbala's College of Applied Medical Science's Ethical Committee gave its approval to this project. Before any samples were collected, verbal consent was obtained from each individual who was involved in this study.

Results

The current study was conducted on ninety people suffering from fatty liver and healthy. We take thirty samples suffering from NAFLD patient (group1) and thirty samples suffering from NASH (group2) and thirty samples as a control.

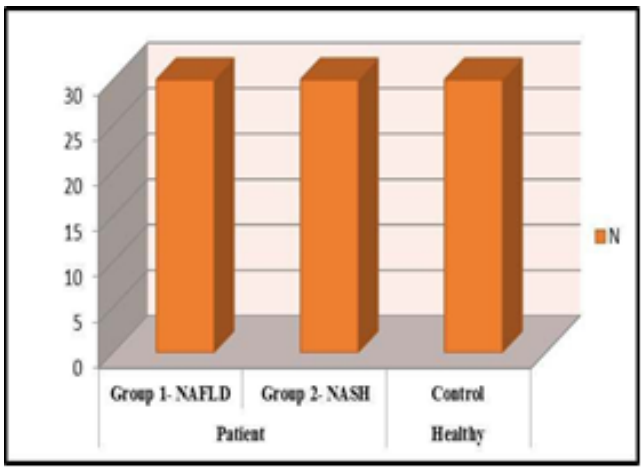

Figure 1: Demographic characteristics of study groups.

In this study, the age differences between group1, group2 and control were statistically significant ($p \leq 0.05$). After comparing the two groups (G1, G2) to the control, it was discovered that the group -2 had a higher mean (45.80± 15.72) than the control group (43.80±15.09). The two groups (group1,group2) were determined to be more valuable than the control group, although the highest value was group 1, whose mean (26.13±5.10) was higher than the control group's mean (21.41±2.73). The BMI differences between the groups are significant.

Table 1: comparison between Group1,Group2 and control in Age and BMI.

Variable	Sample	N	Mean±SD	P.V	LSD
AGE	Group1	30	41.13±12.10	0.02	7.40
	Group2	30	45.80±15.72		
	Control	30	43.80±15.09		
BMI	Group1	30	26.13±5.10	0.00	2.46
	Group2	30	24.80±5.35		
	Control	30	21.41±2.73		

The table below compares the AST and ALT values of Groups 1, 2 and the control group, and the results show a significant statistical difference ($p \leq 0.05$). The AST mean for group2 is the greatest at (56.13±21.70), higher than the means of group1 (44.40±19.90), and control (25.20±7.17).

The mean of group2 in ALT is(64.43±25.03), which is greater than that of group1 (55.47±26.28)and control(28.50±7.31).

Table 2: comparison between Group1,Group2 and control in AST and ALT variable

Variable	Sample	N	Mean± SD	P.V	LSD
AST U/L	Group1	30	44.40±19.90	0.00	8.86
	Group2	30	56.13±21.70		
	Control	30	25.20±7.17		
ALT U/L	Group1	30	55.47±26.28	0.00	10.33
	Group2	30	64.43±25.03		
	Control	30	28.50±7.31		

There is a non-significant statistical difference ($p \leq 0.05$) between the values of Groups 1, 2, and the control group in the PEN-3,as shown in figure 2.

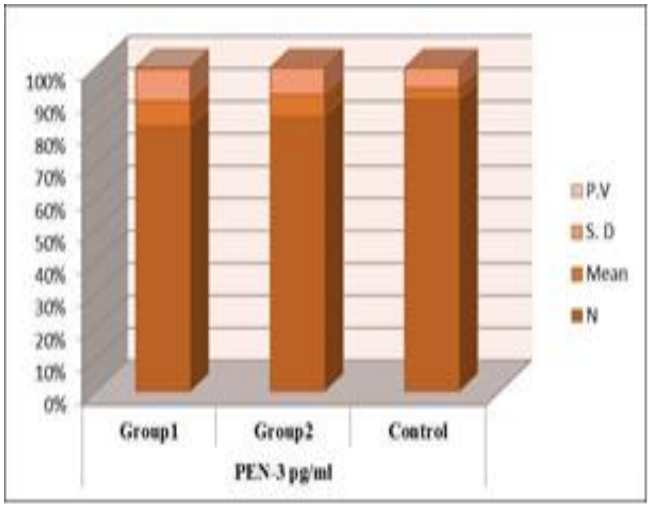

Figure 2: Comparison between group and control according to PEN-3

According to table 3 both the group 1 and group 2 means exceeded the control, while the group 1 mean in PEN-3 was higher than the other groups' and the control's (1.16±2.12) means.

Table 3: comparison between Group1,Group2 and control in biomarker.

Variable	sample	N	Mean±SD	P.V	LSD
PEN-3 pg/ml	Group1	30	2.83±3.66	0.13	N.S
	Group2	30	2.37±2.97		
	Control	30	1.16±2.12		

Discussion

Age is a risk factor for disease-specific mortality in NAFLD [18]. According to some predictive models, aging and metabolic abnormalities are the two main independent variables linked to the development of NAFLD [19]. Individuals above the age of 55 exhibited noticeably elevated levels of hepatosteatosis in contrast to their younger counterparts. Although their degrees of fibrosis did not differ much, older people exhibited significantly more severe portal inflammation and significantly less lobar inflammation [20].

Angulo et al.,[21] noted that there is a tendency for female NASH patients to have higher levels of fibrosis; however, this association was not noted in another investigation on NASH-affected children[22]. When Ratziu et al.,[23] examined the clinical and pathological features of NASH in Japanese patients, they found that the fibrosis in older individuals is more severe than in younger ones.

Higher amount of body fat can be seen as predisposal factors for developing NAFLD and NASH.A risk factor for NAFLD development is obesity, and the prevalence of NAFLD rises in tandem with BMI [24]. One of the most traditional epidemiological indicators of obesity,

body mass index (BMI), was linked to the risk of fatty liver, according to research that examined risk factors for fatty liver [25]. Higher BMIs were roughly 4.1 to 14 times more likely to have fatty livers than people with normal BMIs [26]. In the Dionysos Study, normal weight participants had a 16% prevalence of NAFLD, according to early data by Bellentani et al.,[27] One of the earliest studies in non -obese Asian communities found that NAFLD prevalence was over 23%. Male, sex, higher BMI, older age, hyperuricemia, and raised metabolic markers were among the numerous characteristics common to obese NAFLD patients as well as non-obese people [28]. Fat deposition in the liver may cause increased levels of liver enzymes that are detected during routine blood tests (e.g., AST and ALT).An enzyme in the liver called ALT helps liver cells make energy from proteins. Amino acid metabolism is aided by AST, low levels of ALT and AST are typically found in blood. Elevations in ALT and/or AST could be a sign of illness, injury to the liver, or damage to the muscles [29, 30]. Bayard M. et al.,[31] demonstrated in his study that laboratory abnormalities often are the only sign of NAFLD. The liver enzymes that are most frequently raised are aspartate transaminases (AST) and alanine transaminases (ALT), which are typically one to four times higher than normal limits. In alcoholic liver disease, the ratio of AST to ALT is typically less than 1, but it may rise as the degree of liver damage. According to Sattar Naved et al.,[32] study, the majority of NAFLD patients are asymptomatic, and the diagnosis of the condition is usually made based on elevated ALT levels along with other clinical and biochemical characteristics, or an unintentional detection during abdominal ultrasonography.

When comparing patients with NAFLD to controls, we discovered that their levels of PTX3 were considerably greater. According to certain research, individuals with infectious diseases and inflammation have much higher serum levels of PTX-3 expression than the healthy population [33]. Furthermore, the diagnosis of liver illness depends on PTX-3. However, according to the results of other investigations, PTX-3 is useless for differentiating between NASH and NAFLD [34]. Our findings were in line with a research by Yoneda et al.,[35] that found that NAFLD patients had considerably greater levels of PTX3 than did healthy control persons. Independent of the components of the metabolic syndrome, Kadir et al.,[36] previously shown that PTX3 levels in NAFLD patients with fibrosis were higher than those in NAFLD patients without fibrosis and in healthy participants. However, Maleki et al.,[34] discovered no discernible variation in plasma PTX3 between NAFLD and healthy control patients.

Between NAFLD patients, there was non-significant difference in the current study. Inflammation is indicated by a sharp rise in PTX3, which is directly generated by tissues that are damaged. Liver-associated clinical diseases such NAFLD, NASH, hepatic malignancies, and liver infections are associated with elevated amounts of PTX3 [37].

Conclusion

According to the study's findings, fatty liver poses a serious risk to patients of all ages, especially those who are obese. The current study's findings demonstrate that as the severity of fatty liver disease increased, so did the concentrations of all biomarkers.

Patients with NAFLD had elevated serum PTX 3, and patients with NASH had elevated AST and ALT levels in their liver enzymes.

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