ORIGINAL RESEARCH

The Level of Serum Pentraxin 3 Marker in Obese Adolescents with Nonalcoholic Fatty Liver Diseasein the local population

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ABSTRACT

Background/aims: It was suggested that serum pentraxin 3(PTX3) levels could differentiate obese adults with nonalcoholic steatohepatitis (NASH) from those with simple fatty liver. Our objective was to assess the clinical value of serum PTX3 levels as a diagnostic tool for nonalcoholic steatohepatitis (NASH) and to determine its significance in evaluating the severity of NAFLD in obese adults. **Methods:**For our study, we recruited 120 Indian subjects who visited the outpatient clinic of Vels medical college and Hospitals between June 2022 and April 2023, presenting with non-specific symptoms. These participants were categorized into two groups based on ultrasound findings: the Control group comprising 60individuals (19 males - 31.6%, 41 females -68.3%), aged between 26 to 50 years, with no evidence of NAFLD, and the NAFLD Group consisting of 60 patients (16 males - 26.6%, 44 females - 73.3%), aged between 20 to 60 years, who had varying grades of NAFLD. Serum PTX3 levels and routine laboratory investigations were conducted for all the subjects. **Results**: BMI showed a higher significant difference in NAFLD than the control group (34.5+ 9.8 kg /m2 vs. 26.9 + 3.9kg/m2, P<0.001). Also, ALT and AST levels were higher in the NAFLD group than control; ALT(37.4+23.9 mg /dl vs. 25 + 9.6 mg/dl, P=0.001), AST (32.8 + 18.5 mg/dl vs. 24.3+ 11.7 mg/dl,P<0.001) respectively. Serum pentraxin level was statistically significantly higher in the NAFLD group (2.9 ±1.4 ng /ml) vs. control (0.61 + 0.43 ng/ml), (P< 0.001). **Conclusion:** "Utilizing noninvasive monitoring of serum PTX3 fragment levels in obese patients with suspected NAFLD may offer a dependable approach for distinguishing NASH from simple fatty liver.

Keywords: PTX3, Nonalcoholic fatty liver, Obesity

INTRODUCTION

Obesity has reached epidemic proportions in India in the 21st century, with morbid obesity affecting 5% of the country's population{1}.Given the rising prevalence of diabetes, obesity, and insulin resistance in India over the past two decades, it is reasonable to anticipate an increase in the incidence of NAFLD in the country. However, there is limited available data on the actual prevalence of NAFLD in India. Furthermore, whether the clinicopathological characteristics of NAFLD in Indian patients differ significantly from those observed in Western populations remains a subject of ongoing debate. (2)

The majority of patients with NAFLD andNASHare asymptomatic with mild, incidental elevation of aminotransferases. No specific symptoms can distinguish NAFLD or NASH from other types of liver disease.When symptoms occur, the most common complaint is fatigue and occasionally right upper quadrant abdominal discomfort.The diagnosis of NAFLD requires the exclusion of other specific etiologies of liver disease and excessive alcohol consumption.[3] .

"In this context, timely detection of patients with NASH before advanced fibrosis develops would be beneficial in guiding proactive interventions. While liver biopsy is the gold standard for accurately diagnosing NASH and distinguishing it from simple steatosis, it is a costly and invasive procedure.Pentraxin 3 (PTX3) is synthesized by various tissues and cells, especially innate immune cells and endothelial cells, in response to proinflammatory signals (4). Unlike C-reactive protein (CRP), PTX3 levels are thought to serve as a

genuine and independent marker of disease activity, as it is produced at the sites of inflammation due to its extrahepatic synthesis. (5)

Thus, the objective of the current study was to assess the clinical value of serum PTX3 levels in diagnosing NASH and evaluating its severity in obese adults with suspected NAFLD.

SUBJECTS AND METHODS

A cross-sectional study was conducted at Vels Medical College and Hospital between June 2022 and April 2023, including 120 subjects aged 20 to 60 years, presenting with non-specific symptoms. Participants were divided into two groups based on ultrasound findings: the Control Group (60 subjects) had no NAFLD evidence, and the NAFLD Group (60 patients) had varying ultrasound grades of NAFLD.

Exclusion criteria involved

- recent cerebrovascular stroke,
- acute coronary syndrome within the last 3 months,
- chronic liver diseases,
- diabetes mellitus,
- renal failure,
- hypothyroidism,
- and certain medications affecting serum pentraxin 3 levels.

All participants underwent comprehensive assessments, including medical history, clinical examination, and laboratory tests. Measurements encompassed body height, weight, BMI, blood parameters, liver function, thyroid-stimulating hormone, HBsAg, HCV antibodies, and serum pentraxin-3 levels. Ethical approval and informed consent were obtained.

Serum PTX3 measurement used ELISA, and abdominal ultrasound grading was performed by the same operator using a high-resolution B-mode scanner with a 3.5MHz transducer.

The statistical analysis involved using SPSS software for coding and data entry. Quantitative data were summarized using mean, standard deviation, median, minimum, and maximum values. For comparisons between groups, unpaired t-tests were used for normally distributed quantitative variables, and the non-parametric Mann-Whitney test was used for non-normally distributed quantitative variables.Qualitative data were summarized with frequency (count) and relative frequency (percentage). The Chi-square test was employed to compare categorical data, and Fisher's exact test was used when the expected frequency was less than 5.

Correlations between quantitative variables were examined using the Spearman correlation coefficient. Significance levels were set at $P < 0.05$ for denoting significance, $P > 0.05$ for insignificance, and $P < 0.001$ for high significance

RESULTS

BMI showed a higher significant difference in NAFLD than the control group (34.5+ 9.8 kg /m2 vs. 26.9 + 3.9kg/m2, P<0.001). Also, ALT and AST levels were higher in the NAFLD group than control; ALT(37.4+23.9 mg /dl vs. 25 + 9.6 mg/dl, P=0.001), AST (32.8 + 18.5 mg/dl vs. 24.3+ 11.7 mg/dl,P<0.001) respectively. Serum pentraxin level was statistically significantly higher in the NAFLD group (2.9 ±1.4 ng /ml) vs. control (0.61 + 0.43 ng/ml), (P< 0.001).

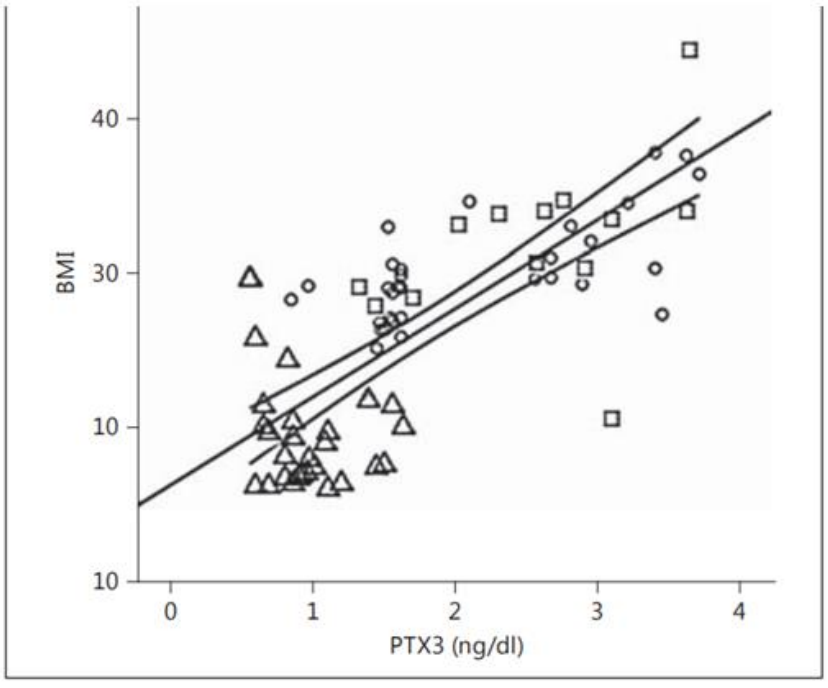

Fig (1): correlation between BMI and PTX3 in all the subjects

Table (1): Baseline Characteristics of Study Subjects with Respect to Sex and Anthropometric Measures (n=120)

Parameter	NAFLD group (60)	Control group(60)	P value
Male n(%)	16 (26.6%)	19 (31.6%)	0.26 NS
Female n(%)	44 (73.3%)	41 (68.3%)	
Wt (range)Mean±SD	70--139	60--90	
	90.2 ±18.2	75.3 ±7.5	<0.001 HS
Ht (m)Mean±SD	1.45--1.85	1.57---1.75	
	1.63 ±0.11	1.62±0.09	0.70 NS
BMI (kg/m2)Mean±SD	25.12--48.6	23.14—31.2	
	35.5 ±9.8	25.9 ±3.8	<0.001 HS

Table (2): Comparison between males and females in the NAFLD group regarding pentraxin3(n=60)

	Male(16)		Female(44)		P value
	Mean±SD	**Min--Max**	**Mean±SD**	**Min--Max**	
PTX-3(ng/ml)	2.9±1.9	1.2--7.4	3.0±1.6	.48—7.7	0.69

DISCUSSION

NAFLD is characterized by the accumulation of hepatic fat without any specific underlying causes, accompanied by varying degrees of inflammation and fibrosis. If left untreated, it can advance to more severe conditions such as liver cirrhosis and hepatocellular carcinoma. (6).

NAFLD is the most prevalent chronic liver disease, with simple steatosis and NASH affecting approximately 20-30% and 5-12% of the general population, respectively. However, in individuals with obesity and type 2 diabetes mellitus (T2DM), the occurrence of NAFLD is even more widespread, affecting up to 70% of these subjects (7). Pentraxin 3 (PTX 3) belongs to the pentraxin superfamily and is rapidly produced by various cell types, especially mono-nuclear phagocytes, dendritic cells, fibroblasts, and endothelial cells, in response to primary inflammatory signals. It functions as an acute phase response protein. (6).

In NASH, a predictable and noteworthy increase in plasma PTX3 levels was observed, showing a correlation with non-NASH. The results suggest that plasma PTX3 levels may serve not only as a laboratory marker to distinguish NASH from non-NASH but also as an indicator of the severity of hepatic fibrosis in NASH (8)

In Our Study the participants were categorized into two groups based on ultrasound findings: the Control group comprising 60 individuals (19 males - 31.6%, 41 females - 68.3%), aged between 26 to 50 years, with no evidence of NAFLD, and the NAFLD Group consisting of 60 patients (16 males - 26.6%, 44 females - 73.3%), aged between 20 to 60 years, who had varying grades of NAFLD.

Also, our results showed that pentraxin 3 level is significantly higher in NAFLD group (2.9 +1.4 ng/ml) than control group (0.61+0.43 ng/ml) with a statistically significant difference (P value < 0.001) as shown in table (2), and that was in concurrence with the previous studies that researched serum pentraxin 3 as a non-invasive marker of steatosis.

The current study revealed a higher serum PTX3 level in obese cases than in controls, which is supported by a recent study by Barazzoni et al. (9)

CONCLUSION

Based on the results of our study, we found a significant elevation in plasma PTX3 levels in NAFLD patients compared to non-NAFLD patients. This suggests that plasma PTX3 could serve as a non-invasive biomarker to differentiate between NAFLD and non-NAFLD cases, as well as being valuable for targeted fibrosis treatment in NASH patients. However, its effectiveness in determining disease severity through ultrasound is limited. Nevertheless, there is potential for plasma PTX3 to be utilized as an indicator for NAFLD severity in the future. Further research on a larger scale of enrolled patients is necessary to explore its full potential and validity in clinical settings.

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