Effect of Non Alcoholic Fatty Liver on Lipid Profile and Liver Function Tests (LFTS): An Observational Study in Rural Area of Jammu

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Abstract
Introduction: Non-Alcoholic Fatty Liver Disease (NAFLD) is public health problem world wide . It is one of the most common forms of liver diseases, affecting 2.8-24% of the population. It is also currently the most common cause of abnormal liver function tests and is recognized as a major cause of cryptogenic cirrhosis of liver.
Methodology: A cross sectional was conducted in the rural area o for a period of one year w.e.f., 1st November 2016 to 31st October 2017. Total population of 5150 was covered. 250 individuals aged 30 years were selected using simple random sampling technique. . A 12hr fasting venous sample was taken from each participant to measure biochemical parameters like Blood Sugar (F), liver function tests, lipid profile. All the participants were also subjected to abdominal Ultrasonography to investigate for the presence of fatty liver disease.
Results: Cholesterol and triglycerides levels were found to be high in 15 and 35 patients respectively. AST were found to be high in 58% of patients and ALT in 24.7% of the total diagnosed patient .Whereas alkaline phosphates level were raised only in 10 patients. S.HDL is found to be <40mg/dl in 19 patients.
Conclusion: The present study attempted to describe the abnormality of lipid levels among the patients of NAFLD in rural area of north India. The Association was found to be statistically significant in case of Cholesterol, SGOT, SGPT, HDL and LDL levels. However Association was found to be statistically insignificant in case of Triglycerides, and Alkaline phosphates levels.
Keywords: NAFLD, Cholesterol, triglycerides, AST, ALT

I.   Introduction

Non-Alcoholic Fatty Liver Disease (NAFLD) is rapidly becoming a public health problem world wide and is recognized as one of the most common forms of liver diseases, affecting 2.8-24% of the general population.1 NAFLD rates are increasing in developing countries as well in India, it is emerging as an important cause of liver diseases . 2 The overall prevalence of NAFLD in western countries vary from 15-40% and in Asian countries from 9-40%.3It is also currently the most common cause of abnormal liver function tests and is recognized as a major cause of cryptogenic cirrhosis of liver.4 NAFLD exists as a spectrum and is best characterized histologically. Important features include steatosis, inflammation, hepatocellular ballooning and fibrosis The most common documented comorbidities that have been associated with NAFLD include obesity, impaired insulin sensitivity and dyslipidemia.5 NAFLD is an indolent condition, with few clinical squeal in most patients, but can progress to irreversible and fatal liver diseases like cirrhosis, liver failure or hepatocellular carcinoma in some patients.6,7,8 Older age, obesity, diabetes mellitus, and AST/ALT ratio greater than 1 were demonstrated in one study to be significant predictors of severe fibrosis in patient with NAFLD. In a study on overweight patients with abnormalities of liver biochemical tests liver fibrosis was independently associated with hepatic necroinflammatory activities.

II.   Methodology

A cross sectional was conducted in the rural field practice area of the Department of Community Medicine and Govt. Medical College Hospital Jammu for a period of one year w.e.f., 1st November 2016 to 31st October 2017. 6 villages including Gazian, Alawal Chak, Langotian, Benagarh, Tutre and Ganda comprising of total population of 5150 were covered. 250 individuals aged 30 years or more were studied to within 20% precision (in relative terms) assuming the prevalence of NAFLD to be 30% in this population and considering

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a confidence level and response rate of 95% & 90% respectively using simple random sampling technique. The list of selected participants was shared with local health workers and a visit was scheduled to a particular village in consultation with the worker with-out disturbing their routine home visit schedule. Accompanied by the local worker, the investigator visited randomly selected participant, and requested him/her to participate in the study. In case the house of the participant was found locked or the participant was not available at home, another visit was made after seeking appointment from him. If the house was found consistently locked or the participant has moved away or he declined to participate, he was excluded from the study. Individuals taking >20 gms/day or 140 gms/ week of alcohol for >1 year and patients with chronic liver diseases, Hepatitis B or C, a known case of autoimmune hepatitis or Wilson diseases were also be excluded from the study.

The consenting eligible participant after being briefed about the purpose of study was subjected to in person interview to collect socio-demographic and clinical details from him using a semi-structured questionnaire. The participant then were communicated appointment for blood testing and sonography at GMCH Jammu and the participants were asked to attend the same after overnight fasting on day convenient to the participant. A 12hr fasting venous sample was taken from each participant to measure biochemical parameters like Blood Sugar (F), liver function tests , lipid profile.[67-69] All the participants were also subjected to abdominal Ultrasonography to investigate for the presence of fatty liver disease.[70] Data was analysed using computer software Microsoft excel SPSS version 17.

III. Results

A total of 93 cases of NAFLD were identified based on ultrasonography from the sample population of 250 people. Out of which 63 were males and 30 females (Table 1). Majority of the cases were found in the age group of 30- 40 years of age (Table 2).

Table1: Age wise distribution of NAFLD

Age (in completed years)	No with NAFLD
30≤40	37
40≤50	34
50≤60	10
60≤70	8
≥70*	4
Total	93

Table 2: Gender wise distribution ofNAFLD

Gender	No with NAFLD
Male	63
Female	30

Table 3: Cholesterol levels in diagnosed NAFLD patients

S.no	Total cholesterol	No with NAFLD
1	Desirable 200	49
2	Borderline High 200-220	21
3	High >220	23

Table 4 : Distribution of NAFLD according to Triglyceride

Triglyceride	No with NAFLD
Desirable <150	40
Borderline high 150-200	35
High 200-450	18

Cholesterol levels were found to be high in 15 out of the total 93 NAFLD patients and 20 had borderline high cholesterol levels (Table 3). High triglycerides levels that is 200-450 were found in 18 patients whereas it was reported borderline high in 35 patients.(Table 4)

Table 5: SGOT / AST levels in diagnosed NAFLD patients

S.no	SGOT	No with NAFLD
1	Desirable 15-37IU/L	39
2	High >37IU/L	54

Table 6: SGPT/ ALT levels in diagnosed NAFLD patients

S.no	SGPT	No with NAFLD
1	Desirable 30-65IU/L	70
2	High >65IU/L	23

Table 7: S.Alkaline phosphates levels in diagnosed NAFLD patients

S.no	S.ALKP	No with NAFLD
1	Desirable 50-136 IU/L	83
2	High >136 IU/L	10

AST were found to be high in 54 patients (table 5) and ALT was high in 23 out the total diagnosed patients (table 6). Whereas alkaline phosphates level were raised only in 10 patients. (table 7)

Table 8: S.HDL levels in diagnosed NAFLD patients

S.no	S.HDL	No with NAFLD
1	>60 mg/dl	10
2	40-60mg/dl	64
3	<40 mg/dl	19

Table 10: S.LDL levels in diagnosed NAFLD patients

S.no	S.LDL	No with NAFLD
1	Desirable up to 150	26
2	High >150	67

Most of the diagnosed patients had normal levels of S.HDL and it as found to be <40mg/dl in 19 patients (table 8). S.LDL levels were found to be high in 72% of the diagnosed patients(table 10)

Table 11: Relationship of various biochemical factors with NAFLD

Variable	With NAFLD n (%)	Without NAFLD n (%)	Crude Odds Ratio (95% CI)
(l) Triglyceride*			
High>150	53(37.8)	87(62.1)	1.06 (0.63-1.7)
Normal<150	40(36.3)	70(63.3)	
($x^2_{(1)}$=0.058 p=0.80 Not Significant)			
(n) Cholesterol*			
High>200	35(53.8)	30(46.1)	2.55 (1.42-4.5)
Desirable	58(31.3)	127(68.6)	
($x^2_{(1)}$=10.42 p=0.001 Highly Significant)			
(0) SGOT AND SGPT*			
Abnormal	69 (43.6)	89 (56.3)	2.19 (1.2-3.8)
Normal	24 (26)	68 (73)	
($x^2_{(1)}$=7.69 p=0.005 Highly Significant)			
(p) S.ALKP*			
HIGH >136 IU/L	10 (43.4)	13 (56.5)	1.33(0.5-3.1)
Desirable	83(36.5)	144(63.4)	
($x^2_{(1)}$=0.427 p=0.51 Not Significant)			
(q) S.HDL*			
>60 mg/dl	10 (18.8.)	43 (81.1)	1 (Reference)
40-60 mg/dl	64 (42.1)	88 (57.8)	3.1 (1.4-6.6)
<40 mg/dl	19 (42.2)	26 (57.7)	3.1 (1.2-7.7)
($x^2_{(2)}$=9.6 p=0.007 Highly Significant)			
(r) S.LDL*			
High >150	67 (64.4)	37 (35.5)	8.35 (4.6-14.9)
Desirable	26(17.8)	120(82.1)	
($x^2_{(1)}$=56.49 p=0.001 Highly Significant)			

The Association was found to be statistically significant in case of Cholesterol ,SGOT,SGPT,HDL and LDL levels. However Association was found to be statistically insignificant in case of Triglycerides, and Alkaline phosphates levels.

IV. Discussion

NAFLD has gained prominence over the past few decades and its prevalence in general population has been on increase both in developing and developed nations because of affluent and traditional lifestyles change (increasing fat in the diet, less physical activity, increasing prevalence of type 2 diabetes)It is likely to pose great challenges for health care as the factors responsible for its occurrence are deeply embedded in social and environmental milieu. The present study attempted to describe the abnormality of lipid levels among the patients of NAFLD in rural area of north India. Out of the 93 diagnosed NAFLD patients, 56% were found to have high and borderline high levels of triglycerides and 47% reported raised levels of cholesterol. Bajaj et al had also reported that the subjects with NAFLD had significantly higher values of total cholesterol and serum triglycerides.[9] In our study, elevated levels of ALT and AST were found in 58% and 24.7 % of NAFLD patients respectively. Elevation in ALT and AST, or both, to mild and moderate levels is a very common finding

in NAFLD. Most previous studies have shown that there is a significant relationship between NAFLD and AST,10,11ALT[11,12] and ALP.11].   However, in our study no significant relationship was seen between NAFLD and Serum alkaline phosphates . In our study high HDL levels were found low (<40mg/dl) in 20.4% of the diagnosed patients. Roli Agrawal et al reported low HDL in 45.16% of patients.[13] To summarize majority of the NAFLD subjects in our study were asymptomatic. All the nonalcoholic fatty liver patients studied were either obese or overweight. The serum triglycerides, serum cholesterol and LDL values were significantly increased, whereas HDL-C was significantly decreased in NAFLD patients . Ultrasonography offers promising role to diagnose NAFLD which is supported by significantly increased lipid profile values in our study. Ultrasonography can be used for the early detection of NAFLD.

V. Conclusion

A cross-sectional study was conducted on 250 randomly selected individuals aged 30 and above from rural population to find out the association of NAFLD with various biochemical markers. The participants were subjected to biochemical measurements and ultrasonographic assessment was used to classify the participant as having NAFLD. All the participants were counseled on adopting healthy life style and remain active to cut down the risk of progression of NAFLD and non-communicable diseases like CVD. Following are the conclusions of the study;

1. Increased levels of triglyceride, SGOT/SGPT, Sr. ALKP and low levels of HDL were associated with NAFLD .
2. Fasting blood sugar (>126mg/dl)(AOR- 3.1), Low level of HDL(AOR-5.4), older age(AOR-6.1) were significant predictors of NAFLD .

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