Exploring SGPT/SGOT Ratio Biochemical Marker for "Non-Alcoholic Fatty Liver Disease"

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ABSTRACT
Purpose: "Non-Alcoholic Fatty Liver Disease (NAFLD)" is a challenging ailment that has been occurring among adults with 25% global prevalence among adults. The disease, as a liver complication is attributed as a challenging development of other diseases and having a clinical burden. Oftentimes, "Type 2 Diabetes Mellitus" is considered to be related to NAFLD. The following study had focused on implementation of a cross-sectional research and had identified to be involving patients within the age group of 30s to 60s years of age. 200 patients had been selected for the study's findings, this included both patients diagnosed with and without fatty liver. The SGPT/SGOT ratio was evaluated within the study. The results indicated that the SGPT/SGOT ratio's mean was 1.34 for 120 out of all 200 patients with fatty liver. As per the results, the SGPT/SGOT ratio was identified as statistically significant. Hence, in conclusion, it is determined that SGPT/SGOT is considered as a biochemical marker for NAFLD incidence during initial stages.

1. Introduction

"Non-Alcoholic Fatty Liver Disease (NAFLD)" is identified being some of the challenging health complications that has a high prevalence and occurrence as a liver complication. It has been assumed that NAFLD is recognised as a predominant cause of liver diseases having a globally an approximate prevalence of over 25% among adults[1]. Additionally, there is a strong prevalence of this disease in developing regions such as Asia as well. NAFLD are considered to be connected with significant"clinical burdens" with possible progress of "advanced fibrosis", "liver cirrhosis" and other such diseases. Additionally, there have also been findings that there are possibilities that type 2 diabetes mellitus patients are also prone to NAFLD, with over 70% of type 2 diabetes mellitus being found to have NAFLD. Moreover, the disease is also associated with development and independent predictor of moderate-severe liver fibrosis and other overall and liver related mortality.

NAFLD is identified as a spectrum thar is ranging within a diverse range of diseases that range from steatosis to cirrhosis. The disease is regarded as a"spectrum" of potential ailments ranging from "simple steatosis, steatohepatitis with or without fibrosis, cirrhosis and ultimately cirrhosis with HCC"[2]. The disease is known as being characterised as prevalence of "fat in the liver" from "absence of alcohol" and other reasons such as "drugs", "lipodystrophy", "parenteral nutrition", starvation and "viral disease". NAFLD are considered as a spectrum of diseases that consists the presence of the different liver diseases such as fibrosis and cirrhosis, with a majority of patients facing NAFLD also suffering from liver steatosis.

It is further observed that NAFLD as a disease is characterised through the accumulation fat in the liver. This fat that is observed to be accumulating and causing liver dysfunction, scarring, and 'irreversible failure for the concerned patients [3]. The development of this disease is strongly associated with excessive "hepatic fat deposition" and is one of the most "common liver diseases". The diagnosis from NAFLD involves both invasive and non-invasive methods for diagnosis, with invasive technique included histology while non-invasive technique include imaging techniques[4]. In this study though,

for the sake of understanding the study had identified the spectrum of NAFLD that supports the claim of liver accumulating excess fat.

There are different biochemical markers that are identified as parameters for use in the case of identifying and assisting in diagnosis. Some of biochemical markers for NAFLD often involve different "blood biochemical markers" such as "higher glycaemia, Hb1Ac, triglycerides" and cholesterol among others[5]. Moreover, there are other biochemical markers that include "AST, platelet count, and gamma globulin"[6]. Another biochemical marker could be identified to include a ratio of "serum glutamic oxaloacetic transaminase (SGOT)" and "serum glutamic pyruvic transaminase (SGPT)"[7]. The development of SGPT and SGOT ratio is identified as an effective and standardised biochemical marker for detecting NAFLD. The study further on aims to expand on the element of determining that SGPT/ SGOT ratio is indeed a reliable and effective biochemical marker that could be further used for detection of NAFLD among patients.

2. Material and methods

This study implements the use of a primary data analysis for the research of NAFLD being evaluated through the SGPT/SGOT ratio biochemical markers for "Non-Alcoholic Fatty Liver Disease". The advance of this research is based on the development of collecting and evaluating primary quantitative data for the statistical evaluation of the findings that would be gathered for this study. The study employed random sampling for randomly selecting the participants that had later also consented to the participation of this clinically focused evaluation. The study had selected a total of 200 participants for this study and the participants included both male and female patients. The participating patients had been selected from the "Sree Balaji Medical college and hospital, Chennai"for this research. The data was collected within a time period of 11 months, the time ranging from "February 2023 to December 2023".

The selected concerned "patients" had been already identified having "type 2 diabetes mellitus". The assessment had set its inclusion criteria for selection of patients who have already been diagnosed with "Type 2 Diabetes Mellitus" and would "belong to both sexes" within the "age bracket of 30 to 60 years old". This study focused on excluding any potential candidate patients that had any history of alcohol consumption for any time period, and any patients that had past record history of "jaundice" and other forms of "hepatic diseases". Any patients having a medical record of having intake history of "hepatotoxic drugs" such as "Methotrexate", "Amiodarone", "Glucocorticoids", "OC Pills", "ART"among others were also excluded. Further on, patients with history of "past major abdominal surgeries" and "Chronic Renal Failure" and "severe ischemic heart disease" had been excluded from the study as well.

The research followed certain ethical and clinical elements for the study design of conducting this research's data collection for findings. It was maintained that "informed consent" was gained from everyone that were "involved in this study". 200 patients that were either "newly diagnosed" or on "follow-up schedule" had been selected based on the set criteria. This study had employed a "cross sectional study" and "random selection" through "random number charts". Detailed records of medical history of the patients were also taken and put into consideration. The study also involved collection of blood samples and other suitable examination elements needed for gathering the findings. It is also worth noting that the information that had been collected had been evaluated using "Chi-square" test and "student t test" methods for quantitative analysis.

3. Results and Analysis

Table 1: Mean Age Distribution

Sl. no.	Group	N	Mean	Std. Deviation	t
1.	With fatty liver	120	52.83	6.648	1.583
2.	Without fatty liver	80	54.33	6.435	p=0.115 ns

The findings regarding the mean age of the patients had included patients that belonged to both the groups of being patients "with fatty liver" and "without fatty liver". As per the results of the findings displayed in the above table, around 120 patients had been diagnosed to be with a fatty liver, while 80 people were noted to not have a fatty liver. As this study had mainly focused on the NAFLD patients, the patients with fatty liver were more of particular interest for this study. This makes the mean age distribution for patients with fatty liver be more concerning. The mean age for patients with fatty liver was 52.83.

Table 2: Age Distribution

Age group		Group		Total
		With fatty liver	Without fatty liver	
<40	Count	5	4	9
	%	4.2%	5.0%	4.5%
40 -45	Count	13	3	16
	%	10.8%	3.8%	8.0%
45 - 50	Count	18	14	32
	%	15.0%	17.5%	16%
50 - 55	Count	29	18	47
	%	24.2%	22.5%	23.5%
55- 60	Count	55	41	96
	%	45.8%	51.2%	48.0%
>60	Count	0	0	0
	%	0.0%	0%	0%
Total	Count	120	80	200
	%	100.0%	100.0%	100.0%

. x2=8.297 p=0.141 ns

The "distribution of the age groups" of the "patients with fatty liver" had been identified to be distributed within the "age group of 55 to 60 years" the most, statistically speaking. As per the "study's findings indicate" that 4.2% of the "patients were under 40 years". This is followed by around 10.8% of the "patients being within the age group of 40 to 45 years of age". Apart from this, 15.0% of "the patients were within 45-50 years of age" making it the third largest incidental age group. Around 24.2% of the "patients were within the ages 50-55 years", which constituted the second largest patient population. Finally, 45.8% of the patients belonged to the "age group of 55-60 years of age", and this is the largest segment of sampled patients as per the findings.

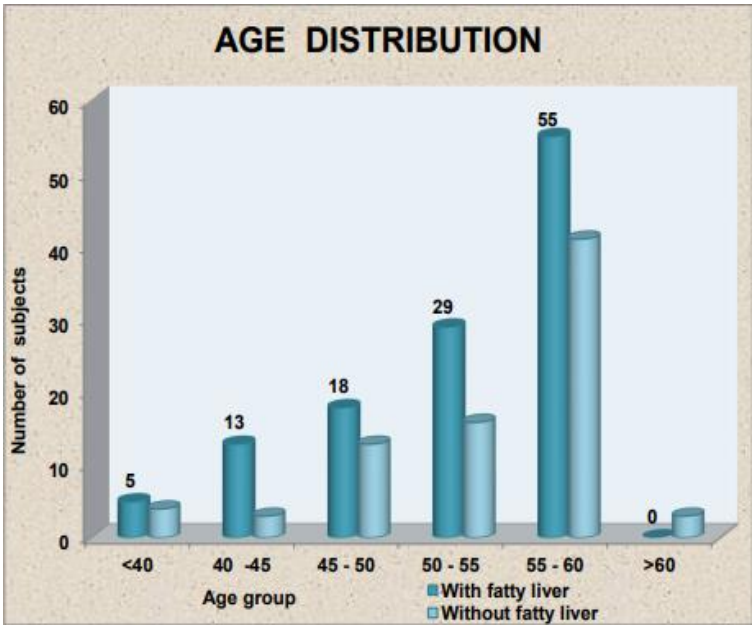

Figure 1: Age Distribution

As shown in the above graphical representation, the people within the sample population mostly constitute the middle to elderly age group. This is particularly observed in the case of the number of patients that were under the age of 40 years was only 5 patients, the patients within the "age brackets of 40 to 45 and 45 to 50 years" included 13 and 18 patients respectively. The number of patients in the "age group of 50 to 55 years" involved 29 patients. Most of the patients were within the "age group of 55 to 60 years". This goes on to show that a larger share of the patients having fatty liver were elderly and old.

Table 3: Gender Distribution

			group		Total
			With fatty liver	Without fatty liver	
Sex	F	Count	40	30	70
		%	33.3%	37.5%	35.0%
	M	Count	80	50	130
		%	66.7%	62.5%	65.0%
Total		Count	120	80	200
		%	100.0%	100.0%	100.0%

a. x2=0.366p=0.545 ns

The patients surveyed and recognised to be having fatty liver were 120 patients, and among them it was discovered that there were more male patients than female patients. This is so as around 33.3% patients were confirmed as female patients. In comparison to this, the male patients constituted the rest of the sample, that is around 66.7% of the patients. The "presence of fatty liver" in patients is presumed through this to be more prone in the male patients within the selected sample.

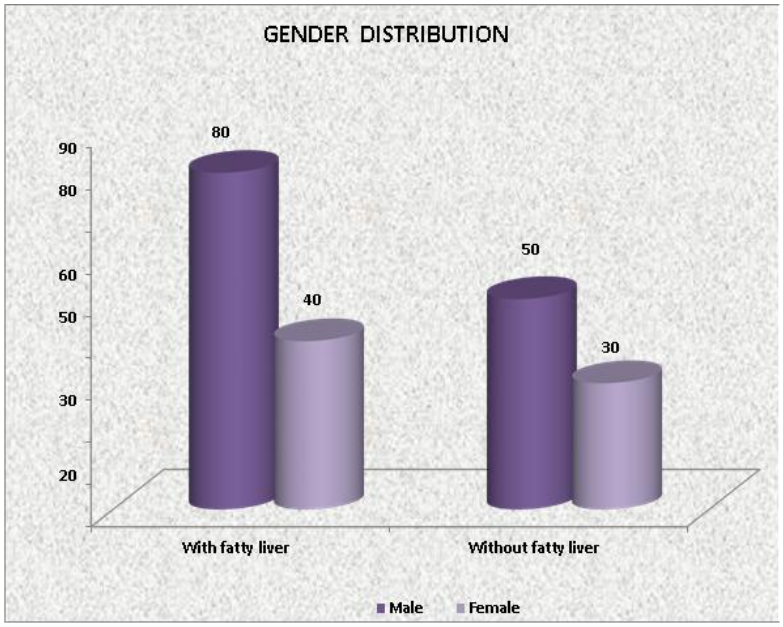

Figure 2: Gender Distribution

This above graphical representation presents the different composition of the patients according to their gender demographic. Among the 120 patients with fatty liver, only 40 of them were identified as females. The remainder, that is, 80 out of the 120 patients had been identified as male patients.

Table 4: Mean Weight, Height and Body Mass Index

	group	N	Mean	Std. Deviation	t
Weight (kg)	With fatty liver	120	69.85	10.576	2.578
	Without fatty liver	80	66.31	7.613	p=0.011 sig
Height (cm)	With fatty liver	120	161.11	11.701	2.905
	Without fatty liver	80	165.71	9.793	p=0.004 hs
BMI	With fatty liver	120	27.20	5.548	4.540
	Without fatty liver	80	24.20	2.467	<0.001 vhs

As per the above table in the study, the patients with fatty liver had a mean weight of around 69.85 kg. In terms of height that was measured in centimetres, patients with a fatty liver had been noted to have a mean height of 161.11 cm. The study's findings further identified that the body mass index for the patients with fatty liver stood at 27.20. The patients had illustrated that they were at the risk of having more than usual level of body mass and fat present, possibly contributing to the NAFLD condition.

Table 5: Mean SGPT/SGOT ratio

group	N	Mean	Std. Deviation	t
With fatty liver	120	1.34	.527	12.625
Without fatty liver	80	.71	.206	p<0.001 vhs

In the case of the above table, the study had compared among the findings on "patients with fatty liver" and those "without fatty liver". The "mean ratio" for patients with a fatty liver was 1.34. This further on illustrated that SGPT/SGOT is applicable as a biochemical marker for the patients with fatty liver as the p value had been identified to be under 0.001 vhs, hence statistically significant.

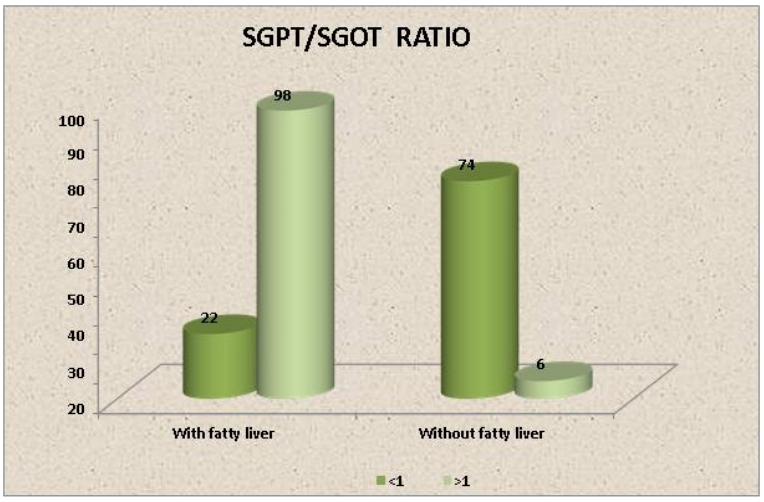

Figure 3: SGPT/SGOT Ratio

As per the above graphical presentation, the range of population that has been identified to be divided as per the SGPT/SGOT ratio. The study's findings identified that there were 22 patients out of 120 patients with fatty liver that had been identified to be falling under the <1 as ratio. In comparison to this, around 98 of the 120 patients with fatty liver were identified to be falling under the >1 as ratio category. This could further indeed be associated with SGPT/SGOT ratio being a sort of biomarker for NAFLD.

Table 6: Distribution of SGPT/SGOT Ratio

			GROUP		Total
			With fatty liver	Without fatty liver	
SGPT/SGOT ratio	<1	Count	22	74	96
		%	18.3%	92.5%	48.0%
	>1	Count	98	6	104
		%	81.7%	7.5%	52.0%
Total		Count	120	80	200
		%	100.0%	100.0%	100.0%

a. x2=105.783 p<0.001 vhs

The above tabular presentation illustrates the distribution of the population on the basis of the SGPT/SGOT ratio biochemical marker. As per the table, around 189.3% of the total count of patients with fatty liver had been categorized to be falling within the <1 bracket of the SGPT/SGOT ratio. The study findings further illustrated that the patients who had been identified within the >1 bracket of SGPT/SGOT ratio included 81.7% of the total 120 patients. As already mentioned, this was identified as statistically significant in nature.

4. Discussion

The findings of the primary quantitative analysis of this study critically showcase the SGPT/SGOT ratio as an effective biochemical marker that might effectively be used in measuring the severity of NAFLD among patients. The participants selected in this study followed appropriate inclusion and exclusion criteria which made the overall data analysis section of the study more accountable. According to the findings of this study, the "average age of the patients with fatty liver" is 52.83 years which can be considered that "age has a significant impact on the dysfunction of the liver among the common people". Chronic liver disease is largely influenced by age-related dysbiosis of the gut microbial makeup[8]. This is also indicating that age is a stimulating factor regarding the dysfunction of the liver among common people.

The primary purpose of this study was to identify the correlation between the SGPT/SGOT ratio and the NAFLD. Therefore, the descriptive statistics of the measure have been accumulated by dividing the groups into two parts. Based on the findings of this study, it has been reported that the majority of the patients in the group with fatty liver have a higher than 1 SGPT/SGOT ratio. On the other hand, the majority of the patients without fatty liver have been recorded to have an SGPT/SGOT ratio of less than 1. Considering this finding, it can be stated that patients who have a higher SGPT/SGOT ratio are directly associated with NAFLD. On the other hand, the findings of this study can also be stated to provide effective evidence regarding the role of this ratio in providing key insights associated with the efficiency of the ratio as a biochemical marker for identifying NAFLD among patients.

The descriptive statistics of the ratio have also been recognised as effective evidence regarding the role of the ratio in identifying liver dysfunctioning especially among diabetes mellitus patients. As previously mentioned in this study each patient involved in the study is diagnosed with diabetes and considering this as a common factor further research has been constructed. SGPT/SGOT ratio has been reported by several authors as an effective indicator of the enzyme activities in the liver[9]. This can also be considered as effective evidence supporting the overall findings of this study which also indicates the ratio as a biochemical indicator of NAFLD. Based on the findings of this study, it can also be stated that patients with fatty liver are mostly vulnerable to changes in enzyme activities. Therefore, it can be stated that the ratio is one of the most crucial biochemical indicators of NAFLD among human beings as it productively helps in reporting the enzyme activity changes in the liver.

Apart from this the findings of this study also indicate that being overweight is another critical factor directly linked with the disruption of liver health more specifically, the findings of this study reported that the average weight of patients with fatty liver is about 69.85 kg which is higher than the average weight of patients without fatty liver which is about 66.31 kg. Considering this aspect, it can clearly be stated that the BMI is a crucial influential component associated with the NAFLD and fatty liver is a common issue associated with this group. In other words, fatty liver patients who also have higher BMI can be considered as obsessed NAFLD[10]. Therefore, the findings of this study can be considered to be aligned with the previous research findings based on the similar context of the research.

5. Conclusion

The study's findings indicate that although type 2 diabetes individuals have a substantial risk of NAFLD, there is no correlation between the occurrence of NAFLD and the average length of mellitus. Individuals with mellitus should aggressively seek for and treat NAFLD due to the higher death rate among these individuals. Based on the findings of this study it can also be concluded that the patients who are facing type 2 diabetes are mostly vulnerable to the negative impact of the NAFLD. Therefore, it can be suggested that diabetes mellitus has to be controlled among patients with fatty liver in terms of promoting health along with minimising the risk of mortality among these patients.

This particular study has been constructed with an ideology of understanding the effectiveness of the SGPT/SGOT ratio as a biochemical marker to identify the severity of fatty liver. The findings of this study concluded that the ratio will be higher among the patients with fatty liver which is effectively indicating a strong and positive interrelation between the marker and the condition. In this specific study, an SGPT/SGOT ratio greater than 1 was linked to a higher incidence of fatty liver and may serve as a biochemical marker for early detection of the onset of fatty liver in individuals with type 2 diabetes. Considering this aspect, the SGPT/SGOT ratio can be concluded as an effective indicator of liver dysfunctioning especially in the initial stage which can help patients in preventing negative situations based on the following context.

The following study has been conducted using primary sources by which relevant information associated with NAFLD along with fatty liver among diabetic patients has been collected. However, using only primary sources of data can be considered a critical limitation of this study as the medical

condition of each individual varies. Therefore, not using secondary sources and resilience on primary sources can be considered as a downside of this study. However, the provided data along with the analysis technique used in the research can be stated to have a significant impact on providing sufficient amounts of information which are relevant to the context of the research undertaken in this study. Overall, this study can be considered sufficient information by which it can be stated that the SGPT/SGOT ratio is one of the most effective biochemical indicators that help in determining NAFLD in the initial stage.

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