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RESEARCH ARTICLE

ROLE OF FIBROSCAN TO DETECT FIBROSIS OF LIVER IN THE PATIENTS OF NONALCOHOLIC FATTY LIVER DISEASE IN COMPARISON WITH ULTRASONOGRAPHY

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ABSTRACT

Introduction: Non-alcoholic fatty liver disease (NAFLD) is the most common cause of liver disorders in the world. The global burden of NAFLD is estimated to be as high as one billion. NAFLD is the presence of fat accumulation in hepatocytes when other secondary causes like heavy alcohol consumption is not present. The standard diagnostic test of fatty liver disease is liver biopsy. Liver biopsy is an invasive procedure. A potentially non-invasive method used as an alternative to liver biopsy for diagnosis of fibrosis and hepatic steatosis is the measurement of liver stiffness using transient elastography. **Material and methods:** It was a prospective study of 72 patients visiting Gastro and Medicine OPD of RNT medical college Udaipur. Suspected patients of fatty liver disease screened with ultrasonography. Those with fatty liver disease taken into study and screened for fibrosis using non-invasive methods Fibro scan, CBC, LFT, TSH level, B12 level, HbA1c level and compared with ultrasonography grading of fatty liver. **Results:** In this study, out of 72 patients 47 patients had grade 1, 17 had grade 2 and 8 had grade 3 fatty liver. Maximum number of patients were in age group 41-60. Male patients predominates than females. In this study more BMI patients had high fibrosis grading by ultrasonography or fibro scan both. With progression of fibrosis there was elevation of SGOT, SGPT levels. In this study we observed that with advancing fibrosis there is high RBS and HbA1c level. Also observed that with high fibrosis value there is reduction in platelets count. **Conclusion:** Male has higher prevalence of NAFLD in the age group 41-60. Significant relation observed with RBS, HbA1c, SGOT, SGPT, HDL, LDL, TG, PT/INR, and prevalence of fatty liver by USG and Fibro scan. Also observed that Fibro scan helps in diagnosing advanced fibrosis and cirrhosis prior to ultrasonography.

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INTRODUCTION

Non-alcoholic Fatty liver disease (NAFLD) is the most common cause of liver disorders in the world. The global burden of NAFLD is estimated to be as high as one billion. NAFLD is the presence of fat accumulation in hepatocytes when other secondary causes like heavy alcohol consumption is not present. The simple accumulation of triglyceride within hepatocytes (hepatic steatosis) is one of the most clinically benign extreme of the spectrum. The risk of developing cirrhosis is extremely low in individuals with isolated steatosis (non-alcoholic fatty liver [NAFL]) but increases as steatosis becomes complicated by liver cell injury and death and the accumulation of inflammatory cells (i.e., non-alcoholic steato-hepatitis [NASH]). At least a quarter of adults with NAFLD are presumed to have NASH. Advanced hepatic fibrosis is the primary predictor of eventual liver related morbidity and mortality in NAFLD [(1)]. Most patients with NAFLD are asymptomatic, and the disease may be diagnosed incidentally by elevation of hepatic enzymes or accidental hepatic steatosis finding on imaging [(2)]. The gold standard diagnostic test of fatty liver disease is liver biopsy. Liver biopsy is an invasive procedure and cannot be used as a screening method because of its complications [(3)].A potentially non-invasive method used as an alternative to liver biopsy for diagnosis of fibrosis and hepatic steatosis is the measurement of liver stiffness using transient elastography with sensitivity of 83%, 88%, and 99% for a diagnosis of mild-to-moderate fibrosis, severe fibrosis, and cirrhosis, respectively [(4,5)].However, it is not used extensively because of its inaccessibility.

Ultrasonography (US) is a cheap and an accessible method and is the most used imaging method in diagnosis of NAFLD [6]. There are many studies on sensitivity and specificity of US in detecting NAFLD. In a meta-analysis of 49 studies from 1967 to 2010, the sensitivity and specificity of ultrasound were 84.8% and 93.6%, respectively [7]. However, there is no study comparing the ability of US with transient elastography in detecting fatty liver disease. Because of high prevalence of fatty liver disease and many undiagnosed patients, due to lack of an appropriate diagnostic method, we designed a study to investigate the sensitivity and specificity of ultrasonography in detecting fatty liver disease in comparison with fibro scan (the elasticity imaging technique) and find the diagnostic performance of ultrasonography using fibro scan as a standard method. The study aimed to detect whether the ultrasonography can be used as an alternative to fibro scan and liver biopsy in diagnosis of fatty liver disease. This has become a popular non-invasive device to assess the liver hardness or stiffness and quantification of liver steatosis with the Controlled Attenuation Parameter (CAP). Since fibrous tissue is harder than normal liver tissue, the degree of hepatic fibrosis can be inferred from liver hardness. The results are expressed in kilopascals (Kpa).

AIM OF THE STUDY: To assess the utility of transient elastography (fibro scan) as a screening tool to detect the presence of fibrosis of liver in the patients with non-alcoholic fatty liver disease in comparison with ultrasonography.

METHODS AND MATERIALS

SOURCE OF THE DATA: Data consists of data collected from the cases visited Gastroenterology or medical OPD in RNT Medical college and MB hospital Udaipur.

STUDY PERIOD: One year, July 2021 to June 2022.

STUDY DESIGN: It is a prospective study.

STUDY METHOD: This is a prospective study of 72 cases of non-alcoholic fatty liver disease visited gastroenterology and Medical OPD in RNT medical college and MB hospital Udaipur. Suspected patient of fatty liver disease screened with ultrasonography. Detailed history regarding symptoms, duration of symptoms, history of significant alcohol intake, history of any drug intake, any past illness were taken. Those patients with fatty liver disease taken into study and screened for fibrosis of liver using non-invasive methods- Fibro scan, Complete blood count, Liver function test, Lipid Profile, Serum TSH level, Serum B12 level, HbA1c level, viral markers done to all patients.

INCLUSION CRITERIA

- All the patients above the age of 18 years suspected of liver disease.
- USG abdomen showing fatty liver.

EXCLUSION CRITERIA

- Patients with chronic liver disease of any other aetiology other than NAFLD.
- Pregnancy
- Features of cirrhosis and portal hypertension.
- History of hepatotoxic drugs.
- Significant alcohol intake.
- Consent not given.

RESULTS AND OBSERVATIONS

Table 1. Grading Of Nafld By Ultrasound

USG GRADING	No.	PERCENTAGE
GRADE 1	47	65%
GRADE 2	17	24%
GRADE 3	8	11%
Grand Total	**72**	**100%**

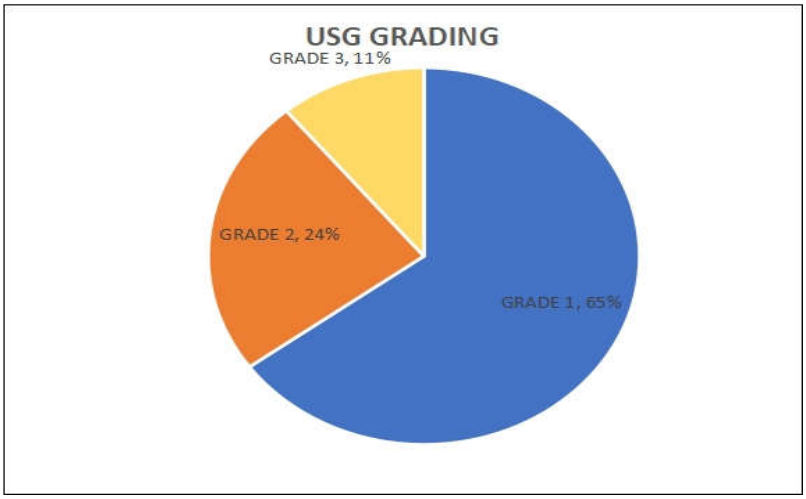


Table 2: Age Distribution

AGE IN YEARS	No.	PERCENTAGE
<40	23	32%
40-60	39	54%
>60	10	14%
Grand Total	**72.00**	**100%**

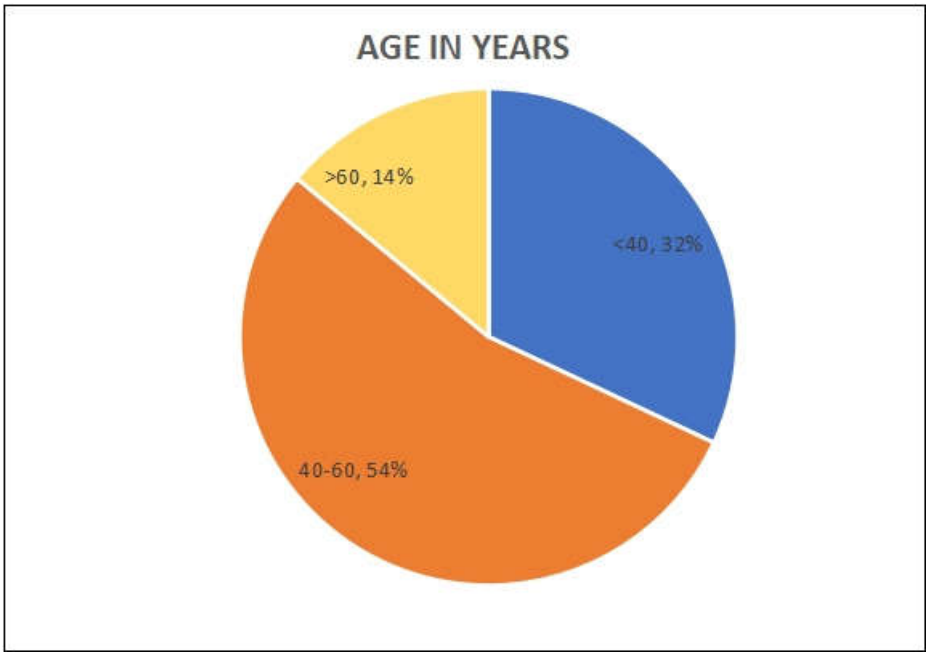


Table 3. Age Distribution Among Nafld

USG GRADING	Mean Age	SD
GRADE 1	46.11	11.53
GRADE 2	51.59	11.22
GRADE 3	47.63	15.43

ANOVA P value=0.27 (non-Significant)

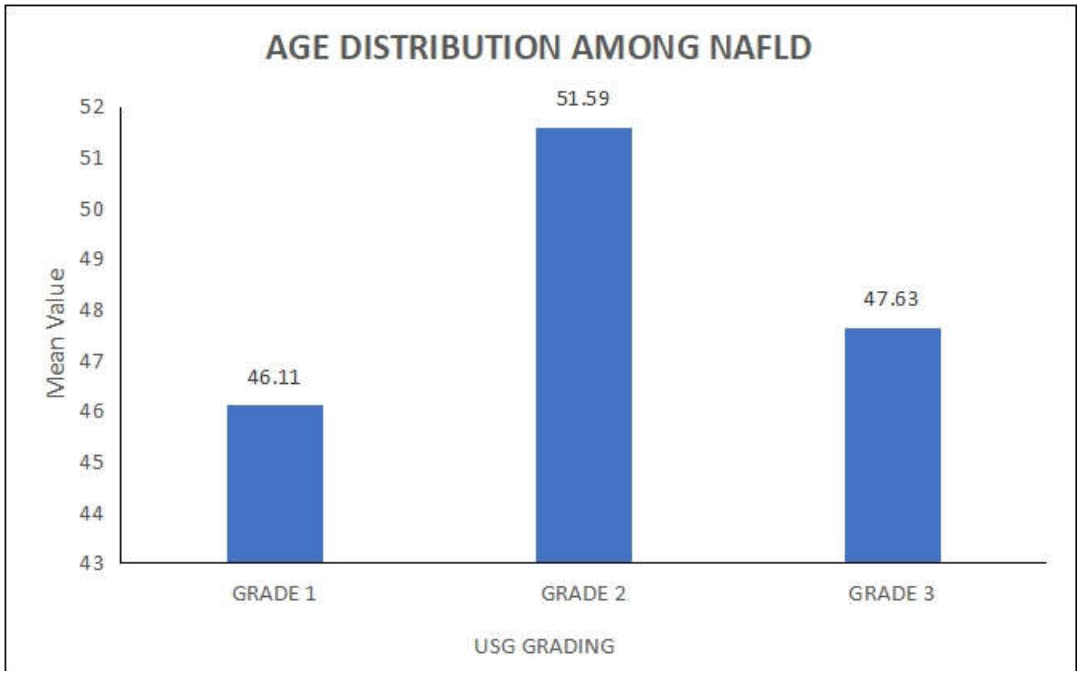


Table 4. Sex Distribution

SEX	No.	PERCENTAGE
MALE	50	69%
FEMALE	22	31%

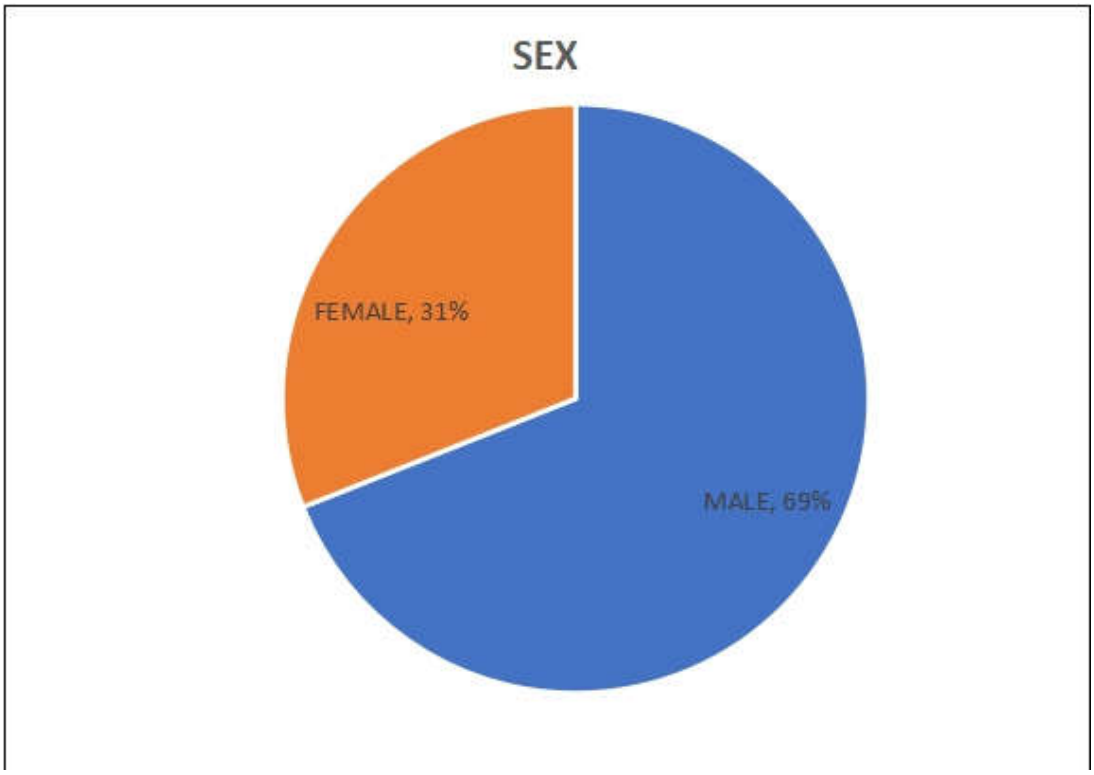


Table 5. Distribution of sex among nafld

USG GRADING	MALE	FEMALE
GRADE 1	33	14
GRADE 2	12	5
GRADE 3	5	3

ANOVA P value=0.902 (NonSignificant)

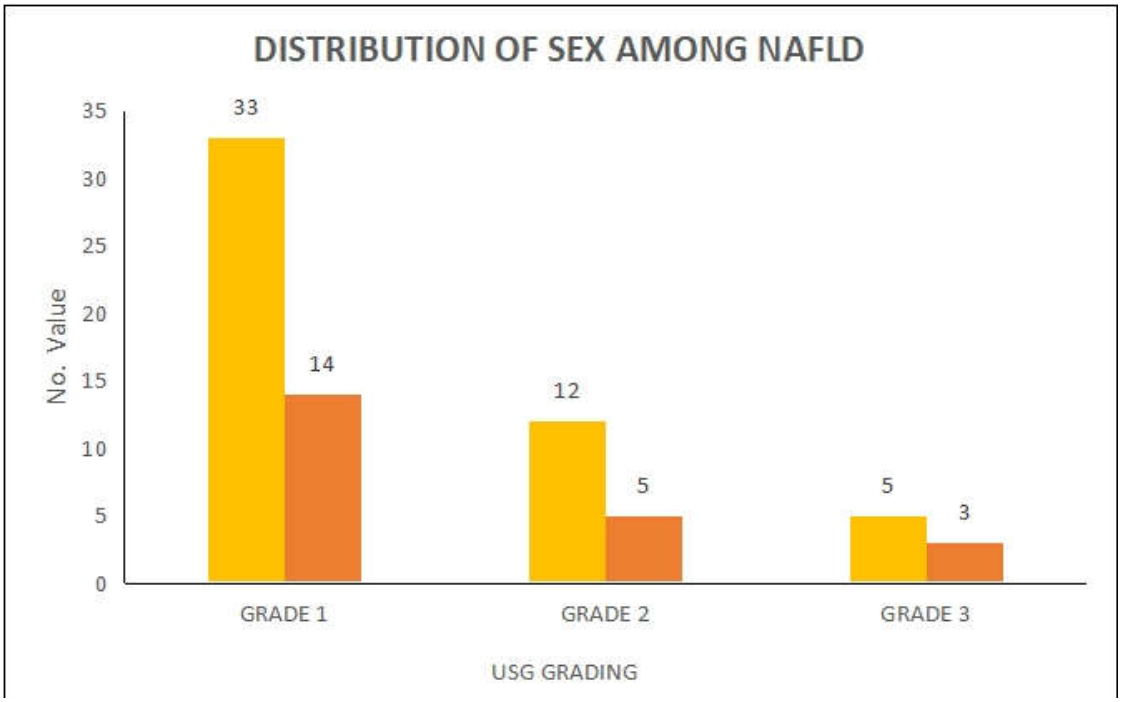


Table 6. Body Mass Index Of The Patients

BMI(Kg/m^2)	No.	PERCENTAGE
<23	44	61%
>23	28	39%

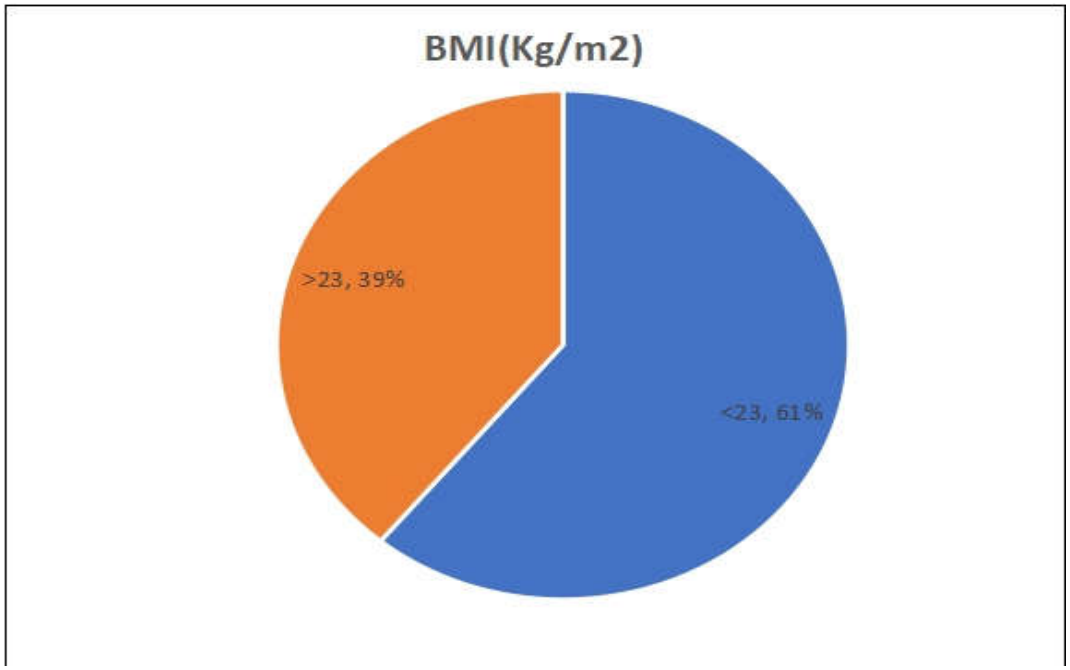


Table 7. Bmi Distribution In Nafld

USG GRADING	BMI	
	<23	>23
GRADE 1	32	16
GRADE 2	9	8
GRADE 3	1	6

ANOVA P value=0.028 (Significant)

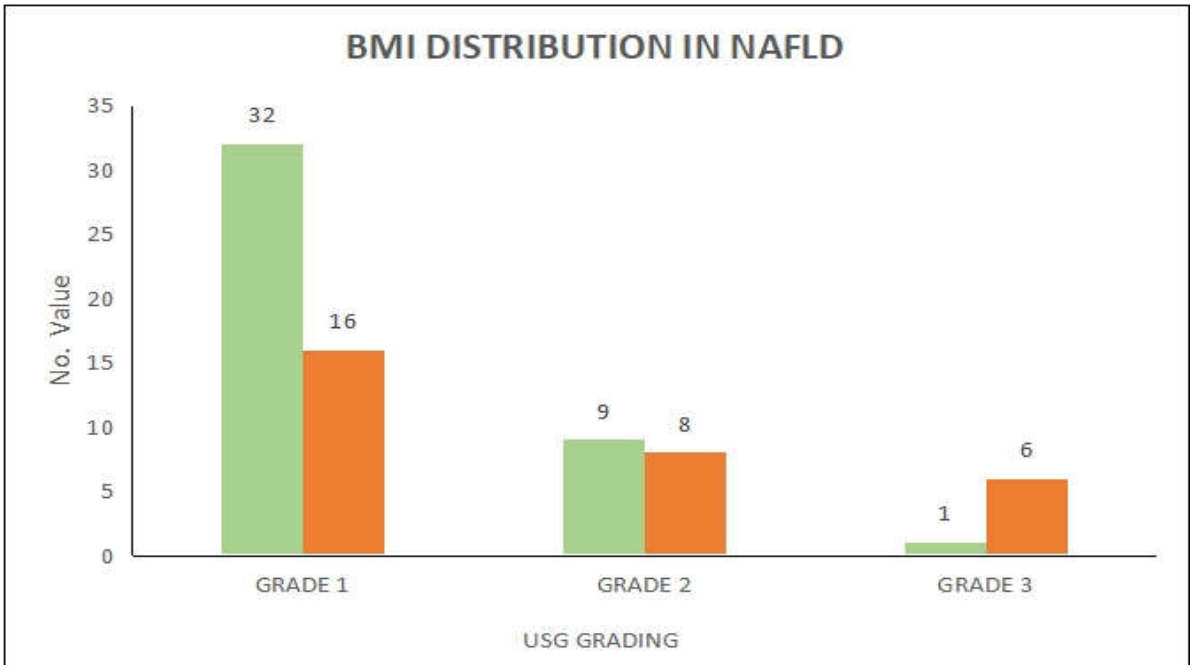


Table 8. Comparison of fibroscan kpa with fatty liver in nafld

USG GRADING	Kpa value	
	MEAN	SD
GRADE 1	6.44	6.09
GRADE 2	7.2	4.27
GRADE 3	25.31	22.83

ANOVA P value<0.001 (Highly Significant)

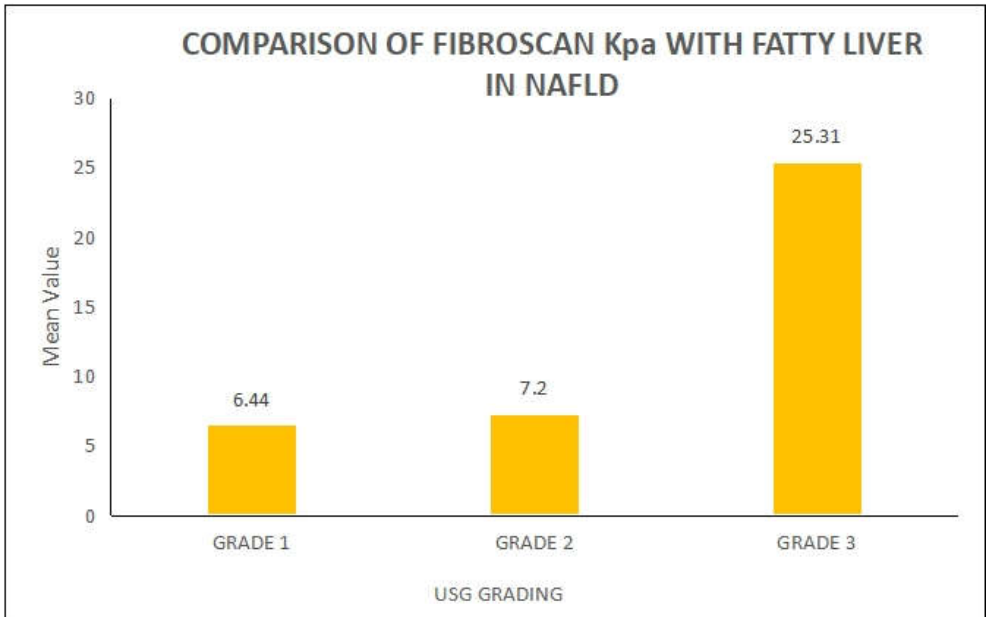


Table 9. Comparison Of Fibroscan Cap With Fatty Liver In Nafld

USG GRADING	CAP VALUE	
	MEAN	SD
GRADE 1	106.06	33.32
GRADE 2	117.35	31.33
GRADE 3	164.63	55.54

ANOVA P value<0.001 (Highly Significant)

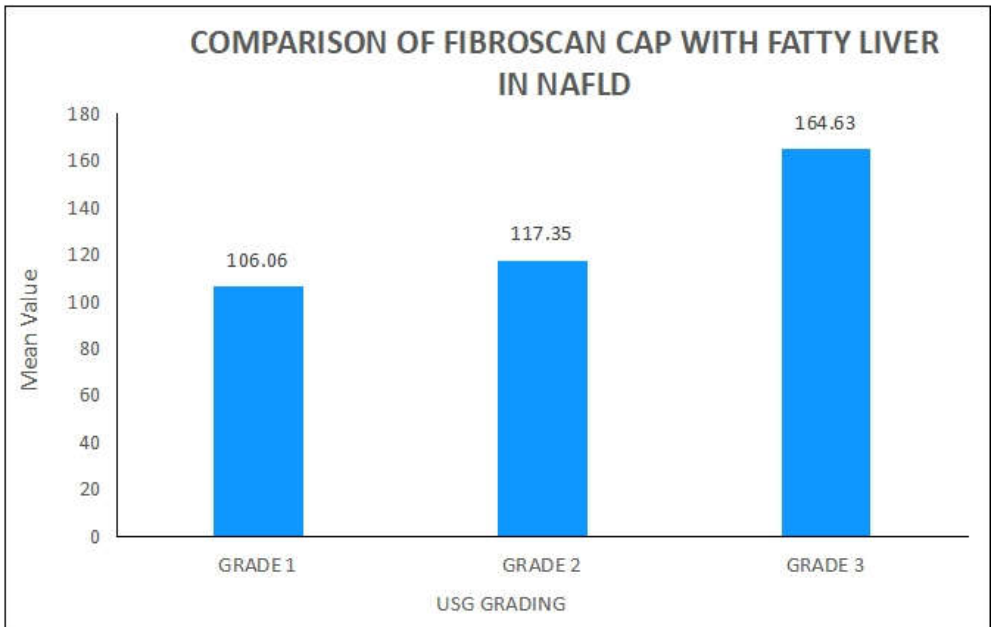


Table10. Comparison Of Kpa Level With Rbs Of Patients

Kpa	RANDOM BLOOD SUGAR	
	MEAN	SD
<7.1	108.58	35.21
7.1-8.7	122.75	28.16
8.7-10.3	129.75	25.17
>10.3	136.70	62.88

ANOVA P value=0.022 (Significant)

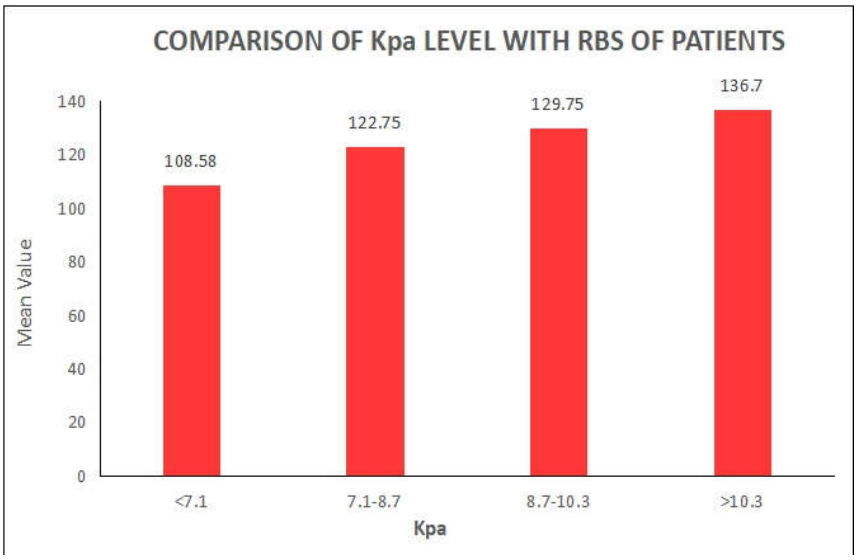


Table 11. Comparison of kpa level with hba1c of patients

kPa	No.	Mean	SD HbA1c
<7.1	50.00	5.96	1.08
7.1-8.7	8.00	6.60	1.18
8.7-10.3	4.00	6.80	1.04
>10.3	10.00	7.46	1.54
Grand Total	**72.00**	**6.28**	**1.26**

ANOVA P value=0.003 (Significant)

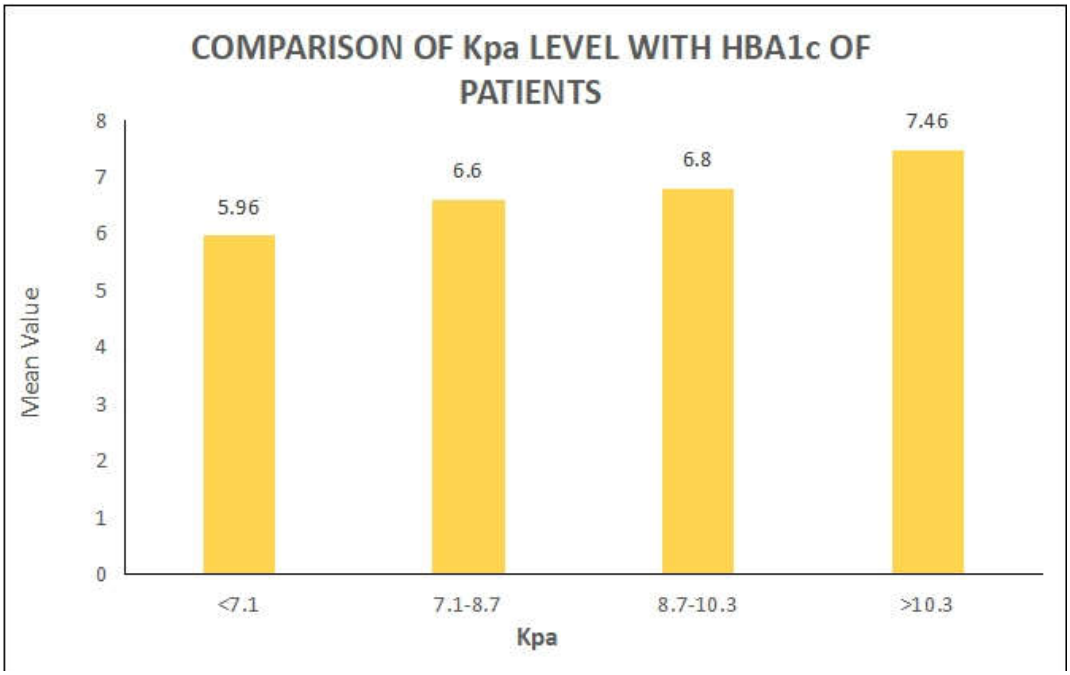


Table 12. Comparison of kpa level with pt of patients

kPa	No.	Mean	SD PT
<7.1	50.00	13.72	2.21
7.1-8.7	8.00	14.64	1.76
8.7-10.3	4.00	14.60	2.24
>10.3	10.00	19.99	13.38
Grand Total	**72.00**	**14.74**	**5.59**

ANOVA P value=0.01 (Significant)

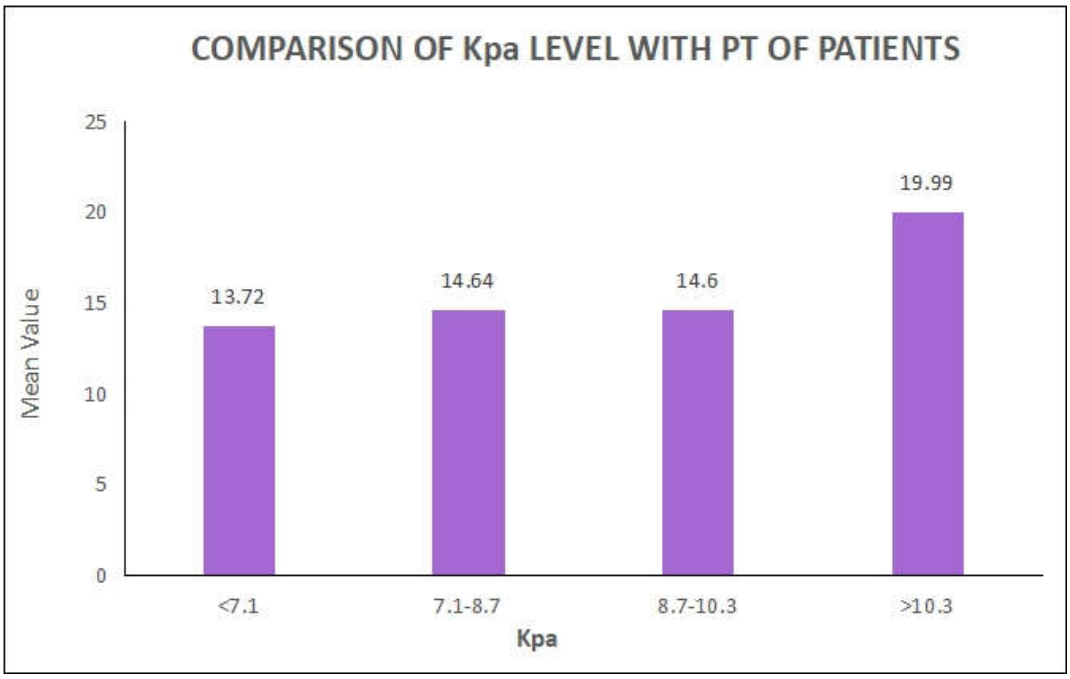


Table 13. Comparison Of Kpa Level With Inr Of Patients

kPa	No.	Mean	SD INR
<7.1	50.00	1.12	0.20
7.1-8.7	8.00	1.09	0.14
8.7-10.3	4.00	1.19	0.19
>10.3	10.00	1.61	1.01
Grand Total	**72.00**	**14.74**	**0.38**

ANOVA P value=0.009(Significant)

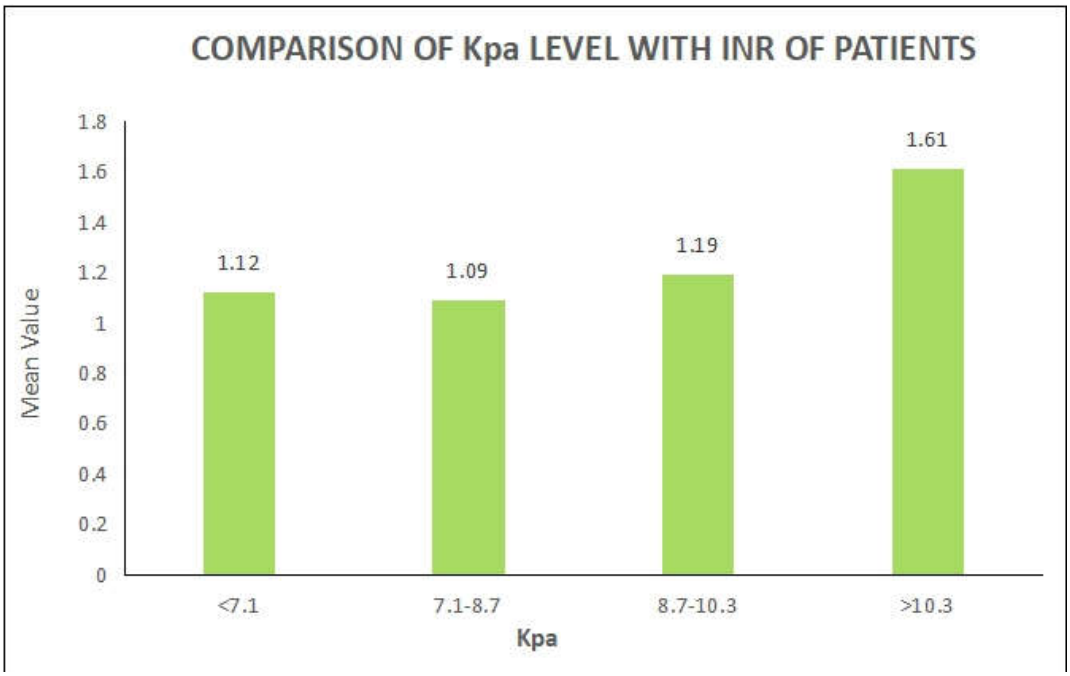


Table 14. Comparison of kpa level with tg of patients

kPa	No.	Mean	SD TG
<7.1	50.00	136.70	68.14
7.1-8.7	8.00	197.25	71.47
8.7-10.3	4.00	161.25	26.06
>10.3	10.00	215.00	65.73
Grand Total	**72.00**	**155.67**	**72.32**

ANOVA P value= 0.003 (Significant)

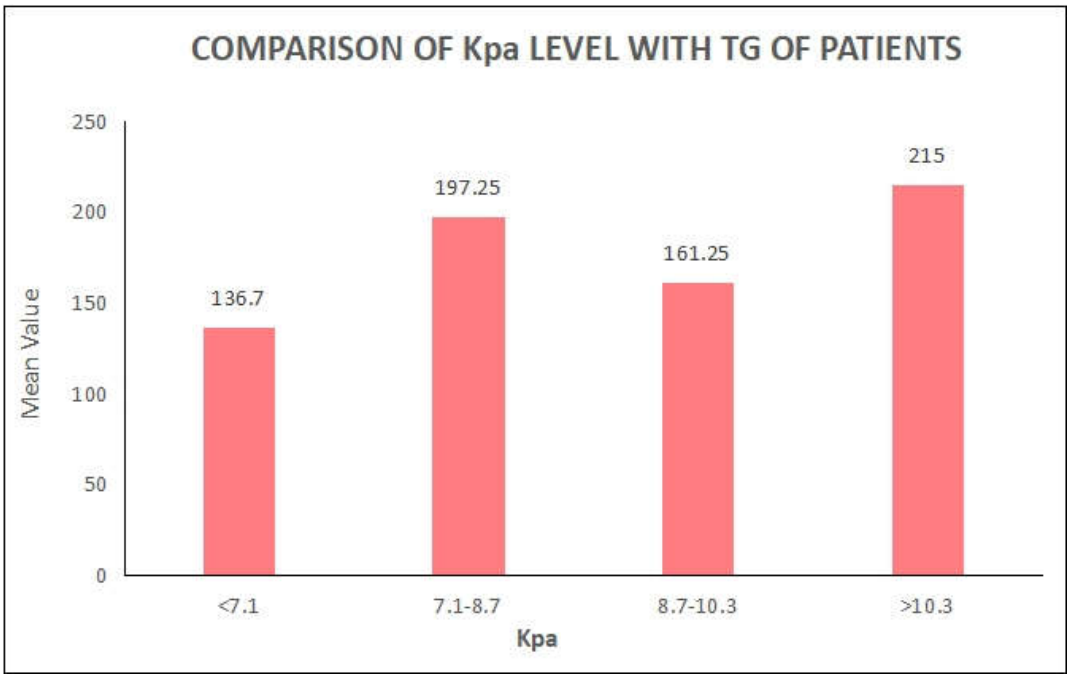


Table 15. Comparison of kpa level with tc of patients

kPa	No.	Mean	SD TC
<7.1	50.00	149.66	53.47
7.1-8.7	8.00	187.38	65.08
8.7-10.3	4.00	221.50	58.98
>10.3	10.00	204.70	69.93
Grand Total	**72.00**	**165.49**	**61.49**

ANOVA P value=0.006 (Significant)

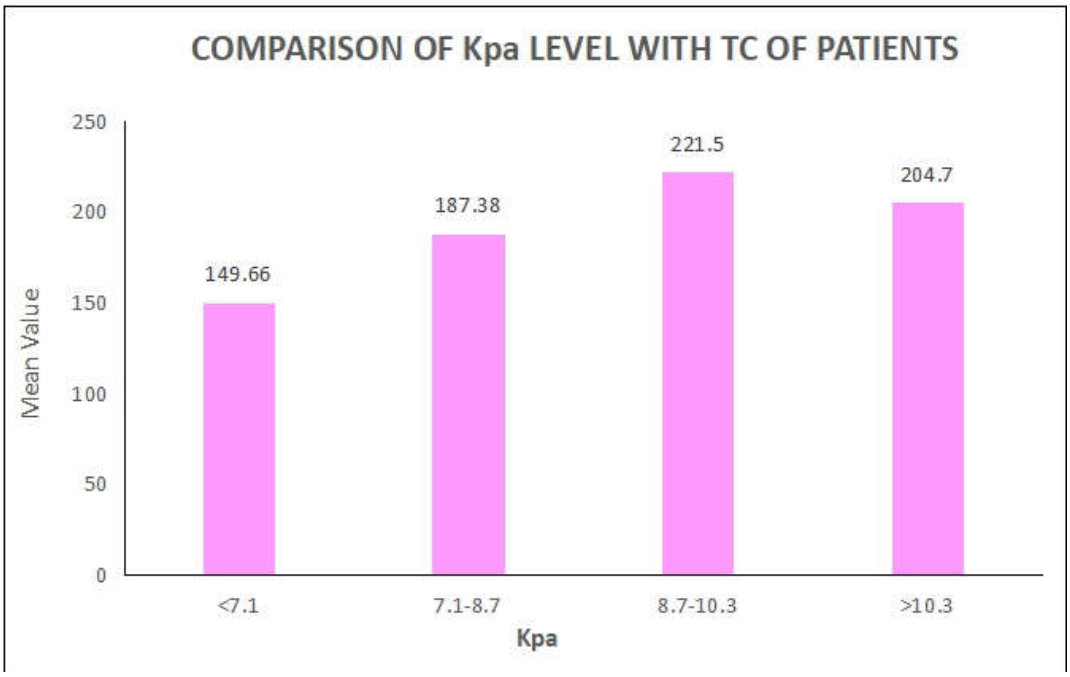


Table 16. Comparison Of Kpa Level With Ldl Of Patients

kPa	No.	Mean	SD LDL
<7.1	50.00	96.02	47.64
7.1-8.7	8.00	126.75	36.09
8.7-10.3	4.00	119.25	23.63
>10.3	10.00	134.50	47.51
Grand Total	**72.00**	**106.07**	**47.40**

ANOVA P value=0.05 (Significant)

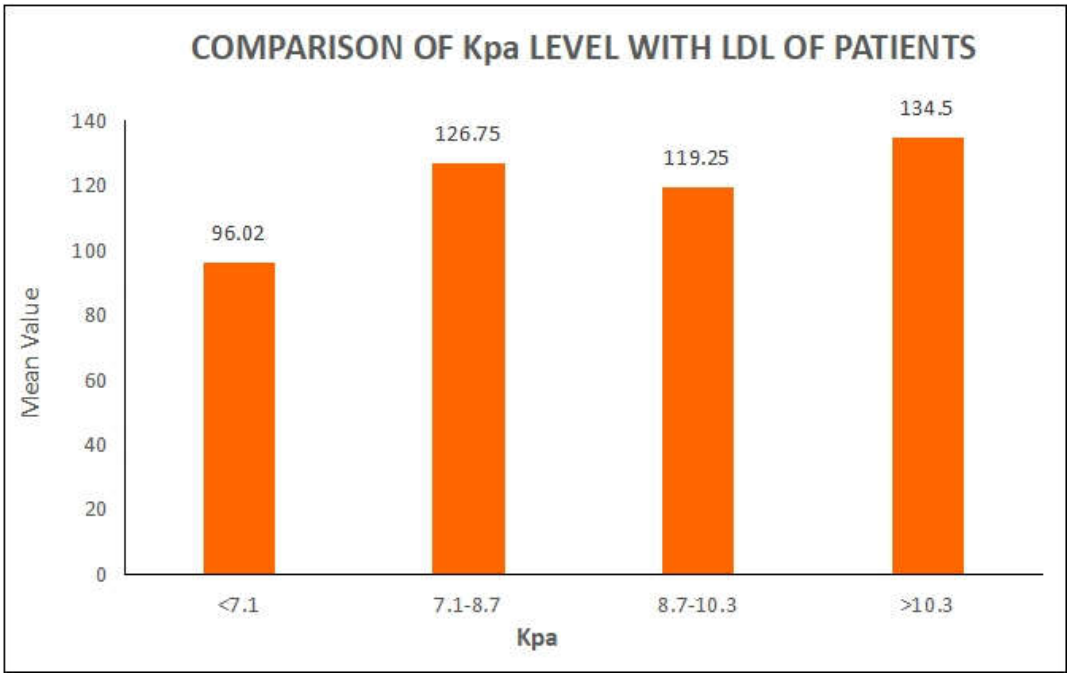


Table 17. Comparison Of Kpa Level With Sgot Of Patients

kPa	No.	Mean	SD SGOT
<7.1	50.00	55.40	42.90
7.1-8.7	8.00	84.00	50.78
8.7-10.3	4.00	90.00	53.39
>10.3	10.00	210.90	255.91
Grand Total	**72.00**	**82.10**	**113.09**

ANOVA P value=0.001 (Highly Significant)

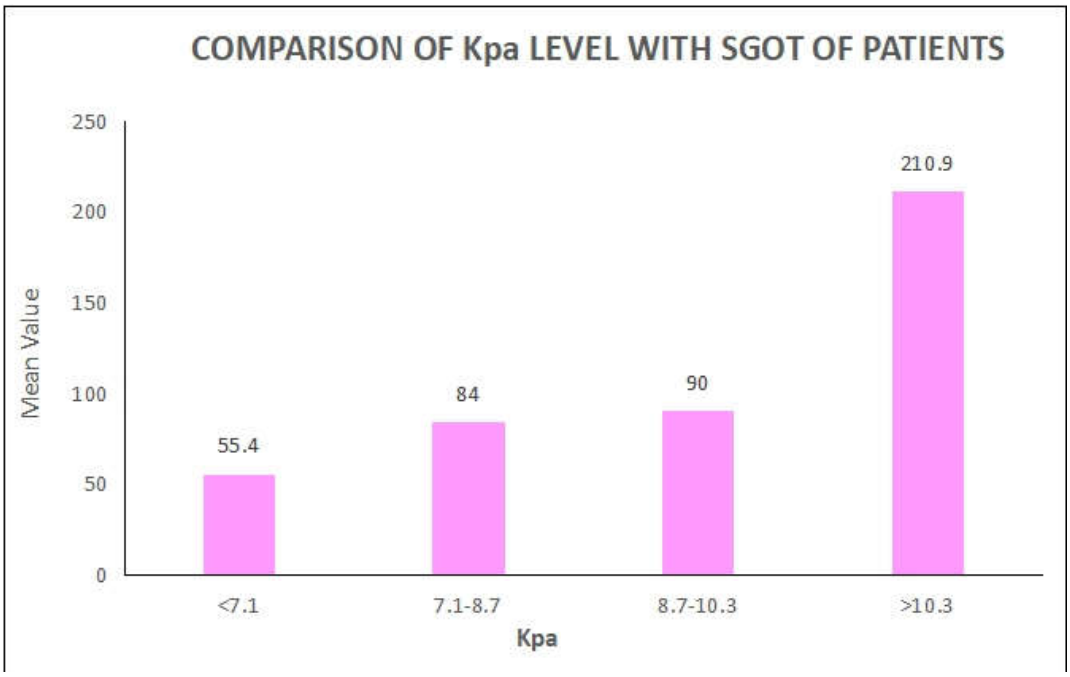


Table 18. Comparison of kpa level with sgpt of patients

kPa	No.	Mean	SD SGPT
<7.1	50.00	49.45	43.25
7.1-8.7	8.00	81.50	39.28
8.7-10.3	4.00	93.50	49.76
>10.3	10.00	218.30	270.93
Grand Total	**72.00**	**78.91**	**119.22**

ANOVA P value<0.001 (Highly Significant)

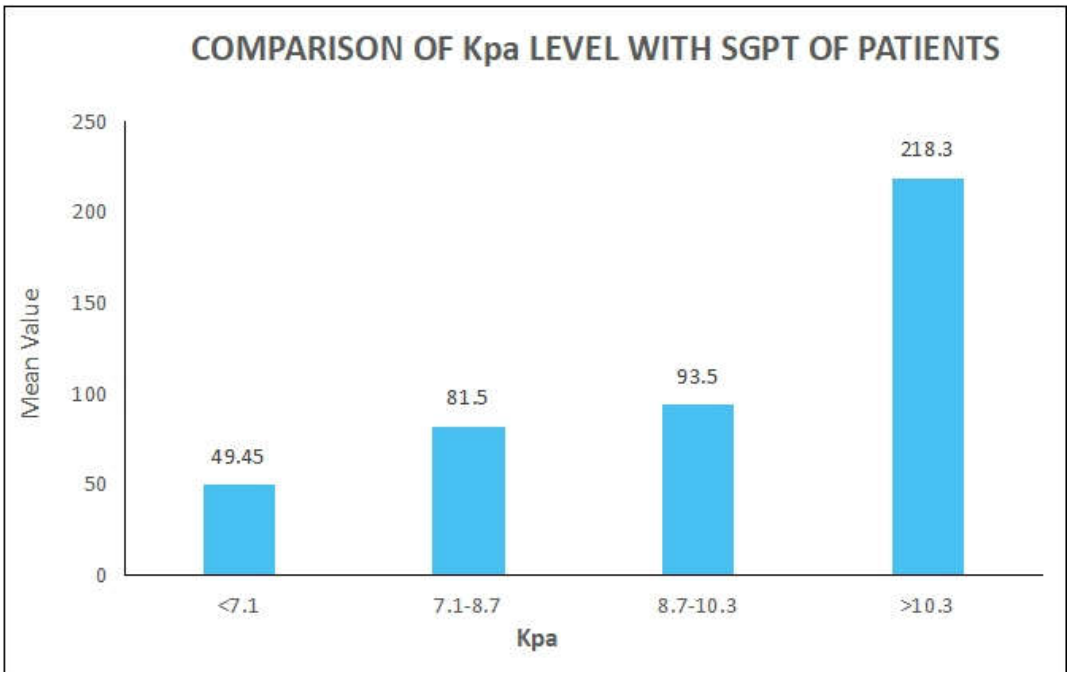


Table 19. Comparison Of Kpa Level With Platelets Of Patients

kPa	No.	Mean	SD Platelets
<7.1	50.00	2.54	1.18
7.1-8.7	8.00	2.48	1.70
8.7-10.3	4.00	2.01	0.90
>10.3	10.00	1.72	0.86
Grand Total	**72.00**	**2.39**	**1.21**

ANOVA P value=0.23 (Non-Significant)

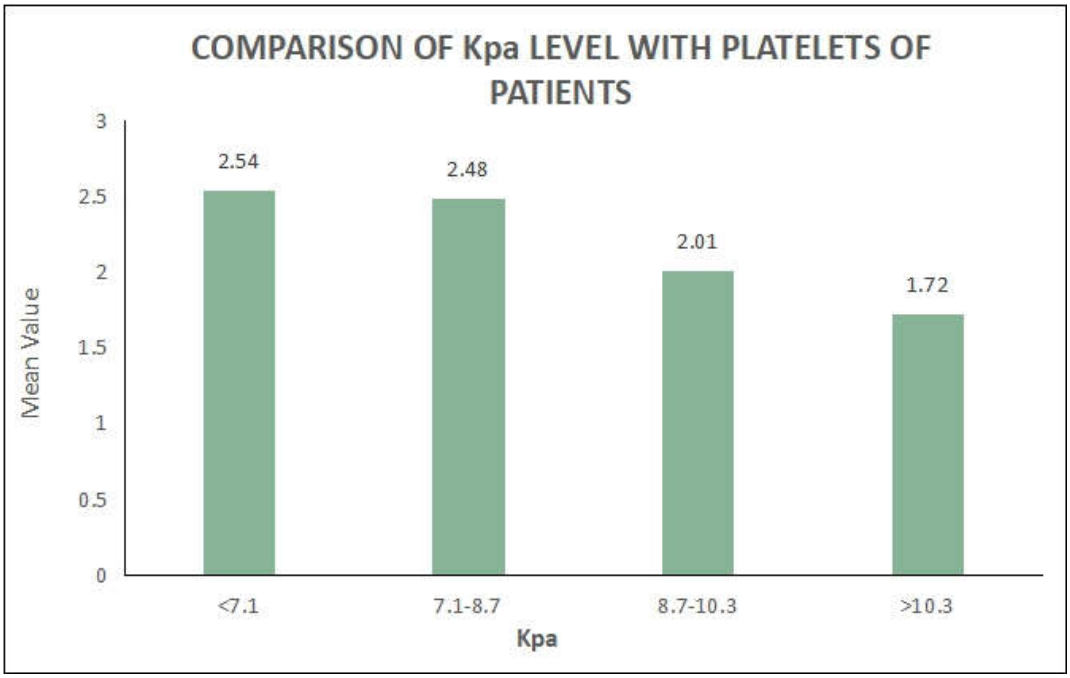


Table 20. Comparison Of Kpa Level With B12 Of Patients

kPa	No.	Mean	SD B12 LEVEL
<7.1	50.00	494.86	411.14
7.1-8.7	8.00	580.75	289.05
8.7-10.3	4.00	258.98	321.14
>10.3	10.00	856.90	711.55

ANOVA P value=0.07 (non-Significant)

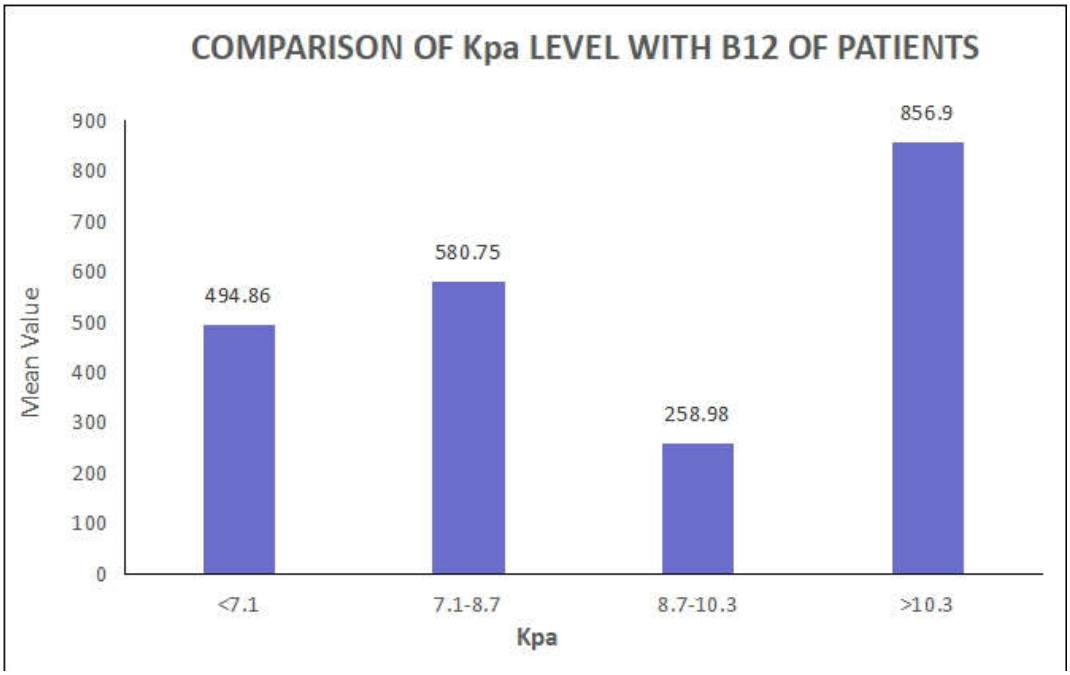


Table 21. Comparison of kpa level with tsh of patients

kPa	No.	Mean	SD TSH
<7.1	50.00	3.19	6.02
7.1-8.7	8.00	2.51	2.57
8.7-10.3	4.00	4.01	2.37
>10.3	10.00	1.90	1.26

ANOVA P value=0.35 (non-Significant)

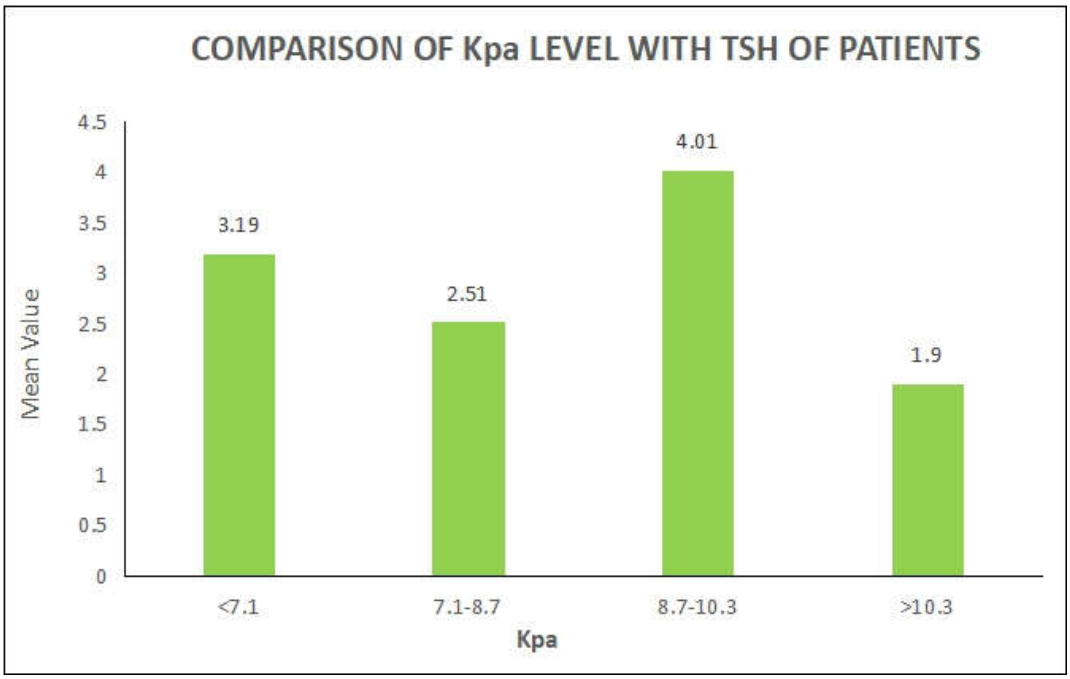
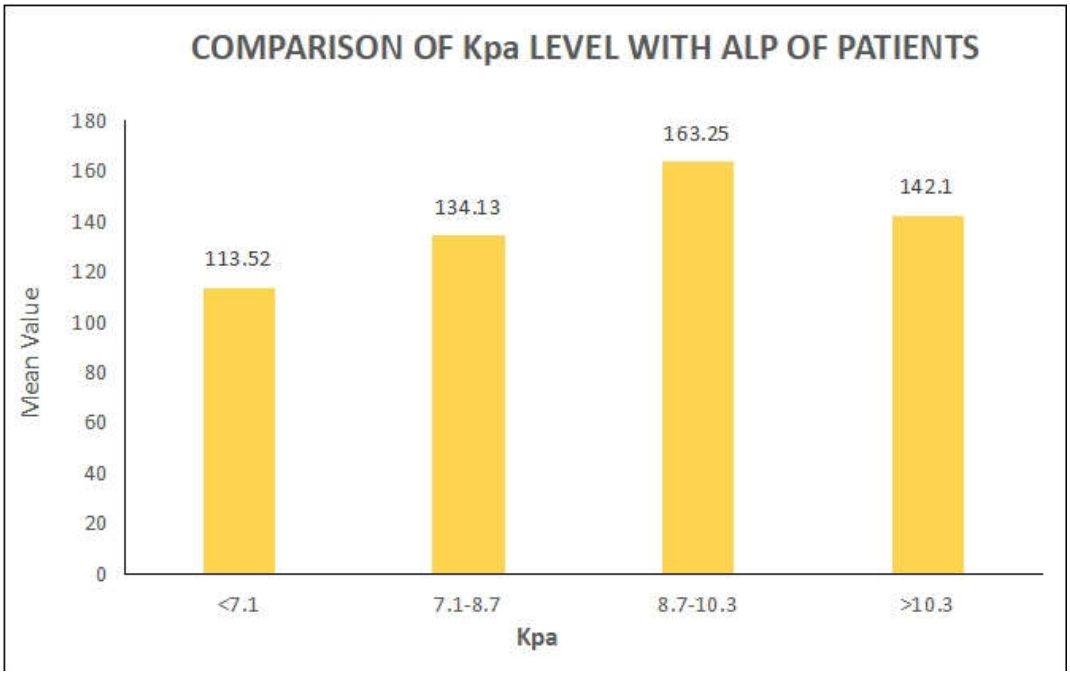


Table 22. Comparison Of Kpa Level With Alp Of Patients

kPa	No.	Mean	SD ALP
<7.1	50.00	113.52	102.48
7.1-8.7	8.00	134.13	53.22
8.7-10.3	4.00	163.25	95.73
>10.3	10.00	142.10	60.24

ANOVA P value=0.62 (Non-Significant)



DISCUSSION

In this study, out of 72 patients 47(65%) of patients had grade I,17(24%) had grade II and 8(11%) had grade III fatty liver. A study conducted by Roli Agrawal, Mishra S et al [8] showed that 48.4%, 40.3%, 11.3% had grade I, II, III fatty liver respectively which was comparable to the observations made in this study. Out of 72 patients, 23 patients are of age group <40 years, 39 patients are between 41-60 years and 10 patients belongs to age group >60 years. In this study majority are in the age group 41-60 years. A study conducted by Roli Agrawal, Mishra S et al [8] found mean age 42.70. Mean age of patients who had grade I, grade II, grade III fatty liver was 46.11 years, 51.59 years, 47.63 years respectively. No statistically significant relationship was found between age and ultrasound grading of fatty liver. In this study, 69% patients are male and 31% are female. Males are majority in this study. In a study conducted by Shil BC, Saha M et al [9] showed male predominance of ratio of male to female was 1.37:1. In our study Male patients are high in number in grade I, II, III fatty liver. In this study BMI was > 23 kg/m^2 in 30 patients, 42 patients had BMI < 23kg/m^2. Out of 30 patients with BMI > 23 kg/m^2, 16 patients had grade I, 8 had grade II and 6 had grade III fatty liver which are statistically significant. In the study done by Daad H Akbhar et al [10], obesity was identified as an independent factor for development of NAFLD. Out of 72 patients 50(70%) patients had slight elevation in mean SGOT and SGPT value (55.40 and 49.45 respectively). rest 22 patients had significant elevation in SGOT and SGPT values. Mofrad P et al [11] studied NAFLD in 2 groups. Of which one group comprises of 51 cases showed normal SGPT values and second group comprises of 50 cases with elevated SGPT values. In this study, out of 72 patients 47(65%) of patients had grade I, 17(24%) had grade II and 8(11%) had grade III fatty liver by ultrasonography. Using Fibro scan frequencies of fatty liver grading 50(69.5%) patients had F0-F1 fibrosis, 8(11%) patients had F2 fibrosis, 4(5.5%) had F3 fibrosis and 10(14%) patients had F4 fibrosis. In this study the mean Kpa value for the patients with grade I fatty liver was 6.44, grade II was 7.2, grade III was 25.31 respectively. In this study patient with Kpa <7.1 had mean RBS, HbA1c of 108.58 mg%, 5.96 % . Kpa 7.1-8.7 had mean RBS, HbA1c of 122.75 mg%, 6.60%. Kpa value 8.7-10.3 had mean RBS, HbA1c of 129.75%, 6.80% .Kpa value >10.3 had mean RBS, HbA1c of 136.70mg%, 7.46% respectively. A study conducted by Nandhini Devi et al. showed mean RBS in <6kpa was 153mg%,>6kpa had mean RBS 182mg%, mean HbA1c was 6.1 in <6kpa LS, 7.49 in >6kpa Liver stiffness. Which is comparable to our study. Out Of 72 patients, 50 patients who had SGPT mean 49.45 had Kpa value <7.1, 8 patients who had SGPT mean 81.50 had Kpa value 7.1-8.7, 4 patients who had mean SGPT 93.50 had Kpa value between 8.7-10.3, 10 patients who had SGPT mean 218.30 had Kpa value of >10.3 respectively, which is statistically significant. Of 72 patients, 50 patients have Kpa value <7.1(F0-F1 fibrosis), 8 patients have Kpa value between 7.1 – 8.7 (F2 fibrosis), 10 patients has Kpa between 8.7 – 10.3 Kpa (F3 fibrosis), 10 patients has Kpa values >10.3 (F4 fibrosis). Mean CAP value of USG fatty liver grade 1,2 and 3 are 106.06, 117.35 and 164.63 respectively. Which are statistically significant. Out of 72 patients 50 patients who had F0-F1 fibrosis have mean platelets count 2.54, 8 patients who had F2 fibrosis patients have mean platelets count 2.48, 4 patients who had F3 fibrosis have mean platelets count of 2.01, and F4 fibrosis have platelets count of 1.72. In our study we observe decline in platelets count with advanced fibrosis.In this study comparison of Kpa value with value of Vitamin B12 level, serum TSH level and serum ALP levels are statistically insignificant. No correlation was found with these values. A study conducted by Alba Martinez-Escude et al [12]. showed the TSH level significantly higher in subjects with presence of NAFLD.

CONCLUSION

- In this study, male sex group has higher prevalence of occurrence of Non-alcoholic fatty liver disease and the common age group was 41-60 years.
- There was significant relation observed between Body Mass Index, Random blood sugar, HbA1c level, SGOT and SGPT level, PT/INR level, and the prevalence of fatty liver by USG and Fibro scan.
- There was no significant relation observed between age, TSH level, serum B12 level, serum ALP level with progression in fibrosis of liver.
- Out of 72 patients only 2 patients has very high SGOT/SGPT values.
- Out of 72 patients, 3 patients has F4 fibrosis but USG was showing grade 2 fatty liver, and 3 patients has F4 fibrosis but USG was showing grade 1 fatty liver. So, Fibro scan helps in diagnosing advanced fibrosis and cirrhosis prior to Ultrasonography.
- Most of the patients with advanced fibrosis and cirrhosis are in prediabetic or diabetic range.

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