

COMPARISON OF PORTAL VEIN DIAMETER IN PATIENTS WITH NORMAL AND FATTY LIVER

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Abstract

Background

Non-Alcoholic Fatty Liver Disease (NAFLD) is a growing global health concern due to its increasing prevalence, particularly in individuals with metabolic syndrome, obesity, and diabetes. Sonographic evaluation is a primary imaging modality for detecting fatty liver and associated vascular alterations. Portal vein diameter (PVD) is commonly measured to assess hepatic hemodynamics, but its relationship with fatty liver remains controversial.

Objective

To compare the portal vein diameter in patients with fatty liver and those with normal liver echotexture using ultrasound.

Methodology

This comparative study was conducted at The University of Lahore Ultrasound Clinic, Green Town, Lahore over a 9-month period. All patients aged 25–65 years visiting the clinic during the study period were included using convenient sampling. Inclusion criteria involved both male and female patients diagnosed with fatty liver, while those with inadequate sonographic visualization, hepatocellular carcinoma, or prior abdominal interventions were excluded. Portal vein diameter was assessed using a Canon Ap...

Results

A total of 95 participants were enrolled, comprising 41 patients with fatty liver and 54 with normal liver. The mean portal vein diameter in the fatty liver group was 12.08 ± 1.52 mm, and 12.15 ± 1.75 mm in the normal liver group. The difference was not statistically significant ($P = 0.8898$), suggesting that fatty liver does not significantly affect portal vein diameter.

Conclusion

The findings indicate no significant variation in portal vein diameter between individuals with fatty liver and those with normal liver echotexture. Therefore, PVD should not be used in isolation to evaluate or diagnose fatty liver disease in the absence of other pathological features

INTRODUCTION

The portal vein (PV) is the primary channel of the portal venous system (PVS), carrying blood from the gastrointestinal tract, gallbladder, pancreas, and spleen to the liver (1). The portal vein (PV) is generated when the splenic and superior mesenteric veins meet posterior to the pancreatic head. It carries blood from the bowels and spleen to the liver. Ribero et al, 2021. Portal hypertension is a common symptom of chronic liver disease. USG can measure PV diameter, which is important for assessing portal hypertension in individuals with chronic liver disease. There are various PV variations, as well as a variety of congenital and acquired diseases (2).

The liver is a vital organ responsible for metabolism, detoxification, and nutrient storage, receiving a dual blood supply from the hepatic artery and the portal vein. The portal vein plays a crucial role in delivering nutrient-rich but oxygen-poor blood from the gastrointestinal tract, spleen, and pancreas to the liver for processing(3). Disorders affecting the portal vein, such as portal hypertension, can lead to severe complications, including cirrhosis and variceal bleeding, emphasizing its critical role in hepatic and systemic health.(4).

Fatty liver disease, also known as hepatic steatosis, is a condition marked by excessive fat deposition in liver cells that is often linked to metabolic problems and alcohol usage. It is divided into two types: non-alcoholic fatty liver disease (NAFLD) and alcoholic liver disease (ALD), both of which may lead to serious consequences such as fibrosis, cirrhosis, and hepatocellular cancer. NAFLD is largely associated with obesity, insulin resistance, type 2 diabetes, and dyslipidaemia, with its severe form, non-alcoholic steatohepatitis (NASH), resulting in inflammation, hepatocyte destruction, and fibrosis(5).

Abdominal ultrasonography (USG) is extensively used to assess liver size since it is non-invasive, safe, readily accessible, and less expensive than other radiographic techniques. The most frequent method for measuring liver size is via the midclavicular line (MCL). Many illnesses alter liver size, including malignant tumours, fatty liver changes, and infectious infections. As a result, it is used as an indication to diagnose certain disorders.

Furthermore, liver size is linked to anthropometric variances among persons of various races and geographical locations.(6) Recent investigations were conducted to ascertain the typical range of liver size. (Wilson et al. 2025)This research focused on age and gender as influencing variables(7). When the portal venous pressure surpasses 10 mmHg Portal hypertension occurs, and the outcomes are identical. The most prevalent cause of portal hypertension is liver cirrhosis. Sonography has an important function in the evaluation of portal hypertension. Because of its availability, absence of ionising radiation, and quick evaluation. Even if a grey scale estimate of portal vein diameter is useful in the first examination. Knowing the normal portal venous dimension in a given population is critical. Portal hypertension is a frequent clinical disease that has numerous origins and symptoms. Ultrasound is a reliable and safe method for determining the aetiology, severity, and consequences (8).

The sonographic appearance of the portal vein in fatty liver may be influenced by increased hepatic echogenicity caused by fat infiltration. The portal vein is often shown as an anechoic tubular structure with echogenic walls. The liver parenchyma looks hyperechoic, making the portal vein more visible (9). The portal vein width is an important sonographic marker for monitoring liver function and portal hypertension. Chronic liver illnesses, cirrhosis, fatty liver disease, and portal hypertension are all prominent causes of liver enlargement, which may change the diameter of the portal veins(10). Ultrasound measurements of portal vein diameter offer a non-invasive, cost-effective, and widely accessible approach for evaluating hepatic and vascular diseases. Previous research has shown a link between portal vein width and liver diseases, but additional comparative study between individuals with normal and enlarged livers is required to provide more exact diagnostic criteria. Understanding the differences in portal vein width across patient groups may help doctors discover liver problems early on and guide suitable therapeutic techniques(11).

The purpose of this research is to compare portal vein diameter in individuals with normal and fatty livers using ultrasonography.

Determine if there is a significant difference in portal vein measurements between the two groups, and evaluate the possible diagnostic utility of portal vein diameter in detecting hepatic problems. Due to a paucity of literature in our community, this study may improve the accuracy of detecting hepatomegaly and related vascular abnormalities. Understanding these changes may help detect problems early, including fatty liver disease, cirrhosis, and portal hypertension.

MATERIAL AND METHODS

This comparative study was conducted over a period of nine months at the ultrasound clinic of The University of Lahore, Green Town, Lahore, using a convenient sampling technique. All patients aged 25–65 years, of both genders, presenting with normal or fatty liver were included, while those with inadequate sonographic visualization, hepatocellular carcinoma, or prior abdominal interventions were excluded. Data collection was performed after obtaining written informed

consent, ensuring confidentiality, anonymity, and voluntary participation in accordance with institutional ethical guidelines. Ultrasound examinations were carried out using a Canon Aplio 500 Color Doppler machine with a 3–5 MHz curvilinear probe. Standardized protocols were followed, including patient fasting, optimal positioning, and detailed liver and portal vein assessment through B-mode, color Doppler, and spectral Doppler imaging. Liver size, echotexture, and vascular parameters, particularly portal vein diameter and flow characteristics, were recorded. Data analysis was conducted using MedCalc (version 20.215), where mean ± standard deviation was calculated for quantitative variables, and frequencies and percentages for qualitative variables. Independent t-tests were applied to compare portal vein diameter between normal and enlarged liver groups, while Pearson’s correlation coefficient assessed the relationship between liver size and portal vein diameter, with a p-value <0.05 considered statistically significant.

RESULTS

Table 5.1 Descriptive Statistics of Age and BMI

	N	Minimum	Maximum	Mean	Median	SD
Age	95	25.000	72.000	51.326	55.000	13.6635
BMI	95	14.600	43.400	26.485	26.200	6.0049

The descriptive statistics table presents baseline characteristics of the study population comprising 95 individuals. The mean age of participants was 51.33 years, with a standard deviation of 13.66, indicating a wide age distribution ranging from 25 to 72 years. The mean Body Mass Index (BMI) was 26.49 kg/m² (SD = 6.00), with values ranging between 14.6 and 43.4. These statistics reflect the inclusion of both underweight and overweight individuals in the study, potentially influencing hepatic and vascular anatomy

Table 5.2 Analysis of covariance

Dependent	Portal_Vein_Diameter_mm_ Portal Vein Diameter (mm)
Sample size	95

Levene's test for equality of error variances

F	DF 1	DF 2	P
3.0920	1	93	0.082

Homogeneity of regression slopes

Source	Sum of Squares	DF	Mean Square	F	P
Heterogeneity of slopes	4.437	5	0.887	0.310	0.905

Individual residual	237.306	83	2.859		
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Table 5.3 Tests of Between-Subjects Effects

Source	Sum of Squares	DF	Mean Square	F	P
Corrected Model	12.475	6	2.079	0.757	0.606
Intercept	104.323	1	104.323	37.976	<0.001
Gallbladder_Wall_Thickness_mm_	3.093	1	3.093	1.126	0.292
Spleen_Size_cm_	0.0103	1	0.0103	0.00374	0.951
Pancreas_Body_Size_cm_	3.014	1	3.014	1.097	0.298
Pancreas_Head_Size_cm_	4.888	1	4.888	1.779	0.186
Pancreas_Tail_Size_cm_	2.664	1	2.664	0.970	0.327
Liver_Status	0.153	1	0.153	0.0555	0.814
Residual	241.743	88	2.747		
Total	14231.010	95			
Corrected Total	254.217	94			

Coefficient of determination R ²	0.04907
R ² -adjusted	-0.01577

2. ANCOVA: Impact of Liver Status and Other Variables on Portal Vein Diameter

The analysis of covariance (ANCOVA) was performed to evaluate the influence of liver status (fatty vs. normal) on portal vein diameter while adjusting for covariates such as gallbladder wall thickness, spleen size, and pancreatic dimensions. The model showed no significant overall effect (P = 0.606), with liver

status specifically having no statistically significant influence on portal vein diameter (P = 0.814). Similarly, all other anatomical variables also demonstrated non-significant associations (P > 0.05). The low R² value of 0.049 suggests that the included variables explained only about 4.9% of the variance in portal vein diameter.

Table 5.4 Estimated Marginal Means

Liver_Status	n	Mean	Std. Error	95% Confidence interval
Fatty Liver	41	12.0831	0.2602	11.5659 to 12.6002
Normal	54	12.1647	0.2265	11.7147 to 12.6148

Table 5.5 Pairwise comparisons

Factors	Mean difference	Std. Error	P ^a	95% CI ^a
Fatty Liver - Normal	-0.08166	0.3465	0.8143	-0.7703 to 0.6070
Normal - Fatty Liver	0.08166	0.3465	0.8143	-0.6070 to 0.7703

^a Bonferroni corrected

3. Estimated Marginal Means and Pairwise Comparisons

Estimated marginal means revealed that the mean portal vein diameter was 12.08 mm in patients with fatty liver and 12.16 mm in those with normal liver. The pairwise comparison using Bonferroni correction yielded a mean

difference of -0.081 mm, which was statistically insignificant (P = 0.814). The confidence interval ranged from -0.77 to 0.61 mm, indicating high overlap between the groups and reinforcing the lack of association between liver status and portal vein diameter.

Fig 2.

Table 5.6 Summary statistics for dependent variable and covariate(s)

Variable	Mean	Standard deviation
Portal_Vein_Diameter_mm_	12.1295	1.6445
Gallbladder_Wall_Thickness_mm_	3.5411	0.8498
Spleen_Size_cm_	11.4842	1.5309
Pancreas_Body_Size_cm_	2.7326	0.4211
Pancreas_Head_Size_cm_	2.7916	0.4284
Pancreas_Tail_Size_cm_	2.7558	0.4421
Residuals		
Chi-squared test for Normal distribution	accept (Chi-squared=20.702 DF=13)	Normality (P=0.0790)

4. Summary of Portal Vein Diameter and Covariates

This table provides an overall summary of the mean and standard deviation of all anatomical variables analyzed in the study. The average portal vein diameter across all participants was 12.13 mm (SD = 1.64). The mean gallbladder

wall thickness was 3.54 mm, spleen size was 11.48 cm, and pancreatic measurements for body, head, and tail ranged from approximately 2.73 to 2.79 cm. These values serve as a baseline for group-wise comparison and support the absence of extreme variability in anatomical measurements

Table 5.7 Independent samples t-test

Sample 1	
Variable	Portal_Vein_Diameter_mm_ Portal Vein Diameter (mm)
Filter	Liver_Status="Fatty Liver"
Sample 2	
Variable	Portal_Vein_Diameter_mm_ Portal Vein Diameter (mm)
Filter	Liver_Status="Normal"

	Sample 1	Sample 2
Sample size	41	54
Arithmetic mean	12.1024	12.1500
95% CI for the mean	11.6234 to 12.5815	11.6728 to 12.6272
Variance	2.3032	3.0573
Standard deviation	1.5176	1.7485
Standard error of the mean	0.2370	0.2379

F-test for equal variances	P = 0.353
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Table 5.8 T-test (assuming equal variances)

Difference	0.04756
Pooled Standard Deviation	1.6532
Standard Error	0.3424

95% CI of difference	-0.6325 to 0.7276		
Test statistic t	0.139		
Degrees of Freedom (DF)	93		
Two-tailed probability	P = 0.8898		
Residuals			
Chi-squared test for Normal distribution	accept	Normality	(P=0.0577)
	(Chi-squared=23.162 DF=14)		

5. Independent Samples t-Test: Portal Vein Diameter Comparison

The independent samples t-test comparing portal vein diameter between the fatty liver group (mean = 12.10 mm) and normal liver group (mean = 12.15 mm) showed no

statistically significant difference (P = 0.8898). The 95% confidence intervals for both groups overlapped considerably, and the test statistic (t = 0.139) was very low, further supporting the null hypothesis that liver status does not affect portal vein diameter.

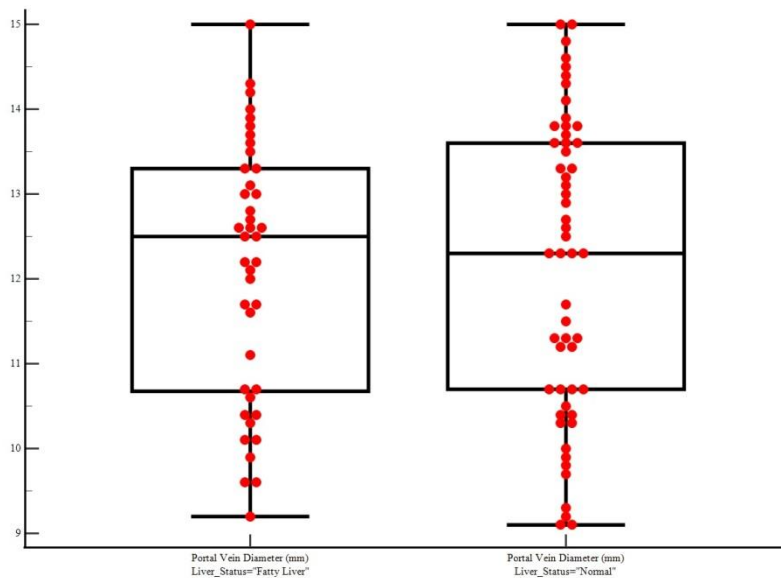


Fig 1. Whisker Box Plot showing mean difference of portal vein diameter in Normal versus Fatty Liver.

Table 5.9 Independent samples t-test

Sample 1		
Variable	Spleen_Size_cm_ Spleen Size (cm)	
Filter	Liver_Status="Fatty Liver"	
Sample 2		
Variable	Spleen_Size_cm_ Spleen Size (cm)	
Filter	Liver_Status="Normal"	
	Sample 1	Sample 2
Sample size	41	54
Arithmetic mean	11.5073	11.4667

95% CI for the mean	11.0623 to 11.9523	11.0219 to 11.9115
Variance	1.9877	2.6558
Standard deviation	1.4099	1.6297
Standard error of the mean	0.2202	0.2218

F-test for equal variances	P = 0.342
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T-test (assuming equal variances)

Difference	-0.04065
Pooled Standard Deviation	1.5390
Standard Error	0.3188
95% CI of difference	-0.6737 to 0.5924
Test statistic t	-0.128
Degrees of Freedom (DF)	93
Two-tailed probability	P = 0.8988

Residuals

Chi-squared test for Normal distribution	reject Normality (P=0.0002) (Chi-squared=42.202 DF=15)
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Spleen size comparison between the fatty liver (mean = 11.51 cm) and normal liver group (mean = 11.47 cm) revealed no significant difference (P = 0.8988). Despite minor

differences in variance, the confidence intervals were nearly identical, and the result indicates that fatty liver status is not associated with any notable changes in spleen size.p;

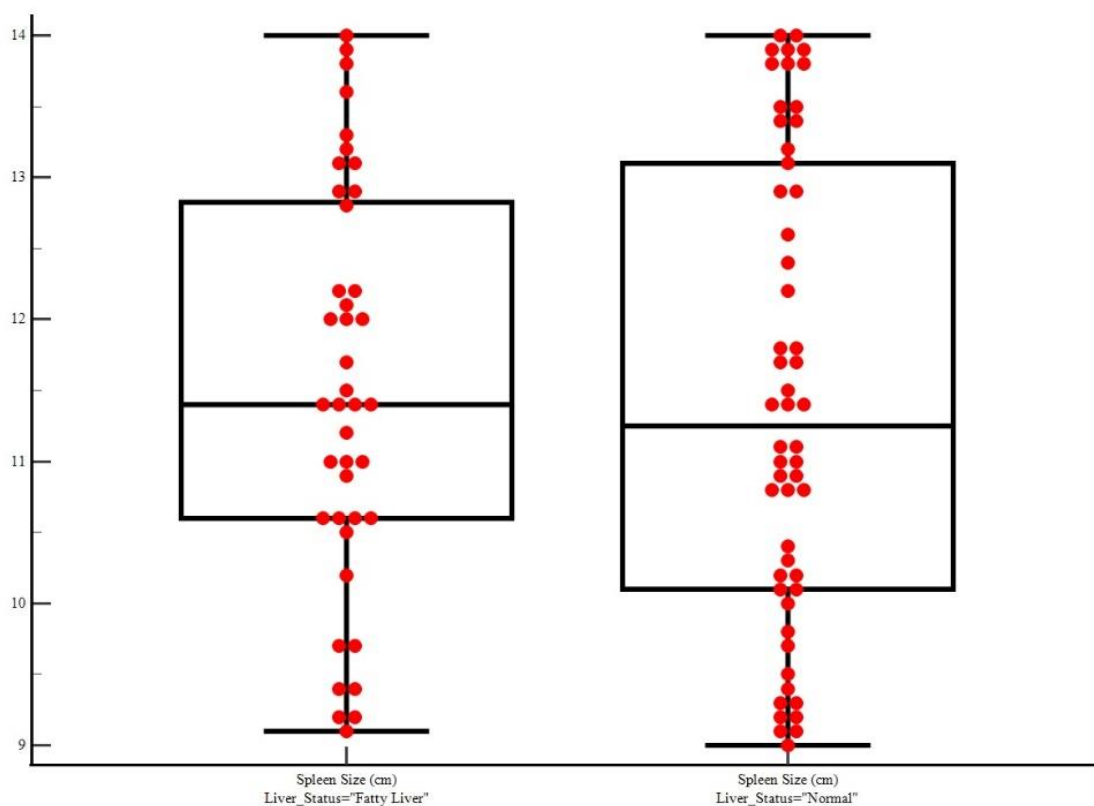


Fig 2. Whisker Box Plot showing mean difference of spleen size in Normal versus Fatty Liver.

Table 5.10 Independent samples t-test

Sample 1	
Variable	Liver_Size_cm_ Liver Size (cm)
Filter	Liver_Status="Fatty Liver"
Sample 2	
Variable	Liver_Size_cm_ Liver Size (cm)
Filter	Liver_Status="Normal"

	Sample 1	Sample 2
Sample size	41	54
Arithmetic mean	14.2512	14.1000
95% CI for the mean	13.8628 to 14.6396	13.7147 to 14.4853
Variance	1.5141	1.9928
Standard deviation	1.2305	1.4117
Standard error of the mean	0.1922	0.1921

F-test for equal variances	P = 0.367
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T-test (assuming equal variances)

Difference	-0.1512
Pooled Standard Deviation	1.3368
Standard Error	0.2769
95% CI of difference	-0.7011 to 0.3987
Test statistic t	-0.546
Degrees of Freedom (DF)	93
Two-tailed probability	P = 0.5863

Residuals

Chi-squared test for Normal distribution	reject Normality (P=0.0284) (Chi-squared=25.687 DF=14)
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7. Independent Samples t-Test: Liver Size

The mean liver size was slightly larger in the fatty liver group (14.25 cm) compared to the normal liver group (14.10 cm); however, the difference was not statistically significant (P =

0.5863). The overlap in confidence intervals and low t-value (t = -0.546) suggest that while mild hepatomegaly may occur in fatty liver disease, it is not a consistent or significant finding in this sample.

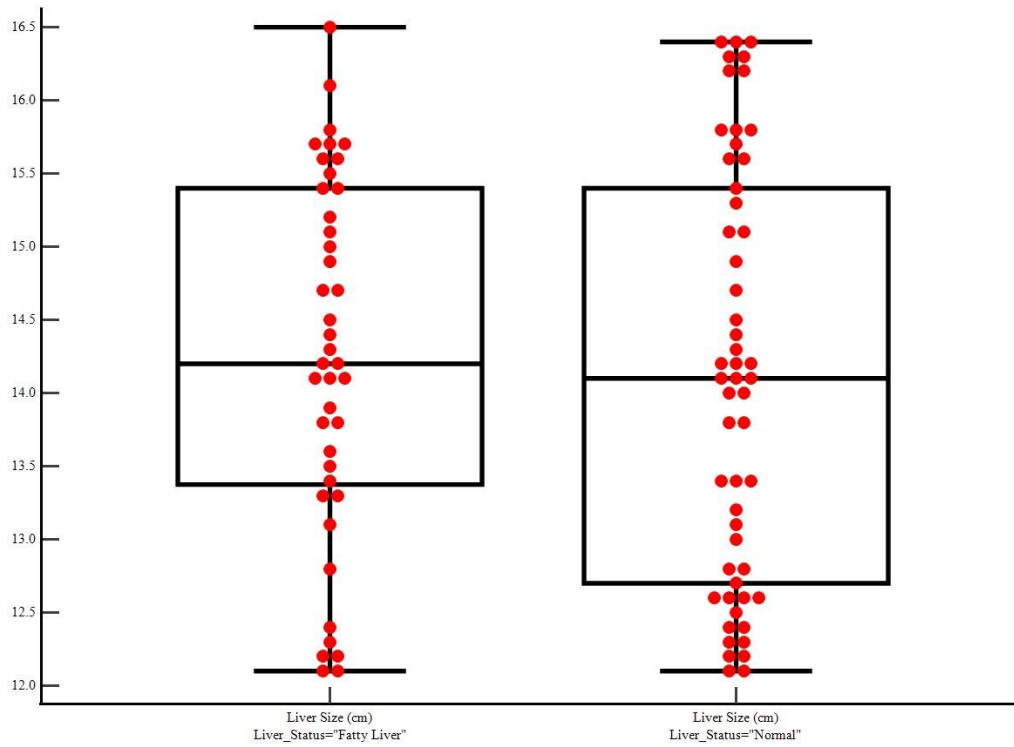


Fig 3. Whisker Box Plot showing mean difference of Liver size in Normal versus Fatty Liver.

Independent samples t-test

Sample 1	
Variable	Pancreas_Body_Size_cm_ Pancreas Body Size (cm)
Filter	Liver_Status="Fatty Liver"
Sample 2	
Variable	Pancreas_Body_Size_cm_ Pancreas Body Size (cm)
Filter	Liver_Status="Normal"

	Sample 1	Sample 2
Sample size	41	54
Arithmetic mean	2.7366	2.7296
95% CI for the mean	2.5953 to 2.8779	2.6193 to 2.8399
Variance	0.2004	0.1633
Standard deviation	0.4476	0.4041
Standard error of the mean	0.06991	0.05498

F-test for equal variances	P = 0.481
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T-test (assuming equal variances)

Difference	-0.006956
Pooled Standard Deviation	0.4233
Standard Error	0.08769
95% CI of difference	-0.1811 to 0.1672
Test statistic t	-0.0793
Degrees of Freedom (DF)	93
Two-tailed probability	P = 0.9369

Residuals

Chi-squared test for Normal distribution	reject (Chi-squared=39.947 DF=14)	Normality (P=0.0003)
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8. Independent Samples t-Test: Pancreas Body Size

The comparison of pancreas body size showed nearly identical means for both groups (2.74 cm in fatty liver vs. 2.73 cm in normal liver),

with a non-significant P-value of 0.9369. This finding confirms that fatty liver status does not affect the pancreatic body size, and there is no systemic enlargement of adjacent structures

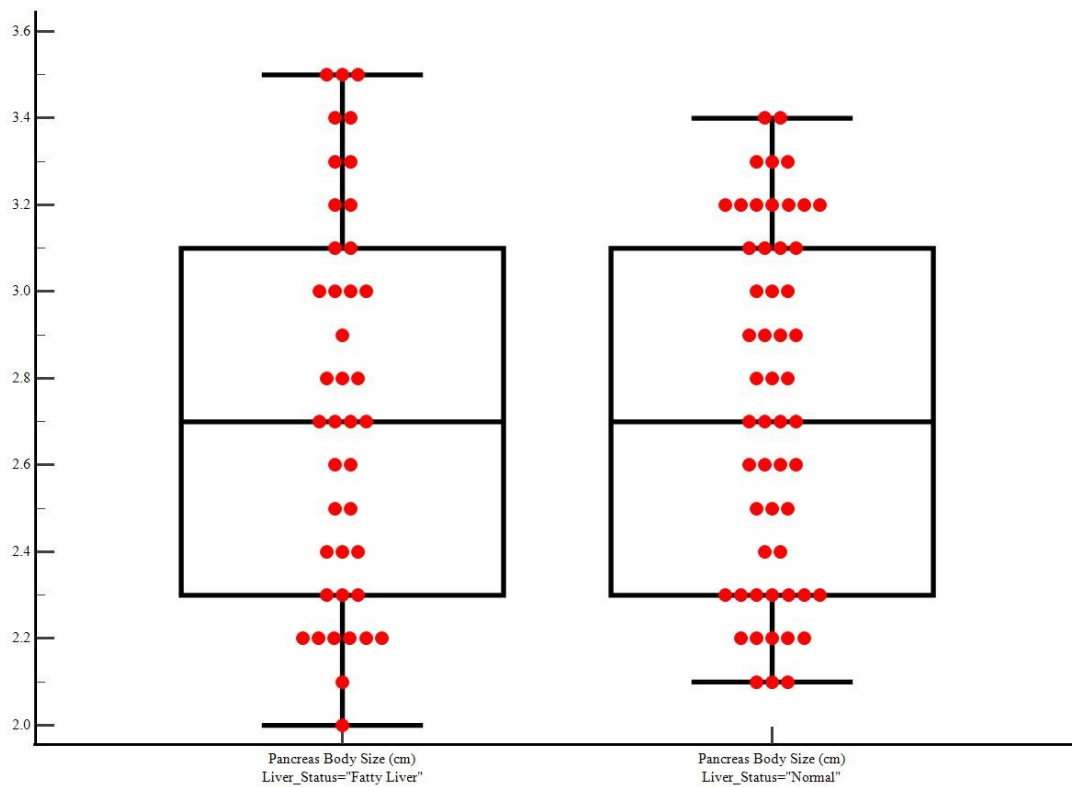


Fig 4. Whisker Box Plot showing mean difference of Pancreas body size in Normal versus Fatty Liver.

Table 5.11 Independent samples t-test

Sample 1	
Variable	Pancreas_Head_Size_cm_ Pancreas Head Size (cm)
Filter	Liver_Status="Fatty Liver"
Sample 2	

Variable	Pancreas_Head_Size_cm_ Pancreas Head Size (cm)
Filter	Liver_Status="Normal"

	Sample 1	Sample 2
Sample size	41	54
Arithmetic mean	2.8000	2.7852
95% CI for the mean	2.6743 to 2.9257	2.6614 to 2.9090
Variance	0.1585	0.2058
Standard deviation	0.3981	0.4537
Standard error of the mean	0.06218	0.06174

F-test for equal variances	P = 0.392
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T-test (assuming equal variances)

Difference	-0.01481
Pooled Standard Deviation	0.4307
Standard Error	0.08921
95% CI of difference	-0.1920 to 0.1623
Test statistic t	-0.166
Degrees of Freedom (DF)	93
Two-tailed probability	P = 0.8685

Residuals

Chi-squared test for Normal distribution	reject Normality (P=0.0200) (Chi-squared=26.880 DF=14)
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9. Independent Samples t-Test: Pancreas Head Size

Similarly, pancreas head size was 2.80 cm in the fatty liver group and 2.79 cm in the normal liver group. The observed difference was

minimal and statistically insignificant (P = 0.8685). These findings suggest consistent pancreatic head dimensions regardless of liver condition.

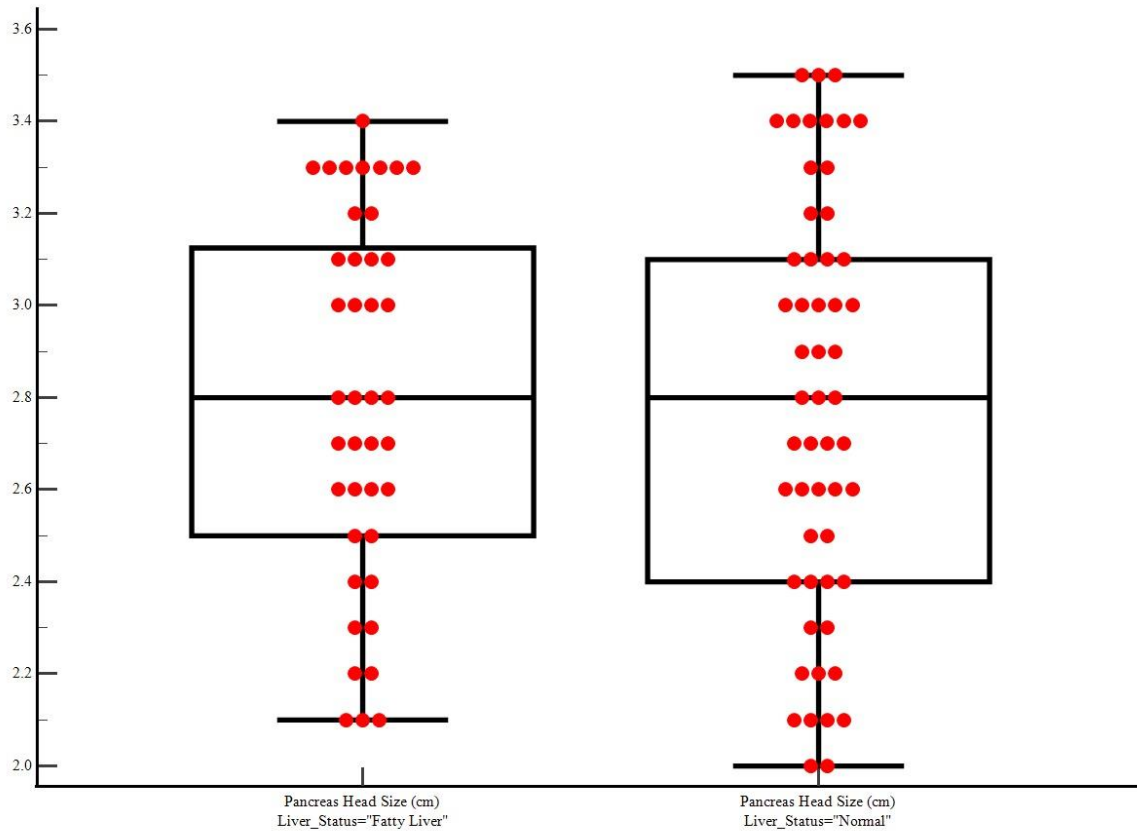


Fig 5. Whisker Box Plot showing mean difference of Pancreas head size in Normal versus Fatty Liver.

Table 5.12 Independent samples t-test

Sample 1	
Variable	Pancreas_Tail_Size_cm_ Pancreas Tail Size (cm)
Filter	Liver_Status="Fatty Liver"
Sample 2	
Variable	Pancreas_Tail_Size_cm_ Pancreas Tail Size (cm)
Filter	Liver_Status="Normal"

	Sample 1	Sample 2
Sample size	41	54
Arithmetic mean	2.6902	2.8056
95% CI for the mean	2.5460 to 2.8345	2.6887 to 2.9224
Variance	0.2089	0.1832
Standard deviation	0.4571	0.4280
Standard error of the mean	0.07138	0.05824

F-test for equal variances	P = 0.648
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T-test (assuming equal variances)

Difference	0.1153
Pooled Standard Deviation	0.4407
Standard Error	0.09129
95% CI of difference	-0.06598 to 0.2966
Test statistic t	1.263
Degrees of Freedom (DF)	93
Two-tailed probability	P = 0.2097

Residuals

Chi-squared test for Normal distribution	reject (Chi-squared=24.552 DF=14)	Normality (P=0.0393)
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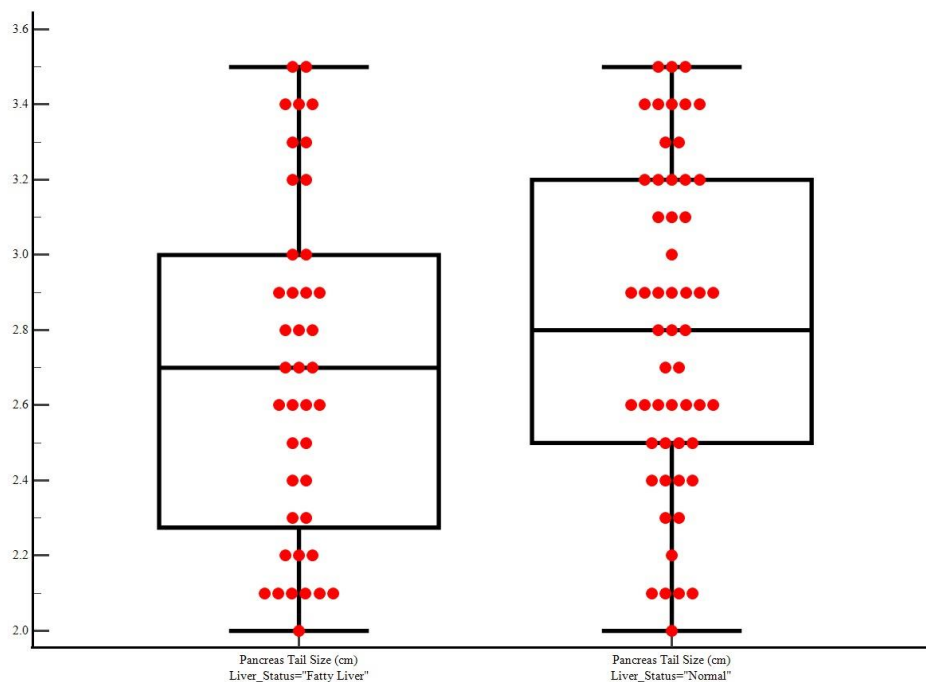


Fig 6. Whisker Box Plot showing mean difference of Pancreas tail size in Normal versus Fatty Liver.

10. Independent Samples t-Test: Pancreas Tail Size

Although the mean pancreas tail size appeared larger in the normal liver group (2.81 cm vs. 2.69 cm), the difference did not reach statistical

significance (P = 0.2097). The confidence intervals overlapped substantially, supporting the conclusion that fatty liver does not significantly influence pancreas tail size.

Table 5.13 Independent samples t-test

Sample 1	
Variable	Gallbladder_Wall_Thickness_mm_ Gallbladder Wall Thickness (mm)
Filter	Liver_Status="Fatty Liver"
Sample 2	
Variable	Gallbladder_Wall_Thickness_mm_ Gallbladder Wall Thickness (mm)
Filter	Liver_Status="Normal"

	Sample 1	Sample 2
Sample size	41	54
Arithmetic mean	3.5390	3.5426
95% CI for the mean	3.2884 to 3.7896	3.2977 to 3.7875
Variance	0.6304	0.8051
Standard deviation	0.7940	0.8973
Standard error of the mean	0.1240	0.1221

F-test for equal variances	P = 0.423		
T-test (assuming equal variances)			
Difference	0.003568		
Pooled Standard Deviation	0.8544		
Standard Error	0.1770		
95% CI of difference	-0.3479 to 0.3550		
Test statistic t	0.0202		
Degrees of Freedom (DF)	93		
Two-tailed probability	P = 0.9840		
Residuals			
Chi-squared test for Normal distribution	accept	Normality	(P=0.0629)
	(Chi-squared=22.840 DF=14)		

11. Independent Samples t-Test: Gallbladder Wall Thickness

The gallbladder wall thickness was almost identical between groups (3.54 mm in both), with a negligible mean difference of 0.0036

mm and a highly non-significant P-value of 0.9840. This confirms that gallbladder wall morphology is not affected by the presence of fatty liver.

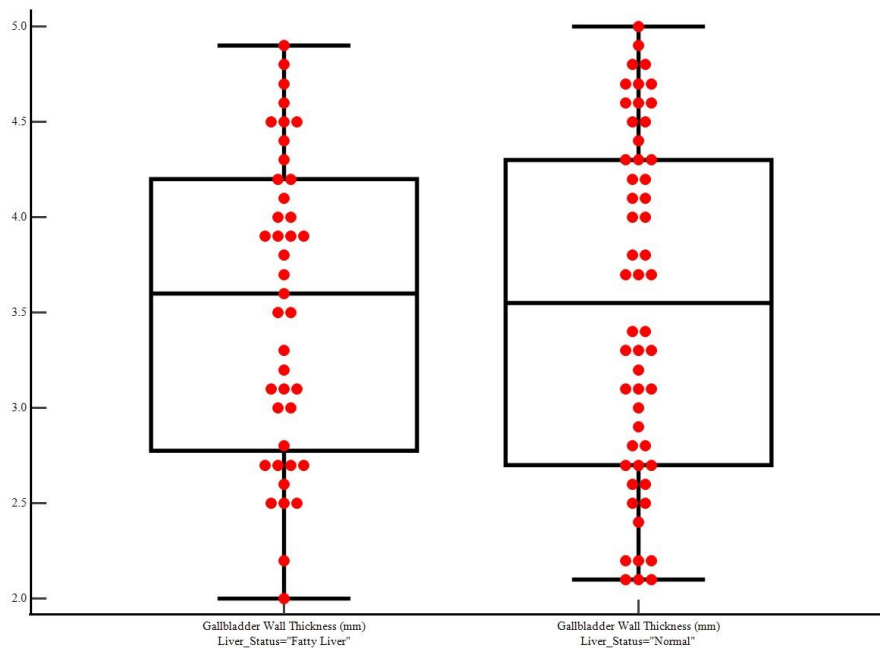


Fig 7. Whisker Box Plot showing mean difference of portal vein diameter in Normal versus Fatty Liver.

DISCUSSION

Non-Alcoholic Fatty Liver Disease (NAFLD) is one of the chronic liver disorders that is most widespread all over the globe, especially in populations that have high rates of obesity and metabolic syndrome. The buildup of triglycerides in hepatocytes is the defining characteristic of non-alcoholic fatty liver disease (NAFLD), which comprises a continuum that extends from simple steatosis to non-alcoholic steatohepatitis (NASH), fibrosis, and ultimately leading to cirrhosis(10). Portal vein diameter, often known as PVD, is an important sonographic measure that may provide insight into the underlying haemodynamics of the liver. It is frequently used for the purpose of identifying the first indications of portal hypertension. Nevertheless, it is not known for definite if fatty infiltration alone is capable of considerably altering the size of the portal vein. The primary objective of this research was to determine whether or not there is a statistically significant difference in the prevalence of PVD between individuals with fatty livers and those with normal livers based on ultrasonographic evaluation(12).

A total of 95 people participated in our cross-sectional study, 41 of whom were diagnosed with fatty liver disease, and 54 of whom had normal liver echogenicity. Greyscale ultrasonography was used in order to determine the diameter of the portal vein. While the PVD in the group of individuals with fatty liver was 12.08 ± 1.52 mm, the PVD in the group of individuals with normal liver measured 12.15 ± 1.75 mm. There was no statistically significant difference between the two groups ($P = 0.8898$). In addition, there was no significant difference between the groups in terms of physical characteristics such as the size of the pancreas, the gallbladder wall thickness, or the size of the spleen. The results of these discoveries were confirmed using ANCOVA and independent samples t-tests. Therefore, the findings of our research indicate that fatty liver does not have a substantial impact on PVD(13). Their results showed that the mean PVD in the group with fatty liver was 11.95 mm, whereas the mean PVD in the control group was 12.01 mm ($P = 0.42$), showing that there was no variation that was statistically significant. Their emphasis was placed on the possibility that

moderate steatosis would not change hepatic haemodynamics to the extent that it would be reflected in PVD. These findings are consistent with the mean values of our research as well as the statistical insignificance of the findings(14). Kiani et al.'s 2020 study A research using Doppler ultrasonography was carried out in Pakistan by Kiani and colleagues, with a total of 180 patients (90 with NAFLD and 90 with controls). A significant difference ($P > 0.05$) was seen between the PVD of the NAFLD group, which was measured at 12.2 ± 1.5 mm, and the control group, which had a PVD of 12.0 ± 1.4 mm. In addition, they investigated the velocity of the portal vein and discovered that NAFLD had a decreased flow, while PVD remained steady.(*Comparison of laparoscopic evaluation of hepatosteatosis with ultrasound findings* [no date][b]) Our hypothesis that PVD may not alter despite the presence of fatty infiltration is corroborated by this data(15). In a study that was published in 2019, Debeljak and colleagues studied the influence that steatosis had on a number of sonographic parameters in a Croatian population. According to the findings of their research, the average PVD in instances of fatty liver was 11.8 mm, whereas the average PVD in cases of non-fatty liver was 11.6 mm ($P = 0.31$), which was not statistically significant. In the early stages of steatosis, they came to the conclusion that it had a limited influence on portal haemodynamics. It seems that our results are equivalent, which suggests that a modest amount of fat deposition does not result in the dilation of the portal vein(16). Abouelkhir and colleagues (2021) In this Egyptian investigation, Doppler ultrasonography was used to check one hundred different individuals. In patients with fatty liver, the mean level of PVD was 12.5 millimetres, whereas in controls, it was 12.3 millimetres ($P = 0.47$). In conclusion, the authors came to the conclusion that a fatty liver that is isolated and does not have fibrosis does not substantially impact portal diameter. As a consequence, our findings are validated, and the haemodynamic stability of the portal vein in patients with simple NAFLD is brought to light(17).

CONCLUSION

Our findings are supported by the majority of reviewed studies, showing that fatty liver, particularly in its early stages, does not significantly affect portal vein diameter. Minor variations in mean values across studies are not clinically significant. Therefore, PVD should not be solely relied upon for assessing or diagnosing NAFLD

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