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CORRELATION OF SHEAR WAVE ELASTOGRAPHY VALUES WITH SONOGRAPHIC GRADES OF FATTY LIVER DISEASE

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Abstract

Background: The Non-alcoholic fatty liver disease (NAFLD) is the gathering of fat in the liver without any unnecessary liquor utilization or other known liver pathologies .1 Non-alcoholic fatty liver disease is more normal in the western world, with a commonness of 19-46% in the overall US population.

Objective: To evaluate and correlate shear wave Elastography values with Sonographic grades of fatty liver disease

Material and Methods: In this research, an Analytical-cross sectional approach was adopted at PKLI, Lahore for four months. A total of 125 patients were included in this study. Data was collected by using Questionnaire/Performa. A non-convenient sampling technique was used in this study. Data was evaluated and analyzed with statistical package for social sciences (SPSS) v-25 and Microsoft excel.

***Results:** A total of 125 patients were recruited in this study. Out of which 52(41.6%) were male and 73(58.4%) were female patients with mean age of 44.25 ± 13.245. In this study, the most common grade after on gray scale USG was Grade 1 (36%), followed by Grade 2 in (28%), Grade 0 in (25.6%) patients and least common was grade 3 in (10%) patients. On assessment of these 125 patients by shear wave Elastography, the mean subcutaneous liver thickness was found to be 0.86 ± 0.928 cap. By shear wave Elastography the most common grade found was Grade 0 in 41.6% patients followed by Grade 1 in 39.2%, Grade 2 in 10.4% and Grade 3 in only 8.8%. There was a significant correlation with correlation coefficient of 0.63 (p value <0.01), between gray scale sonographic grades of fatty liver and tissue thickness on shear wave Elastography.*

***Conclusion:** This study concluded that study population (mean age: 44.25 ± 13.245) shows increased frequency (58.4%) of female patients. Also, Grade 1*

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was the most common Grade on grey scale sonographic assessment and Grade 0 was the commonest on shear wave elastogrphic assessment. There was also a significant correlation was found between gray scale sonographic grades of fatty liver and tissue thickness on shear wave Elastography with correlation coefficient of 0.63 (p value <0.01)

INTRODUCTION

The gathering of fat in liver without any required consumption of alcohol is generally known as fatty liver disease or pathologies of liver [1.] Non-alcoholic fatty liver disease is more normal in the western world, with a commonness of 19-46% in the overall US population [2.] People with fatty liver diseases have side effects remember completion and greatness for the midsection, more in the right upper corner, weight reduction, sickness, regurgitating, loss of hunger, ascites, jaundice, and dull variety urine [3.] and the causes are being overweight and stout in the stomach part, high cholesterol level, diabetes, hypertension, corpulence, dyslipidemia, and furthermore cause irritation in the body which makes insulin obstruction and pre-diabetes and influences the body to store fat in the liver as well as generally around the organs as well as in the belly [4.]

With the variable levels of alchoholless steatohepatitis and fibrosis the scope of the problems usually going through steatosis to lobular (NASH). With the severe medical consequences the NAFLD can be summoned of carcinoma of hepatocellular as well as cirrhosis. The historical stage indicates the supposition of NAFLD. The continuous steatosis harmless sluggish movement has a superior forecast while NASH has unfortunate visualization as a result in the last stage of the disease in liver. Consequently, the determination of NAFLD with the patients usually depends on fibrosis at the very early stage of their conceivability. Even though, the biopsy of liver normally consider as a best quality level for indicative level for NAFLD, however an obtrusive strategy biopsy conveys its own restrictions [7.] Additionally, favored first line of examination among practitioners for creating the conclusion of the disease due to fatty liver. Moreover, keeps on being harmless techniques, for example, markers of serum, ultrasonography, the most important modality of pictures, and SWE.

Dark Scale Sonography (USG), help ism emotional and subjective appraisal in the assessment of a greasy liver [9.] It is protected, sans radiation, effectively accessible, economical and cost-effective and can decide the greasy penetration of liver in view of expanded echogenicity of the liver parenchyma [10.] And just allows us not completely an assessment related to quantitative stages of steatosis and lacuna. Sonographically, greasy liver has been reviewed into three classes in view of echogenicity changes with Grade 1 comprising where the hepatic echogenicity is somewhat expanded than ordinary, Grade 2 in which the echogenic walls of the entrance vein branches are not apparent because of expanded liver echogenicity and Grade 3 where the profoundly echogenic liver parenchyma clouds the blueprints of diaphragm [12.]2 d shear wave elastography in gentle fibrosis mean 7.07 kpa, for moderate fibrosis 8.22 kpa, and for extreme fibrosis 18.16 kpa. It has huge worth with moderate and extreme grade of ultrasonography esteem. The ideal typical end up sides of 2d SWE for diagnosing liver fibrosis stage 0,1,2= 7.15 kpa, for fibrosis stage 2-3 =9.15 kpa , and for fibrosis stage 3-4 =11 kpa or more [13.]The fresher elastographic strategy considers objective evaluation of tissue parenchyma in view of an actual boundary that actions tissue versatility or solidness in kilopascal (kPa). It gives circuitous data about obsessive modifications like irritation and fibrosis.12The last option enjoys benefit of being quantitative with advantage that it doesn't need separate hardware and can be joined with a traditional US, in this way saving time and cost.13It is administrator free, reproducible, conveys high spatial goal, and can play out a quantitative assessment of flexibility in kPa without manual pressure artefacts [14.] The point of this review is to survey the liver solidness in patients with greasy liver illness utilizes shear wave elastography and to connect these liver firmness values with dim scale sonographic grades of greasy liver, to decide whether elastography can go about as a dependable painless

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device to grade Non-alcoholic greasy liver sicknesses NAFLD [15].

In the mid-2000s, the Dionysos Study detailed the primary information on the commonness and occurrence of FL in everybody. In the Dionysos Nutrition and Liver Study, the residents of Campogalliano (Modena, Emilia-Romagna, Italy) with thought liver illness were coordinated with arbitrarily picked residents without thought liver sickness to acquire evaluations of the commonness of and the gamble factors for NAFLD and AFLD in everyone. Numerous epidemiological examinations on FL have been distributed since the Dionysos Nutrition and Liver Study discoveries were made accessible. The overall pervasiveness of NAFLD was assessed to be 0.25 (95%CI 0.22 to 0.28) by a new meta-examination of 45 investigations. Eleven of these 45 examinations were acted in Europe and yielded a gauge of 0.24 (0.16 to 0.33) for the commonness of NAFLD. Five of these 11 examinations utilized imaging strategies to analyze FL and were acted in everybody with one of them being a settled case-control study.

The supposed "biology of clinical consideration" model gives serious areas of strength for a to expect that the evaluations of disease made in everybody will vary from those got in different settings and this has without a doubt been over and over displayed practically speaking. The unpreventable end is that the genuine weight owing to a given infection can't be assessed without epidemiological information got from everybody. There is likewise mounting proof that inside a given level of the nature of clinical consideration ,the people really examined are much of the time not delegate of the people making up that level, for example the patients signed up for preliminaries of NAFLD drugs are not agent of those treated in ordinary practice [16].

OBJECTIVE

To evaluate and correlate shear wave elastography values with Sonographic grades of fatty liver disease.

MATERIAL AND METHODS

4.1. Study Design: Analytical, cross sectional study design.

4.2. Study Settings: The study was carried out at Pakistan Kidney and Liver Institute, Lahore.

4.3. Duration of Study: The duration of this study was 4 months after approval of synopsis

4.4. Sample Size: Sample size is calculated at 95% of significance and 5% marginal of error.

The sample size Formula is

$n = Z^2 p (1-p)/d^2$

$P = 0.09$

$D = 5\% = 0.05$

$Z = 95\% - 1.96$

$n = (1.96)^2 0.09 (1-0.09)/0.05^2$

Sample size (n) $= 125^2$

4.5. Sample Technique: Non-Convenient sampling Technique

4.6. Inclusion Criteria:

- Age<18 years
- Documented history of chronic hepatopathies

4.7. Exclusion Criteria:

- Ascites
- Patents with signs of biliary obstruction
- Patients with liver congestion secondary to heart failure.
- Patients with focal liver lesion.

4.8. Equipment: The non coloured imaging produces with the help of transducer having frequency of 3 to 5 MHz on iU22 scanner.

4.9. Scanning Technique:

With the high Level of motion, the vein in the right of the patient's liver was examined at the left posture side of the right-hand of patient. With a very low level of pressure the scan was performed by the practitioners but with the condition of holding the breathing of the patient for some moments, so that the motion of breathing was avoided. The only condition was that the above procedure was conducted by the same practitioner.

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DATA COLLECTION PROCEDURE

The data collection procedure involved selecting patients who provided written informed consent and met the inclusion criteria of the study. Data was collected systematically based on a structured questionnaire, which included patient history such as the presence of diabetes, hepatocellular carcinoma, insulin resistance, and metabolic syndrome. Ultrasound findings were also recorded, focusing on features like increased echogenicity of the liver parenchyma, poor or non-visualization of the diaphragm, and the presence of ascites (fluid collection). Each patient's data was initially recorded individually, then compiled into a set of 10 patient sheets and entered into an Excel spreadsheet. This data was carefully verified by the supervisor and co-supervisor, ensuring accuracy and confidentiality throughout the process.

DATA ANALYSIS PROCEDURE:

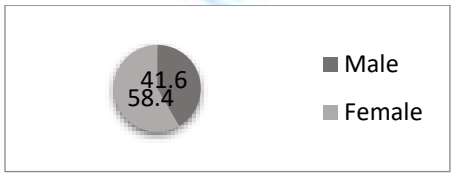
The micro soft excel 2016 and the SPSS 24.0 have been used for the evaluation of data. A descriptive analysis has been performed to investigate the distribution of data. Mean and standard deviation (SD) has been calculated for continuous variables. Frequency and percentage were calculated for categorical variables. Collected data has been stored in Microsoft office.

RESULTS

This cross-sectional study has been conducted during the period of 4 months after the approval of synopsis in the Pakistan kidney and liver institute, Lahore. Out of 125 patients (mean age: 44.25 ± 13.245) with documented history of chronic hepatopathies 52(41.6%) were males and remaining more than half 73(58.4%) patients were females presenting increased population of female gender with hepatopathies.

Table 5.1: Frequency of gender of study subjects

Gender	Frequency	Percent (%)
Male	52	41.6
Female	73	58.4
Total	125	100.0



Graph 5.1: Gender of study subjects

Many sign and symptoms of hepatopathies are presented by patients like mostly patients 99(79.2%) shows the history of hypertension. The history of diabetes was seen in 81 (64.8%) of patients, remaining 44(35.2%) were not diabetic patients. Frequency of obesity in study population was (72%). Almost 103(82.4%) shows the history of dyslipidemia in our study subjects. Presence of weight loss in these patients was also seen in 59(47.2%).

Table 5.2: Frequency of presence of hypertension

Presence of hypertension	Frequency	Percent (%)
No	26	20.8
Yes	99	79.2
Total	125	100.0

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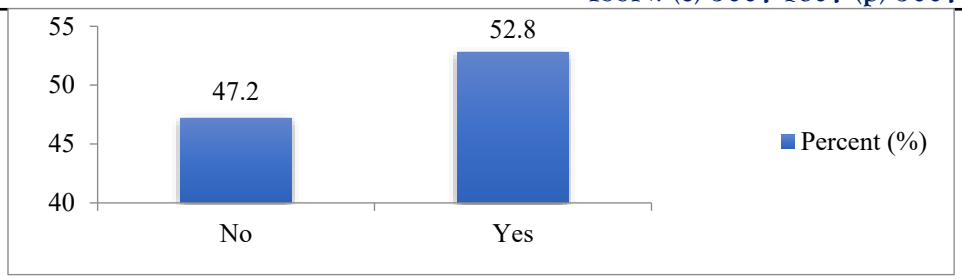
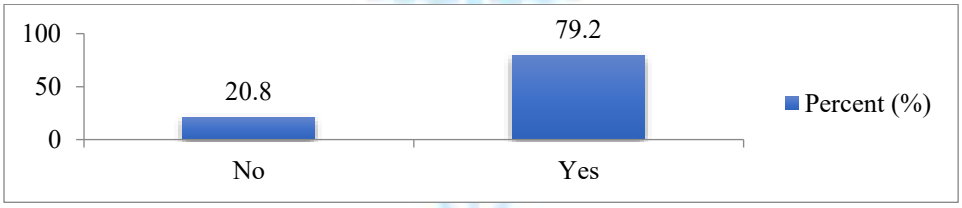


Graph 5.9: presence f parenchymal thickness

In this study, the most common grade after on gray scale USG was Grade 1 (36%), followed by Grade 2 in (28%), Grade 0 in (25.6%) patients and least common was grade 3 in (10%) patients.

Table 5.10: Frequency of sonographic grade in patients

Sonographic grade	Frequency	Percent (%)
Grade 0	32	25.6
Grade 1	45	36.0
Grade 2	35	28.0
Grade 3	13	10.4
Total	125	100.0



Graph 5.2: Presence of hypertension

Table 5.3: Frequency of Diabetic patients

Diabetes	Frequency	Percent (%)
No	44	35.2
Yes	81	64.8
Total	125	100.0

DISCUSSION

NAFLD, is a common disorder of metabolic syndrome which is present in tody world. This cause a an early parenchymal tissue damage due to increasing stages of liver disorders like infection, inflammation and fibrosis that cause an increased liver tissue stiffness. The role of USG has been increased now days for grading of fatty liver due of increase its echo texture but this technique has low sensitivity and specificity. As it's known that stiffness caused by fibrosis so shear wave elastography helps a lot in its better diagnosis. Our cross sectional analytic study shows a correlation between grey scale sonography and shear wave elastography. This study diagnose and quantity the fatty liver in patients (mean age: 44.25 ± 13.245) with hepatopathy. In this study the inelasticity of liver was discovered to be 0.86 ± 0.928 kpa this is consistent with other studies. On SWE the most common Grade found was Grade 0 however, on grey scale sonography the most common Grade was grade 1. Our study also shows an increase ratio of female patients. The previous history of signs and symptoms of liver disorders shows (79.2%) patients with hypertension, (64.8%) diabetes, (82.4%) with dyslipidaemia and (47.2%) with weightless. There has been a huge relationship

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between high APRI and high Aspartate Aminotransferase/Alanine Aminotransferase (AST/ALT) proportion (p=0.04). There has been likewise a profoundly huge relationship between elastography fibrosis score and APRI fibrosis score among NAFLD patients (p<0.001). The results of this study showed that the pSWE is a significant harmless indicative procedure for anticipating liver fibrosis among NAFLD patients and there is huge connection among's APRI and pSWE scores[17].

CONCLUSION

This study concluded that there has been our study population (mean age: 44.25 ± 13.245) shows increased frequency (58.4%) of female patients. Also, Grade 1 was the most common Grade n grey scale sonographic assessment and Grade 0 was the commonest on shear wave elastogrphic assessment. There was also a significant correlation was found between gray scale sonographic grades of fatty liver and tissue thickness on shear wave elastography with correlation value of 0.63 (p value <0.01).

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