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Grading of Fatty Liver Disease in Non-Obese Elderly Patients On Ultrasound

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Abstract

Background and Introduction: Non-alcoholic fatty liver disease (NAFLD) has been demonstrated that insulin resistance and metabolic syndrome are associated with non-alcoholic fatty liver disease (NAFLD), a prevalent condition in the general population. The elderly population has higher rates of certain metabolic syndrome components. The current study set out to ascertain the clinical manifestation of non-alcoholic fatty liver disease (NAFLD) in the elderly, as well as its relationship to underlying metabolic abnormalities. Objective: The objective of our study is to find out the grading of fatty liver disease in non-obese elderly patients on ultrasound.

Materials and Method: A total of 50 cooperative responding patients were included and the study was carried out in AL-Jannat Raza Clinic Jalalpur.

Results: The study of Grading of fatty liver in non-obese patient is held on Al- Jannat Raza clinic, Jalal purpirwala for duration of about 3 months which describes the grading of fatty liver and the age factor with their lifestyle is correlated as middle aged the metabolic condition often manifest or worsen during this stage of life.

Fatty liver grades distribution among 50 participants. Grade 1 fatty liver was observed in 30% of participants, Grade 2 in 44% , and Grade 3 in 26%.On ultrasound, there is mild increase in echogenicity of liver on grade 1 fatty liver There is moderate increase in echogenicity of liver with obscured vessels in grade 2 and Severe increase in echogenicity with poor diaphragm in grade 3.

Conclusion: Our study concludes that fatty livers in nonalcoholic non obese patients are associated with insulin resistant and metabolic problems. The age distribution of 50 participants aged between 50 and 60 years. It shows the frequency, percentage, valid percentage, and cumulative percentage for each specific age. The most common ages were 53 and 54 years in the sample. All data are valid with no missing value. The gender distribution of the 50 participants. Among them,19 was male and 31 were female. The distribution of fatty liver grades among 50 participants. Grade 1 fatty liver was observed in 15 of participants, Grade 2 in 22, and Grade 3 in 13. Grade 2 fatty liver was common, observed in 22 participants.

Keywords: NAFLD, FLD, non obese, steatosis severity, ultrasound, elder patients, grading, liver echogenicity.

Introduction

Percentages of triglycerides in hepatocytes that are more than 5% of the organ weight are diagnosed as nonalcoholic fatty liver disease (NAFLD). NAFLD is a growing sclerosis of the liver that begins as simple steatohepatitis and culminates in NAFH, cirrhosis, and hepatocellular cancer. Aimless lobular inflammation, hepatocellular ballooning, and macro vesicular steatosis are the hallmarks of NASH histologically [ref: Paya et al., J Hepatol 28: 386–399, 1998].

Non alcoholic fatty liver diseases is the common cause of chronic hepatic disease in the western population[3]. However, it is currently burgeoning in most countries in the Asia-Pacific area, particularly due to changes in lipids intake, sedentary life and a shifting tide towards DM-2[4].

NAFLD has three subcategories the first one being grade one, the second one being grade two, and the last one being grade three. On the ultrasound, the liver is increased in echogenicity, periportal and diaphragmatic echogenicity can be observed in grade I liver steatosis which is also known as simple steatosis. In HO, this may be accompanied by lobule inflammation with steatosis and liver cell ballooning so that the nature of the liver echo pattern changes in the grade II, then progresses to grade III. Grade III ultrasonography features are increased hepatic echogenicity, impossible to see the periportal echogenicity and diaphragm obstruction (lobule inflammation with steatosis, liver cell ballooning and Mallory hyaline fibrosis[5].

Fibrotic non-alcoholic steatohepatitis; Perisinusoidal/pericellular fibrosis is the hallmark form of fibrosis in NASH, and it usually starts in zone 3. In NAFLD, fibrosis usually involves an aggressive necro inflammatory response. Liver cirrhosis and portal/periportal and bridging fibrosis may appear as NASH worsens. Furthermore, a number of observational studies have demonstrated that in individuals with nonalcoholic fatty liver disease (NAFLD), biopsy-confirmed liver fibrosis is a significant predictor of both liver-related and overall mortality[12].

Cirrhosis is associated with NASH; Steatosis and necro inflammatory reactions may go away in severe cirrhosis or fibrosis; this is called burn-out NASH. Cryptogenic cirrhosis, of which NAFLD/NASH is thought to be the primary cause, may be detected in patients with this presentation[13].

Males were more likely than females to have it (40% vs. 26%, $P<0.0001$). NAFLD prevalence rose from 26% in studies conducted in 2005 or earlier to 38% in research conducted in 2016 or later. The presence of NASH necessitates a liver biopsy to determine the presence and location of its features, including inflammation as hepatocyte ballooning, Mallory-Denk bodies, and early fibrosis, even though NAFLD can be diagnosed by imaging tests like ultrasound, computed tomography (CT), or magnetic resonance imaging (MRI)[14].

They discovered that non-alcoholic fatty liver disease was more common than previously thought when ultrasound was used to examine asymptomatic members of the general population who did not have severe alcohol usage or liver disease. Liver biopsies were performed on all patients with ultrasonography results that suggested fatty liver in order to confirm the diagnosis. They discovered that NASH and NAFLD were prevalent in 12.2% and 46% of the population, respectively, using ultrasound as a screening method[19].

Ultrasound is more accessible, affordable, and has similar sensitivity to other non-invasive imaging methods when it comes to screening for moderate to severe forms of NAFLD. When sonographic characteristics specific to NAFLD are standardized and utilized to support diagnosis, high diagnostic accuracy can be attained by the ultrasound. Vascular blurring of the portal or hepatic vein, elevated hepatorenal echogenicity, and bright hepatic echoes have all been identified as distinctive sonographic characteristics of nonalcoholic fatty liver disease. To assess the accuracy of ultrasonography in detecting hepatic steatosis, a prospective trial used real-time ultrasound followed by a liver biopsy. These sonographic characteristics had a sensitivity of over

90% in predicting the presence of NAFLD when steatosis was more than 20% on biopsy. Sensitivity decreased with decreasing fat content[20].

The foundation of managing non-alcoholic fatty liver disease (NAFLD) is the evaluation and control of blood pressure, cholesterol, weight, smoking status, and diabetes. Although it can be integrated into a multidisciplinary specialist clinic approach, this will primarily be done in primary care. Diet and exercise: Research shows that losing weight not only lowers the amount of fat in the liver, but that even a 5% weight loss will resolve NASH histologically, and that nearly half of patients who lose 10% of their body weight will have a regression in their fibrosis[21].

The aim of this study was to determine the grade and prevalence of nonalcoholic fatty liver (NAFL) in outpatients who were referred for abdominal ultrasonography (US) examinations, as well as the association between metabolic syndrome (MS) and the presence and severity of liver steatosis. The purpose of this study is to use ultrasound as a diagnostic tool to examine the detection and classification of fatty liver disease (FLD) in older, non-obese patients. Although obesity is frequently linked to fatty liver disease, little is known about how often it occurs in older people who are not obese. By evaluating the prevalence of FLD in this population and analyzing ultrasound results to determine its severity—which ranges from mild to severe—this study aims to close that gap.

3.4. Research Methodology

This three-month cross-sectional study was conducted at AL-Jannat Raza Clinic, Jalalpur, Pakistan, following synopsis approval. The study aimed to assess fatty liver disease in non-obese elderly patients using ultrasound. While the originally calculated sample size was 255 (based on a prevalence estimate and adjusted for grading analysis), time constraints led to a reduced sample of 50 patients. Participants were aged over 50, male or female, with a BMI below 25. Exclusion criteria included obesity (BMI >30), hepatitis B or C, portal hypertension, and prior liver surgery. Ultrasound imaging was performed using a LOGIQ P5 machine with a 3–5 MHz curvilinear probe. Scanning involved both longitudinal and transverse abdominal views to evaluate liver echotexture, comparing hepatic echogenicity with the renal cortex and examining the diaphragm and intrahepatic vessels. Fatty liver grading was based on echogenicity: Grade 0 (normal), Grade 1 (mild), Grade 2 (moderate), and Grade 3 (severe). Data on demographics and clinical risk factors were collected and recorded by experienced radiologists.

The data were analyzed using SPSS, with means and standard deviations calculated for quantitative variables and frequencies and percentages for qualitative data. Bar charts were used for visualization. Ethical standards were strictly maintained, including informed consent, anonymity, confidentiality, and the right of participants to withdraw at any stage without penalty. The study ensured participants' privacy and emphasized voluntary participation.

Results

The study of Grading of fatty liver in non-obese patient is held on Al- jannat Raza clinic, Jalal purpirwala for duration of about 3 months which describes the grading of fatty liver and the age factor with their lifestyle is correlated as middle aged the metabolic condition often manifest or worsen during this stage of life.

Fatty liver grades distribution among 50 participants. Grade 1 fatty liver was observed in 30% of participants, Grade 2 in 44% , and Grade 3 in 26% .

On ultrasound, there is mild increase in echogenicity of liver on grade 1 fatty liver There is moderate increase in echogenicity of liver with obscured vessels in grade 2 and Severe increase in echogenicity with poor diaphgram in grade 3.

4.2. Tables

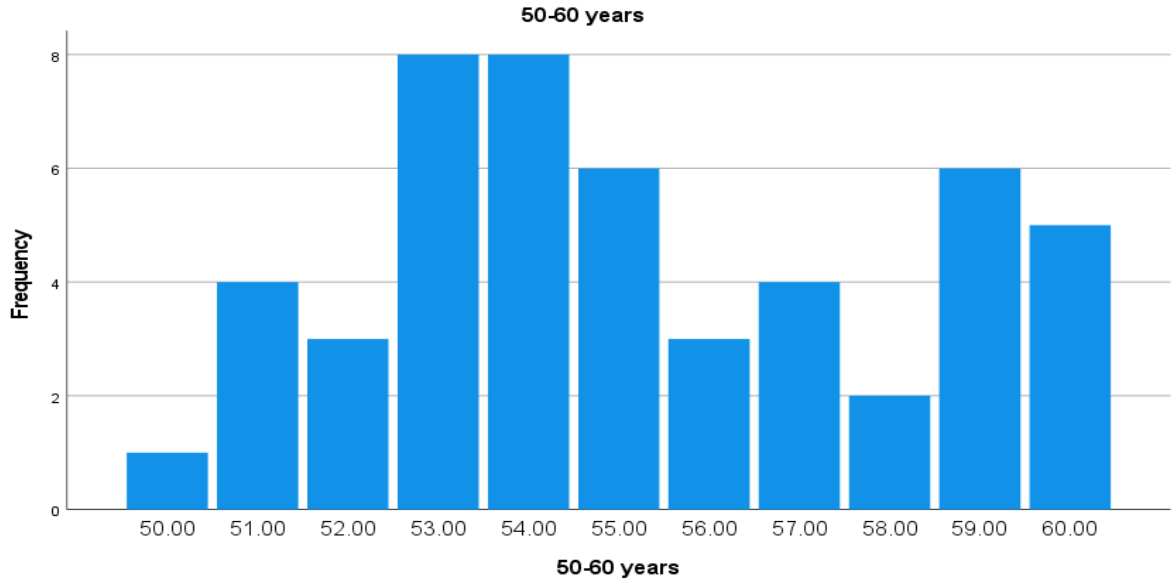
Frequencies

Table 4.2.1. Frequency distribution for age

	N	Minimum	Maximum	Mean	Std. Deviation
50-60years	50	50.00	60.00	55.2400	2.89658

- This table presents the descriptive statistics for age (50–60 years).
- The age ranged from 50 to 60 years, with a mean of 55.24 years (SD =2.896).

Figure 4.2.1



- This bar chart presents the descriptive statistics for age (50–60 years).
- The age ranged from 50 to 60 years, with a mean of 55.24 years (SD =2.896).

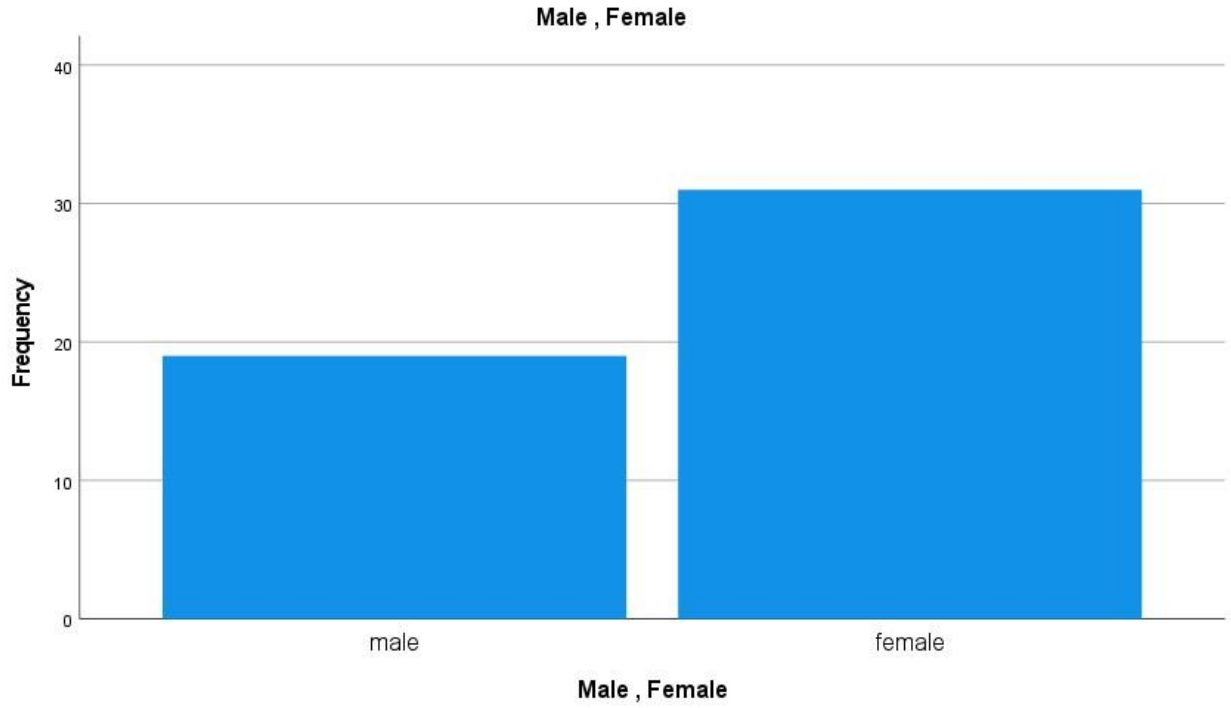
Table 4.2.2. Frequency distribution for gender:

Male, Female

Gender	Frequency	Percent	Valid Percent	Cumulative Percent
male	19	38.0	38.0	38.0
female	31	62.0	62.0	100.0
Total	50	100.0	100.0	

This table shows the gender distribution of the 50 participants. Among them, 38% were male and 62% were female.

Figure 4.2.2



This bar chart shows the gender distribution of the 50 participants. Among them, 38% were male and 62% were female.

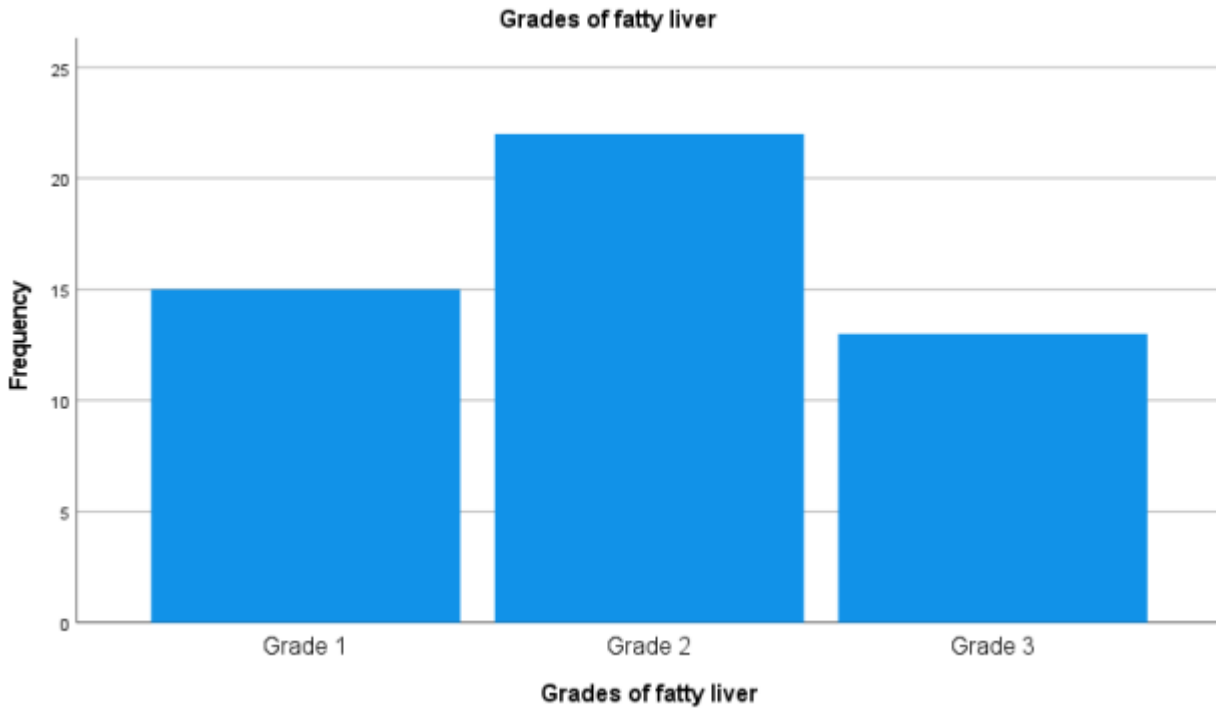
Table 4.2.3.Frequency distribution for grades of fatty liver:

Grades of fatty liver

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Grade 1	15	30.0	30.0	30.0
	Grade 2	22	44.0	44.0	74.0
	Grade 3	13	26.0	26.0	100.0
	Total	50	100.0	100.0	

The table presents the distribution of fatty liver grades among 50 participants. Grade 1 fatty liver was observed in 30% of participants, Grade 2 in 44% ,and Grade 3 in 26%.

Figure 4.2.3



The bar chart presents the distribution of fatty liver grades among 50 participants. Grade 1 fatty liver was observed in 30% of participants, Grade 2 in 44% , and Grade 3 in 26% .

Discussion

In this study ,the mean age is 55.24 with SD 2.89 . The minimum age is 50 and maximum age is 60. The patient with ages 53 and 54 are more common with grade 2 fatty liver . The cases were divided into 3 groups: Group 1 includes 15 patients of grade 1 fatty liver disease .Group 2 includes 22 patients of grade 2 fatty liver disease. Group 3 includes 13 patients of grade 3 fatty liver disease. In 2021, kuchay M.S studied that about 25 percent of population have fatty liver because of their over weight but later they observed that about 20 percent of population have fatty liver but not relate to excessive weight which is called as non obese NAFLD, they may exhibit similar cardiovascular and cancer related mortality compared to obese NAFLD share several metabolic abnormalities, but present dissimilarities in genetic predisposition, body composition, gut microbiota, and susceptibility to environmental factors.

Younossi et al. did his examination in 2022 to figure out " Grading of fatty liver disease in nonobese elderly patients on ultrasound" and his review shows that, The research demonstrates that NAFLD occurs commonly among people who do not meet the obesity criteria yet their disease outcomes result from various metabolic health risks not limited to body weight measurements. A study analyzing NAFLD epidemiology patterns in people who were not obese found a total incidence of 14.5% but South Americans had a higher rate of 25.7% and middle-aged adults aged 45 years and older exhibited an incidence of 16.2% .

Conclusion:

Our study conclude that fatty liver in non alcoholic non obese patient is associated with insulin resistant and metabolic problems. The age distribution of 50 participants aged between 50 and 60 years .It shows the frequency, percentage, valid percentage, and cumulative percentage for each specific age. The most common ages were 53 and 54 years in the sample. All data are valid with no missing values. The gender distribution of the 50 participants. Among them,19 were male and 31 were female .The distribution of fatty liver grades among 50 participants .Grade 1 fatty liver was observed in 15 of participants ,Grade 2 in 22 ,and Grade 3 in 13. Grade 2 fatty liver was common, observed in 22 participants.

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