

Early Detection of Nonalcoholic Fatty Liver (NAFLD) on Ultrasound

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ABSTRACT

Background: Nonalcoholic fatty liver abnormality is more typical determination in clinical practice and around the world. Obesity and diabetic individuals play a basic role in the development and improvement of this disease.

Purpose: This study was done to detect and find out the frequency of nonalcoholic fatty liver abnormalities on ultrasound at Al Noor Ultrasound and KTH hospital Peshawar Pakistan. To review the information of NAFLD and also the hazardous factors for its advancement and the regions where future research is important.

Methods: Cross sectional study was done and overall 230 patients were taken from ultrasound examination.

Results: Total 230 patients were examined on Color Doppler Ultrasound and confirmed 150 diseased patients. In total patients the males are 54.34% and females are 45.65%. The most frequent disease in this study was nonalcoholic fatty liver and detected in 104 (69.33%) patients (75 males, 29 females) and although the remaining diseases frequencies were liver hydated cyst 12 (8%) patients, hepatitis 11 (7.33%) patients, liver cirrhosis 10 (6.66%) patients, hepatomegaly 8 (5.33%) and least frequent liver hematoma in 5 (3.33%) patients.

Conclusion: The most frequent disease found in this study was nonalcoholic fatty liver. The key cause of this disease is the obesity and diabetic patients. Ultrasound is the modality of choice for early detection of nonalcoholic fatty liver disease.

INTRODUCTION

Nonalcoholic fatty liver disease is the medical illness in which hepatocytes accumulate additional fat, generally triglycerides (1). The deposition of fats about 5% to 10% in the liver (2). Decrease fats export in the forms of low thickness lipoprotein-triglyceride (3). Increased synthesis, reduced triglyceride distribution through very-low density lipoprotein, and decreased beta-oxidation process all contribute to NAFLD fat deposition in the liver as a result of highly free fatty acid (FFA) to the liver (4). Insulin resistance (IR) is common in people with NAFLD, which increases fat tissue lipolysis (4). Non-alcoholic fatty liver disease (NAFLD) is one of the high commonest non-transferable disease on the globe level, influencing 25–30% of the entire population (5). The power among fatty people (weight record more than 30 kg/m²) in the United States have been declared as 80-90% (1). NAFLD is diagnosed by a body mass index (BMI) of more than 35 kg/m² and an intraperitoneal fat region of more than 158 cm². (6) Hepatic steatosis is normally analyzed when ≥5% of hepatocytes contain vast lipid beads or when intrahepatic triglyceride content predominance is >5.6% (7). NAFLD is the widespread hepatic illness from the 21st century. NAFLD affecting one billion people worldwide, according to statistics. (8). NAFLD is the main well-known hepatic issue in Western industrialized nations with by and large population of 6-35% (middle 20%) around the world (9). One-fourth of the adult people have NAFLD in North America and Europe (10). The renal cortex, spleen shows echogenicity lower than liver because of fatty infiltration (11). The term "NAFLD" was invented in 1986 with characterizes a range extending from nonalcoholic fatty liver to fibrosis and cirrhosis (12). NAFLD unmistakably advances to cirrhosis with assist decompensating prompting passing or liver transplantation in a few people (13).

Accumulation of fats in the liver infection can additionally be optional to various causes, signs and symptoms including causes are its more likely occurs to those people who are middle age, clinical factors such as obesity, dyslipidemia, and diabetes (9) overweight, obese people who have high cholesterol and diabetes patient, medication, viral hepatitis C, too much bacteria in small intestine, autoimmune disease, fast weight loss and malnutrition (14) and persons with diabetic, obesity, containing those suffering from liver infection, are extra helpless to Vitamin D illness (15). Signs are including belly distension (ascites), enlarged blood vessels just below the skins surface, enlarged breasts in males, and red palms, enlarged spleen, yellowing of the skin and eyes

(jaundice) (16). Symptoms are including confusion, pain in the center of the belly, feel tiredness, appetite, feel weakness, skin of your neck have dark color patches, poor judgment, nausea, liver cirrhosis, and liver fibrosis etc.

Risk Factors: Age, sexual coordination and hereditary qualities all add to a man's danger of creating NAFLD (17). In any case, the primary hazard factors are obesity and diabetes, and in addition different characteristic of metabolic disorder, including insulin resistance and hypertension (17). Determination and improvement of NAFLD amongst people and is connected to a wide range of variables which could influence danger of NAFLD. For example, varieties in consume less calories, physical action, motions of unsaturated fats, hepatic oxidative anxiety, cytokine creation, decreases in low-thickness lipoprotein discharge, and modifications in the bowel microbe are altogether connected with variations in NAFLD (18). Perceiving patients with the metabolic issue is basic to recognizing patients in danger of NAFLD (19).

Anatomical presentation of the liver: In the abdominal portion liver is declared the larger gland (14). The liver lying in the upper abdomen to the right hand, beneath the diaphragm and above the right kidney, intestines and stomach (20). It's a wedge-shaped organ with a thin end pointing left (21). A human liver normally weights 1.44-1.66kg, and has a width of about 15 cm. The liver color is the dark reddish-brown organ, has various tasks. Blood supply to the liver, there are two different sources: 1- Oxygenated blood supply from hepatic artery. 2- Nutrient-rich blood supply through hepatic portal vein. The liver has eight portions or four projections, contingent upon whether it is characterized by its gross structural look or through its inner design (22). The liver is divided topographically into four lobes by three major fissure (23) and the thousands of lobules made up segments. Lobules are combined to minor ducts that combine with bigger ducts to form the common hepatic duct. The hepatic cells produced bile and the common hepatic duct conveys bile to the gallbladder and common bile duct to duodenum (small intestine).

Role of ultrasound: It is a diagnostic tool which is used to detect and find out different pathologies. It assesses the size, shape, vascularity, biliary tree, masses and collections. In the conclusion and management of nonalcoholic fatty liver illness and its difficulties. In this situation ultrasound recognizes fatty variations as low as >20% and hepatic steatosis distinguished sonographically, in this turn, nearly mirrors and atherosclerosis. Ultrasound appearance contain of the following sonographic appearance (24).

- i) To make a picture rapidly inside 4-5 cm of the bottom.
- ii) Echogenicity diffuse yet, especially imperative to detect shine inside the initial 2- 3 cm of the bottom.
- iii) Liver consistently heterogeneous.

Liver fills whole area with no obvious borders (25). Trademark highlights for NAFLD on ultrasound were observed to the most grounded self-determining indicators on many different examination (24).

Scanning Technique: To start and examine the liver, the patient lying supine and require the patient to take deep inhalation to fully show the upper edges of the liver. Look in horizontal (transverse) everywhere throughout the left lobe projection from a subcostal access. Look in transverse through the correct projection right lobe subcostal or intercostal. Roll the patient in a left parallel decubitus position for the assessment of the correct projection simply subsequent to checking for fluid. Gut gas can overlie the liver in a subcostal access, so getting the patient to expand their abdomen can help with demonstration. Additionally considering intercostal among each rib space can guarantee careful representation of the body organs.

Looking for a disease:

- i) Similar Vs dissimilar (normal liver v's fatty fatty)
- ii) Soft Vs rough echo texture mode picture here.
- iii) Estimate: The amount to measure the liver, utilize a longitudinal access in the central clavicle line. Measure the liver from the diaphragm to the lower edges of b mode picture. It can be extremely independent. Additionally, look at the lower border of a liver in association to the right kidney. It should complete mostly down the kidney. The B Mode picture has an amplified liver will have rounded outlines.

When we completely checked, however the liver, and after that begin taking pictures (26).

MATERIALS AND METHODS

Study Design: Cross sectional study

Study Setting: Khyber teaching hospital Peshawar and Al Noor Ultrasound Dabgri_Gardan Peshawar

Sample Selection

Sample Size

Sample size was calculated according to WHO formula. The 230 patients were taken from Khyber Teaching Hospital and Al Noor Ultrasound from Gabgri_Garden Peshawar

RESULTS

A total of 230 patients were examined on Color Doppler Ultrasound and confirmed 150 diseased patients. In total patients the males were 54.34% and females were 45.65% shown in table 1.

Table 1: Gender percentage

Male	125	54.34%
Female	105	45.65%
Total	230	100%

We find various diseases in this study such as fatty liver, liver hydrated cyst, hepatitis, liver cirrhosis, hepatomegaly and liver hematoma. Although remaining diseases such as liver carcinoma and liver masses were not included in this study.

The most frequent disease in this study was nonalcoholic fatty liver and detected in 104 (69.33%) patients (75 males, 29

females) and although the remaining diseases frequencies are liver hydrated cysts 12 (8%) patients, hepatitis 11 (7.33%) patients, liver cirrhosis 10 (6.66%) patients, hepatomegaly 8 (5.33%) and least frequent liver hematoma 5 (3.33%) patients shown in table 2.

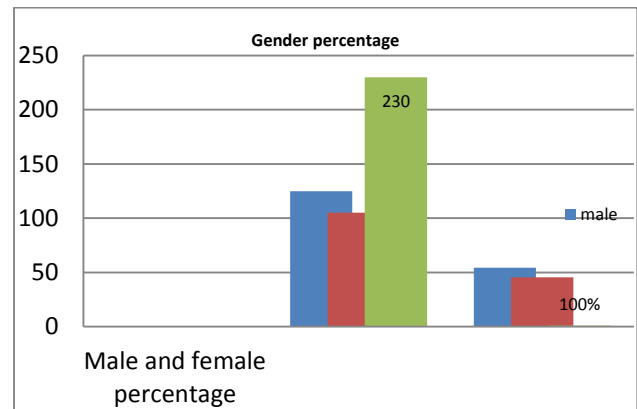
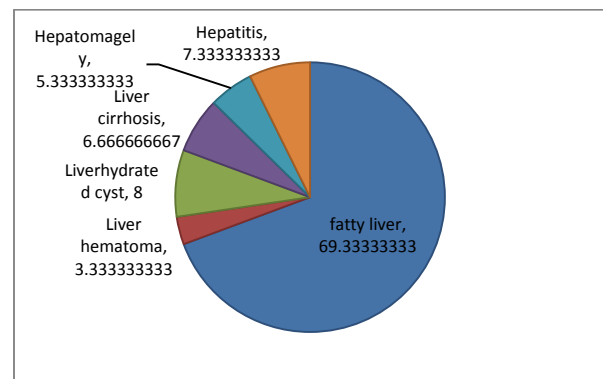


Table 2: Percentage wise distribution of Liver diseases

Sr. No	Liver diseases detected	Number of cases =230	% of liver disease
1	Fatty liver	104	69.33%
2	Liver hematoma	5	3.33%
3	Liver hydrated cyst	12	8%
4	Liver cirrhosis	10	6.66%
5	Hepatomegaly	8	5.33%
6	Hepatitis	11	7.33%



We divided the study population into different age groups to know about frequency distribution in various age groups. Results revealed that most frequent diseases observed frequently in all ages were fatty liver and highest frequency found between 40 – 52 years shown in table 3. Nonalcoholic fatty liver disease was found in all ages, but most commonly occur in 40 – 52 years. The liver hydrated cyst study was observed more common in the age group 27 – 39 years. The hepatitis, hepatomegaly, and liver hematoma also observed more common in the age group 27 – 39 years. The percentage of all liver diseases more common occurs in the age group 27 – 39 years shown in table 3.

Table 3: Age wise distribution of liver diseases

Age	Fatty liver	Liver hydrated cyst	Hepatitis	Liver cirrhosis	Hepatomegaly	Liver hematoma	Total
1-13	2	0	0	0	0	0	2
14 – 26	27	2	2	1	0	1	33
27 – 39	31	10	9	9	8	4	71
40 – 52	35	0	0	0	0	0	35
53 – 65	8	0	0	0	0	0	8
66 – 78	1	0	0	0	0	0	1
Total	104	12	11	10	8	5	150

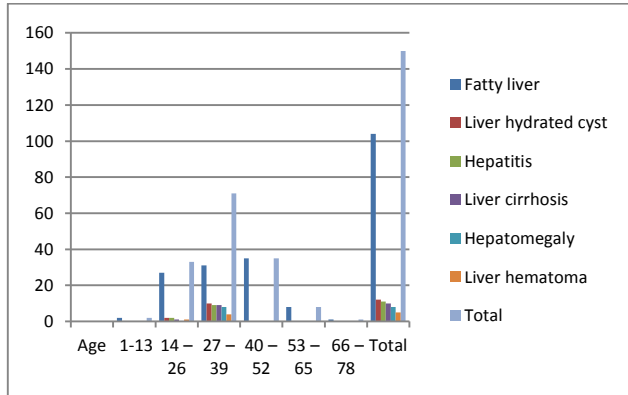
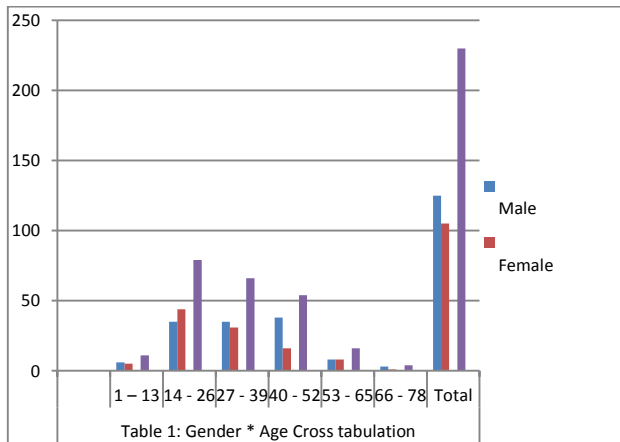


Table 3: Age wise distribution of liver diseases

The gender wise cross tabulation in different age groups shown in table 4.

Table 4: Gender * Age Cross tabulation

Gender	1 – 13	14 – 26	27 – 39	40 – 52	53 – 65	66 – 78	Total
Male	6	35	35	38	8	3	125
Female	5	44	31	16	8	1	105
Total	11	79	66	54	16	4	230



DISCUSSION

Ultrasound declared as an easily available, non-invasive and correct instrument in the finding of nonalcoholic fatty liver disease (24). Ultrasonography is suggested primary -line indicative technique in clinical practice, although it is known to have limited sensitivity (27). Ultrasonography must be utilized as a primary line indicative examination in patients with hepatic abnormalities (24) Medical hazard issues, when utilized with ultrasonography findings, have high utility in detecting NAFLD patients and starting an initial plan of attention (24). We found that NAFLD was available all through a wide range of ages (28).

In this study we tried to sort out frequency distribution of nonalcoholic fatty liver disease in the various age group of life and gender groups. Our analysis revealed that in total 230 patients, the 80 patients were normal and 150 patients had diseased. The most frequent disease in this study was nonalcoholic fatty liver and detected in 104 (69.33%) patients (75 males, 29 female) and more common in males 75 (72.11%) than females 29 (27.88). The sex dissimilarity amongst male and female patients merits specify. Male patients had basically higher rates of NAFLD (58.9%). Greasy liver and NAFLD happen in all age groups, and its predominance increments with increments in body weight (30).

In this study the patients of nonalcoholic fatty liver disease occur in all ages (1-78years) but most frequently distributed between 40 to 52 years. NAFLD can occur at any stage of life, although its occurrence is higher in the fourth and fifth decades (31). It is similarly distribution among men’s and women, but women have a tendency to development of advance forms of the diseases (31). NAFLD may influence any age group and ethnic group. The predominance of NAFLD among grown-ups in the USA is by all accounts unique among various cultural groups, influencing 45% of Hispanic individuals, 33% of White individuals and 24% of Black individuals (32). Right now, NAFLD is one of the main incessant reasons for hepatic disease with an evaluated commonness of 20 to 30% in the developing nations (31). One to two in each ten patients will have NAFLD. Amongst patients with NAFLD (33).

This study show that the nonalcoholic fatty liver disease can be occurs in any stage of life and its occurrence different due to culture, food, life style and geographical area.

To compare the prevalence of developed countries in this study in Pakistan have different frequency distribution due to geographical location, culture, lifestyle, behaviors and foods, etc. It show think about the recurrence of NAFLD is 51% which is close to the finding from India and Pakistan (34). This study was done in the Peshawar Khyber Teaching Hospital and Al Noor Ultrasound Gabgri_Garden Peshawar, Pakistan and the frequency of nonalcoholic fatty liver is (69.33%). When we compare this study with other regions in Pakistan its frequency is different due to environmental factors, and geographical location.

In this study the nonalcoholic fatty liver disease more common occurs due to obesity and diabetic affected patients.

CONCLUSION

In this study the most frequent distribution of nonalcoholic fatty liver in wide range of age groups, but more common between 40 to 52 years due to obesity and diabetic patients. Although other diseases also find out liver hematoma, liver cirrhosis, liver hydrated cyst, liver hepatitis and hepatomegaly. Gender wise, it’s more common in male high energy intake and oily foods.

Therefore, it’s a prime significance, to find out the age distribution and gender distribution beneficial during clinical practice.

This study provides more area for research, such as liver hematoma, liver cirrhosis, liver hydrated cysts, liver hepatitis and hepatomegaly.

Ultrasonography is suggested primary -line indicative technique in clinical practice to detect and find out nonalcoholic fatty liver disease.

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