ORIGINAL ARTICLE

Identifying Non-Alcoholic Fatty Liver Disease on Ultrasound and its Correlation with Obesity

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ABSTRACT

Background: Only a few studies have been conducted to screen and identify Non-Alcoholic Fatty Liver Disease (NAFLD)and its association with obese patients in the Pakistani population.
Aim: To detect any correlation between the presence of an increased waist circumference and Body Mass Index and ultrasound detected NAFLD amongrandomly selectedPakistanipatients.
Methods: This is a descriptive, cross-sectional study, designed to assess the relationship between fatty changes of the liver and obesity amongst adult patients using ultrasonography. A total of 100 adult patients were included in the study. After anthropometric measurements, anabdominal ultrasound examinationwas performed on each patient to detect NAFLD.
Results: An observation of the body measurements revealed a profound correlation between Body mass index (BMI), measurement of waist and ultrasound detected NAFLD.
Conclusion: NAFLD is common in Pakistani obese population, but still remains undetected.There seems to be a strong associationbetween the anthropometric findings and NAFLD. Obese patients should have a screening ultrasound to check for NAFLD and remedial measures should be instituted before NAFLD culminates to liver related morbidity and mortality.
Keywords: Non-Alcoholic Fatty Liver Disease; Body Mass Index;waistcircumference

INTRODUCTION

Obesity is reaching epidemic proportions in Pakistan, with obesity effecting children and the adult population[1]. Metabolic syndrome entails a group of metabolic irregularities that contribute anamplifieddanger of developing cardiac &vascular disease (CVD) and diabetes mellitus (DM). Itsuggests that the syndrome's occurrence entails a robustassociation between NAFLD and central obesity with an increased waist circumference[2].

Founded on radiological studies, the occurrence of NAFLD in the adult population ranges between 14–31%[3]. A population-based study stated that 91% of obese people (BMI>30kg/m^2) had signs of fatty liver on ultrasound examination[4].With the amplifiedoccurrence of obesity along with DM in Pakistan in preceding few years, it is only reasonable to assume an upsurge in the frequency of NAFLD in Pakistan. Though, there is inadequate data on the incidence of NAFLD from Pakistan.

NAFLD entails a spectrum of hepatic pathologies from simple fatty liver, through an intermediate lesion termed Non-alcoholic Steatohepatitis (NASH) leading to cirrhosis, at the far end of the disease range. Currently, total patients which progress to cirrhosis is professed to be low, but the risingoccurrenceof an obesity epidemic is making it one of thesharedreasons of chronic liver disease[5]. It is evident that NAFLD can causehepatic associated morbidity and mortality in a subgroup of people. Using ultrasound as a non-invasive screening method to detect NAFLD'spresence, should help clinicians to select out patients at highest risk. This would lead to early improved diagnostic assessments, follow-upalong with treatment options. Henceforth the rationale of the study was to use ultrasound as a screening tool to record the prevalence of NAFLD among obese Pakistani patients and establish its relationship with obesity.

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METHODS

This study was conducted in the Department Radiology & Medicine of Ghurki Trust Teaching Hospital, Lahore from the months of January 2016 to November 2016. A total of 100 adult patients randomly selected were included in the study. Their BMI was calculated and were sent to radiology department for liver examination. Exclusion criteria included patients who consumed alcohol, pregnancy, identified cases of hepatitis (C or B), patients who were takingany medicinescausing fatty hepatic parenchyma such as amiodarone, estrogens, methotrexate and tamoxifen.All entrants were explained the study and an informed consent

wasobtained. A thorough clinical history and physical examination with anthropometric measurements were taken as given in the WHO guidelines[6]. BMI was calculated according to the following formula:
BMI = Weight in Kilograms / (Height in Meters)^2

Categories of BMI are mentioned in Table 1.All patientshaving an abnormal liver on ultrasonography werechecked for presence of hepatitis B and C and were subsequently excluded. Ultrasound of the liver was done using Toshiba Xario Prime Ultrasound machine with a 3.75MHz probe.Sonographicevaluation was performed by radiologist. Fatty liver was diagnosed in the presence one of the following standards laid down by the American Gastroenterology Association. NAFLD Grade I - Minimal diffuse rise in the fine echoes. Liver seems bright equated to the cortex of the kidney and normal picturing of diaphragm and intrahepatic vessel borders. NAFLD Grade II - Moderate diffuse rise in the fine echoes. Slightly diminished visualization of the intrahepatic vessels and diaphragm. NAFLD Grade III - Noticeable increase in the fine echoes. Poor or no visualization of intrahepatic vessels and diaphragm and poor penetration of the posterior segment of the right lobe of the liver[7]. Waist was measured by placing the measuring tape at the level of hip bone/umbilicus and was documented in centimeters (cm).

Table 1:

<18.5	Underweight
18.5-24.9	Normal
25-29.9	Overweight
>30.0	Obese

Statistical analysis: IBM SPSS Statistics version 23was employed for data analysis. Study data are presented as mean and median. The p-value was determined using independent-samples T test. P value of < 0.05 was aimed at.

RESULTS

Out of 100 patients selected for the study, 55 were females and 45 were males with mean age of 45.23 (minimum was 25years and maximum was 65years).Out of 100 patients included in the study, majority of the overweight (n20) and obese (n28) patients were in 41-50years age group (Table 2).Minimum waist of the patient was 85cm while maximum was 133cm. Chi square was applied on waist of the patients and BMI which showed a p-value of 0.001 (significant). 11 out of 100 patients who were obese showed grade-II NAFLD. 24 patients who were obese had grade-III fatty liver disease while 17 overweight patients had grade-I fatty liver disease (Table 3). Chi square was applied on degree of fatty change and BMI which shows a p=value of <0.001 (significant).

Table 2:

Age in years	BMI Category			Total
	Normal (18.5-24.9)	Overweight (25-29.9)	Obese (>30)	
20-30	1	1	0	2
31-40	10	10	13	33
41-50	3	20	28	51
51-60	3	5	4	12
>61	0	2	0	2

Table 3: BMI Category degree of fatty change

BMI category	Degree of fatty change				Total
	Grade I	Grade II	Grade III	Normal	
Normal (18.6-24.9)	15	17	8	1	17
Overweight (25-29.9)	17	8	10	3	38
Obese (>30)	8	11	24	2	45
Total	40	24	30	6	100

DISCUSSION

Incidence of Obesity is on a global increase.NAFLD is an important cause of altered hepatic enzymes in the western world[8]. In the last few years, Pakistan has had an increase in the rates of obesity, particularly in its younger populations.

In our study,38 out of 100 patients were overweight (BMI between 25-29.9) while 45 patients were obese (BMI>30). 94cases amongst the 100 patients studied, received a diagnosis of NAFLD on the basis of Ultrasonographic evaluation. Thus, the prevalence of NAFLD in thepopulation studied was94%.Out of these 94 NAFLD cases, 43 were obese. NAFLD is seen in 10 to 24 percent of the general population in different countries. The prevalence increases to 57.5 %[9]to 74%[10]in obese persons.

BMI has been correlated risk among obese patients. A raised BMI can be interpreted as increased body adipose tissue and has been correlated to a higher risk of developing complications including DM, hypertension and dyslipidemia[11]. Rising adiposity is related with an amplified risk of morbidity and mortality[12]. Sowaist circumference was also noted. Insulin resistance plays asignificantrole in the disease process of NAFLD[13]. Itis not surprising that theSouth Asian population has a predisposition for abdominal obesity[14].

A relationship between fatty hepatic parenchyma and waist ratios is available in the literature[15]. Considering waist circumference to estimate

abdominal fat mass suggested a straight association between abdominal fat and liver fat content[16].A recent meta-analysis highlights that ultrasound is a precise, dependable imaging method for the recognition of fatty liver, as associated with histology, with a collective sensitivity of 84.8%, a mutual specificity of 93.6%[17].

Some limitations of our study were recognized. A study on a greater scale needs to be done to get a more precisedepiction of the disease burden of NAFLD and obesity. This studyhighlights the fact that ultrasound can be used as a good screening tool to identify NAFLD in obese patients.

CONCLUSION

With the increasing incidence of obesity especially in countries like Pakistan, NAFLD is intimidating major sections of the community. Despite the fact that insulin resistance and obesity are now firmly established as fundamental factors involved in the pathogenesis, for the most part the underlying system remain a mystery. The study of obese people with an aim to correlate anthropometrically diagnosed obesity and radiologic aspects of NAFLD, has further embellished it as a disease of growing importance.

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