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Sonographic Association between Fatty Liver and Gall Bladder Stones among all Adult Patients Visiting Private Clinics of Lahore City

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Abstract

Background: Fatty liver (chronic liver disease) was most commonly found associated with gall stones. It occurs due to the accumulation of lipid in hepatocytes mainly triglyceride. Due to a high incidence of obesity in the population, the risk of fatty liver and gall stones also increases. In Pakistani population, its prevalence of fatty liver was 10 - 14 %. Fatty liver and gall stones could easily be observed on ultrasound. **Objective:** To determine the association of fatty liver with gall stones in the patients younger than 50 years. **Methods:** This Cross-sectional descriptive study was conducted at Park view diagnostic center, Sharif Medical City Hospital, and Central Park Hospital. All the adult patients younger than 50 years diagnosed with gall stones were included. Ultrasound machine Toshiba Xario XG was used to perform this research to determine the association of fatty liver with gallbladder stones in the patient younger than 50 years. Fatty liver disease and gall stones were diagnosed on a trans-Abdominal scan by using a curved array transducer of 2.5 to 5MHz frequency. **Results:** Total 138 patients diagnosed with gall bladder stones were included, among them fatty liver disease was found in 95(68.8%) patients in which most of them were females. The individuals of 36-50 years were mainly involved while under the age of 30 years were rarely involved in gall bladder stones as well as fatty liver. **Conclusions:** We observed that gall stones are associated with fatty liver disease. Moreover, fatty liver disease was more common in females than males.

Keywords: Ultrasound, Gall Bladder, Gall Bladder Stones, Gall Stones, Fatty Liver Disease

Introduction

The fatty liver disease is a common health problem which sometimes represented by elevated liver enzymes. It occurs from the accumulation of lipid in hepatocytes mainly triglycerideⁱ. It defines by the disturbance of at

least one of the liver function tests such as elevated alanine/aminotransferase and or gamma-glutamyl-transferase or ultrasound signs of fatty liverⁱⁱ. Fatty acid metabolism problems are also accountable for the pathogenesis of fatty liver disease, which may be due to disproportion in energy intake and it's burning, resulting in lipid storage in the liver. Fatty liver is diagnosed when fat in the liver exceeds 5–10% by weightⁱⁱⁱ. Hepatocyte death due to necrosis is increased in nonalcoholic steatohepatitis as compared to simple steatosis^{iv v vi}. Fatty liver can develop into liver fibrosis and liver cancer as well^{vii}. Liver function test (LFT, s) are not enough to confirm NAFLD. Liver biopsy is the only procedure that can differentiate NAFL from NASH^{viii}. Risk factors include diabetes, a diet high in fructose and older age^{ix}. In United States, about 20% of population have non-alcoholic fatty liver^x. Due to the high occurrence of obesity in the people, the risk of fatty changes in the liver also increases and it is a common feature observed in imaging. It might develop up to 80% of obese and up to 20% in normal weight people^{xi}. Different characteristic patterns of fatty changes in the liver can be identified such as diffuse, geographical, focal, subcapsular and peri-vascular^{xii}. For diagnosis of fatty liver disease, the sensitivity of ultrasonography was 100% and specificity 60%^{xiii}. However, gold standard for the diagnosis of NAFLD and NASH is liver biopsy^{xiv}.

Gall bladder stones is also a most common gastrointestinal disorder. The prevalence of gall bladder stones in general population is 10- 15 %^{xv}. There is a very likely chance co-occurrence of both gall bladder stones and fatty liver disease because of the high prevalence^{xvi}. Both of them also share same risk factors, and both diseases are linked to obesity/ overweight, hypertriglyceridemia^{xvii}. According to the composition, there are eight main types of gallstones including pigment stones, cholesterol stones, calcium carbonate stones, calcium stearate stones, phosphate stones, cystine stones, protein stones, and mixed stones. The most common type of gallstones are cholesterol stones and second most common are pigment stones.^{xviii}

Ultrasound is the first line imaging modality for diagnosis of gall stones. It is non-invasive, widely available and cost effective as compared to other imaging modalities. Gall bladder stones was diagnosed as the sonographic evidence of one or more distally shadowing mobile or non-mobile structures seen within the gall bladder.^{xix}

Methods

A Cross sectional descriptive study was conducted at Park view diagnostic center, Sharif Medical City Hospital, and Central Park Hospital. Our sample size was 138 patients. 138 patients were included after the approval of synopsis from institutional review board (IRB). All the adult patients younger than 50 years diagnosed with gall bladder stones were included. Ultrasound machine Toshiba Xario XG was used to perform this research to determine the association of non-alcoholic fatty liver with gallbladder stones in the patient younger than 50 years. Fatty liver disease and gall bladder stones was diagnosed on trans-Abdominal scan by using curved array transducer of 2.5 to 5MHz frequency. Figure 1 shows a trans-abdominal scan of 45 years old female in which deep part of liver appears dark and obliterating the echogenic diaphragm in the presence of gallstones. Trans-abdominal scan of 36 years old female in which deep part of liver appears mild hypo-echoic in the presence of gallstones in Figure 2.

Results:

In this study total frequency of the patients was 138 comprising 99 females (71.7%) and 39 males (28.3%). Mean age of the patients was 39.10 ± 8.1 (22-50 years). Graph number 1 shows descriptive statistics of age in years. Frequency in marked Fatty liver was 1 (0.7%)

Frequency in mild Fatty liver was 73 (52.9%), moderate fatty liver was 21(15.2%), and normal liver was 43(31.2%). Demographic details of grade wise fatty liver are given in Table-1. Graph number 2 shows gender wise grade cross tabulation.

Figure- 3 Descriptive statistic of age in years.

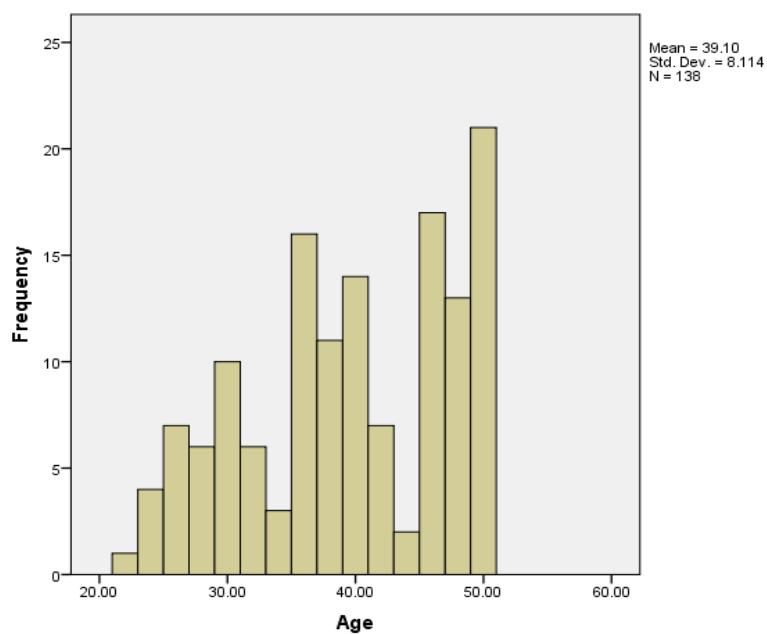
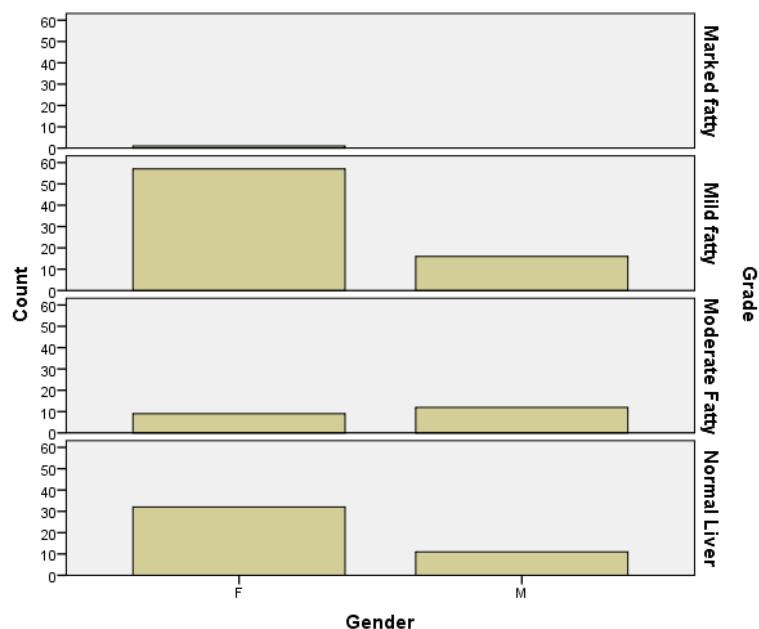


Table-1 Grade wise Fatty liver

	Grade	
	Frequency	Percent
Marked fatty	1	0.7
Mild fatty	73	52.9
Moderate Fatty	21	15.2
Normal Liver	43	31.2
Total	138	100.0

Figure -4 Gender wise grade cross tabulation



In current study, it was noted that there was association between gall bladder stones and fatty liver disease. A study was performed by Mohammad H et al. in 2014 determined the preference between fatty liver disease and cholesterol gallstones. Both conditions are highly prevalent in the general population and include multiple risk factors such as obesity, insulin resistance, dyslipidemia, and high dietary cholesterol intake^{xx}.

Another study was accomplished at civil hospital Karachi in surgical unit 1. In this study, selective sample comprising 88 patients was involved of both genders with ultrasonographic evidence of gallstone regardless of cholecystitis. This study found an association between metabolic disorder with gallstone and fatty liver disease. The huge proportion of first degree relative of gallstone patients had the gallstone in this relation, was more noticeable who had associated fatty liver disease^{xxi}.

A systematic review of studies was carried out in 2015 to explore the relationship between fatty liver and gallstone and its risk factors. Eight studies were conducted which consists of 43,749 people from different ethnics and regions. Five trials were carried out in subgroups of gallbladder disease patients in the NAFLD population. As a result of this study, a significant association was noticed between NAFLD and gallstone disease^{xxii, xxiii}. The results of the current study agree with the data published in international research articles.

Conclusion

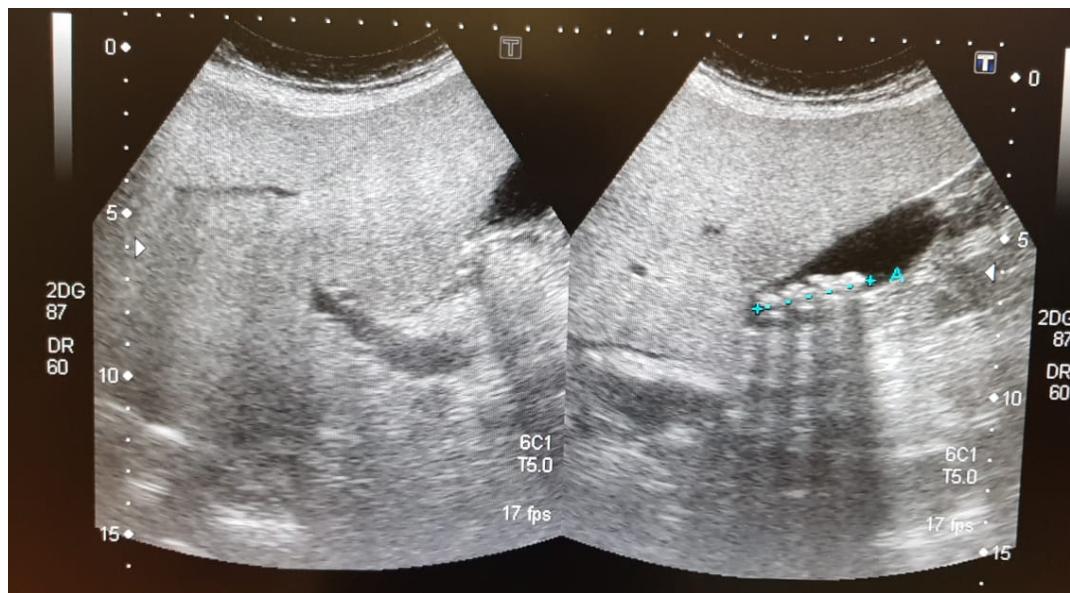
We observed that gall stones are associated with fatty liver disease. Moreover, fatty liver disease was more common in females than males.

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Appendix 1: Image 1



Appendix 2: Image 2

