Correlation of Fatty Liver Imaging on Abdominal CT Scan with Dyslipidemia in Haji Adam Malik General Hospital in 2020

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ARTICLE INFO	ABSTRACT
	Introduction: Fatty liver is a broad term for a condition in which there is an increase triglyceride level in hepatocyte. In Indonesia there is not much research about this condition. Fatty liver is a major health problem in West countries, and is slowly increasing in Asian countries. For many individual with fatty liver, have no specific complaint or can have no symptoms at all. This aim of this study to analyzed the relationship between fatty liver images on abdominal CT scans with dyslipidemia. **Method**: This study is an observational analytic study with a case – control type of research with the aim of knowing the relationship between CT scan images of fatty liver and dsylipidemia. The data in this study were all medical records who went to the Radiology Department for abdominal CT scan at the Haji Adam Malik General Hospital for a period of one year from January 1st, 2020 to December 31st 2020. **Results**: The subjects on the abdominal CT scan results with fatty liver and high triglyceride is 5 peoples out of 12 (41.7%). The test results obtained p value = 0.,688 (p>0,05), in other words there is no significant relationship between fatty liver and high triglyceride level. **Conclusion**: No significant relationship was found between the incidence of fatty liver and the incidence of dyslipidemia.
Keywords	

INTRODUCTION

The liver is said to be "fatty" if the hepatocytes contain more than 5% triglycerides. The diagnosis of fatty liver is confirmed by liver biopsy, which can differentiate between mild (5% - 33%), moderate (>33% and <66%) and severe (>66%) [1]. Hepatic steatosis or "Fatty liver", is also said to be a term widely used for conditions with elevated triglycerides in the cytoplasm of hepatocytes, with altered hepatocellular lipid metabolism. Hepatic steatosis is a growing health concern in industrialized countries, with increasing prevalence despite growing awareness in recent years [2,3]. In Indonesia, there is still lack of research about fatty liver [4].

The prevalence in Asian countries, especially in the Asian - Pacific region is also a major problem of public health that needs to be considered. In Asian countries that have been carried out research can match the incidence with Western countries [5]. Prasetya et al reported 186 patients with type 2 diabetes mellitus (DM), at Cipto Mangunkusumo General Hospital, Jakarta in 2017 as many as 86 patients (45.2%) had NAFLD, and 17 patients (25.0%) had severe fibrosis [6].

A lipid profile is a blood test that measures levels of total cholesterol, triglycerides, HDL cholesterol, and LDL cholesterol. Abnormality of one of the lipid profiles in plasma is called dyslipidemia. Many studies have shown that nonalcoholic fatty liver disease (NAFLD) is closely related to metabolic diseases, such as

obesity, type 2 diabetes and dyslipidemia. Dyslipidemia can be classified based on primary dyslipidemia caused by genetics and most often in children, and secondary dyslipidemia, which is caused by lifestyle and most often in adults [7].

The incidence of this fatty liver in one study conducted by Giorgio et al, the incidence of fatty liver was 2/1000 individuals, but by the same method in another study conducted by Ratziu et al, the rate increased by 49% in obese individuals, and in In a study conducted by Vernon et al, the increase in fatty liver continued to increase in a follow-up study of 3147 patients in whom there was no risk of fatty liver, as much as 10% after 414 days of follow-up showed fatty liver [8].

The lack of data available in Indonesia especially in North Sumatra regarding this fatty liver subject, and its complications that can lead to conditions such as cirrhosis, their relation to metabolic syndrome disease and even lead to malignancy. People whose affected by this disease are mostly asymptomatic, which making people unaware of this disease and its complication, therefore it is important that this research was conducted.

METHOD

This is a cross-sectional facility-based observational study conducted in the Radiology Department of Haji Adam Malik General Hospital Medan during the period of 2022. The population of interest for this study was individuals with fatty liver identified through abdominal CT scan. All inpatients and outpatients with a diagnosis of fatty liver at H. Adam Malik General Hospital in 2020 were included in the population, and the sample was drawn using the Total Sampling technique from the accessible population documented in medical records who underwent an abdominal CT-scan.

The study included individuals over 18 years old (male and female) who had the result of abdominal CT scan without contrast and lipid profile. Patients who underwent splenectomy and abdominal CT scan with an artifact hampering evaluation were excluded. The CT Scanning without contrast was performed using standard protocol 16-slice MDCT Scanner (GE Bright Speed 16) and CT Philips Ingenuity Core 128. Four criteria proposed previously in the literature were applied to evaluate for fatty liver, and the diffuse fatty liver pattern was chosen since it is the most common pattern. Fatty liver attenuation was evaluated by the researcher and one radiologist at Haji Adam Malik General Hospital, Medan.

Data were processed in several stages, including cleaning, editing, coding, and entry. Data were analyzed descriptively to determine the frequency distribution of patient characteristics and the average value of lipid profile displayed in the mean value and standard deviation. To analyze the relationship between fatty liver and lipid profile levels, the chi-square test or other alternative tests will be used if the chi-square does not meet the requirements. This research was undertaken after gaining clearance from the Research Ethics Committee of the Faculty of Medicine, University of North Sumatra/RSUP H. Adam Malik Medan.

RESULT

The majority of the subjects were male; there were 16 of them, or 64.0%.

Table 1. Characteristic of Subjects Demographics

Characteristics	Frequency	Percentage
Gender		
Male	16	64.0
Female	9	36.0
Total	25	100

The most age is >50 years, as many as 17 people (68.0%), The average age of the subjects was above 50, with the oldest being 75 years old, while the youngest being 27 years old (Table 2).

Characteristics of subject cholesterol, cholesterol values in research subjects, with the biggest number, 17 individuals (68.0%), having normal cholesterol readings, while 8 individuals had abnormally high cholesterol levels (32.0%). Subjects who had a CT scan with cholesterol, 9 subjects (or 36.0%), as determined

by the Pearson test, had fatty livers, A p value = 0.394 indicates that 5 individuals (29.4%) had normal cholesterol levels whereas up to 4 individuals (50%) had elevated cholesterol levels. The p value > 0.05 suggests that there is no relationship between a CT scan showing a softer liver and elevated cholesterol levels (Table 3).

Table 2. Characteristic of Subjects Age

Characteristics	Frequency	Percentage
Age (years olds)		
18 -50	8	32
> 50	17	68
Total	25	100

Table 3 : Relationships of Subjects Abdominal CT scan with Cholesterol

Cholesterol	CT Scan						P value*
	Fatty liver		Non fatty liver		Total		
Normal	5	29.4%	12	70.6%	17	100.0%	
High	4	50.0%	4	50.0%	8	100.0%	0,394
Total	9	36.0%	16	64.0%	25	100.0%	

Triglyceride characteristics of subjects triglyceride readings in research subjects showed approximately the same number of 13 normal individuals (52.0%) and 12 abnormal individuals (48.0%) when the total of normal and high values was taken into account. CT scan with triglycerides, after assessing the Pearson test in table 4.6, the number of participants with fatty liver who had normal triglyceride levels was 4 (29.4%), whereas the number of subjects with high triglyceride values was 5 (41.7%). In getting the value of $p = 0.688$, indicated that there was no significant correlation between CT scans showing a fatty liver and triglyceride levels (Table 4)

Table 4 : Relationships of Subjects Abdominal CT scan with Triglycerides

Triglycerides	CT-Scan						P value*
	Fatty liver		Non fatty liver		Total		
Normal	4	29.4%	9	70.6%	17	100.0%	
High	5	41.7%	7	58.3%	12	100.0%	0,688
Total	9	36.0%	16	64.0%	25	100.0%	

HDL characteristics of subjects, HDL values of research subjects, the majority of patients had normal HDL values, with a total of 19 individuals (76%) and 6 individuals (24%) having high HDL values. CT scan with HDL: following the Pearson test, the findings for individuals with fatty liver and normal HDL were 7 individuals (36.8%) and a rise in HDL in 2 individuals (33.3%). P = 1.000 was calculated using the analysis's findings. That there is no correlation between the Ct scan image of a fatty liver and the HDL value (Table 5).

Table 5 : Relationships of Subjects Abdominal CT scan with HDL

HDL	CT can						P value*
	Fatty liver		Non fatty liver		Total		
Normal	7	36.8%	12	63.2%	19	100.0%	
High	2	33.3%	4	66.7%	6	100.0%	1,000
Total	9	36.0%	16	64.0%	25	100.0%	

Characteristics of subject LDL, LDL values in research subjects were practically equal in number, with up to 13 normal individuals (52.0%) and up to 12 abnormal individuals (48.0%). CT scan with LDL, following the Pearson test, the findings indicated that there were 5 individuals with normal LDL (36.8%) and 4

individuals with high LDL (33.3%). The results of the test yielded a p value = 1.000. demonstrates that CT scans of a fatty liver are unrelated to LDL levels (Table 6).

Table 6 : Relationships of Subjects Abdominal CT scan with LDL

LDL	CT Scan						P value*
	Fatty liver		Non fatty liver		Total		
Normal	5	36.8%	8	63.2%	13	100.0%	
High	4	33.3%	8	66.7%	12	100.0%	1,000
Total	9	36.0%	16	64.0%	25	100.0%	

DISCUSSION

In this study, the number of male patients with fatty liver was higher than that of female patients. Research conducted by Chen et al. stated that in men is an independent risk factor for the occurrence of NAFLD. In this study, the higher incidence in men was due to an association with a more likely accumulation of visceral fat and an association between subcutaneous adipose tissue and insulin resistance. Estrogen is thought to suppress the accumulation of visceral fat and increase the accumulation of subcutaneous fat [9].

With increasing age, especially in the age group above 50 years, the occurrence of fatty liver will also increase due to increased risk factors in old age such as metabolic syndrome, obesity, diabetes mellitus, and dyslipidemia. In addition, elderly patients are also more likely to have advanced fibrosis, cirrhosis, and hepatocellular carcinoma [10]. The prevalence of NAFLD increases with age, in the year age group of 20-40 years about 18%, in the year age group 40-50 years around 39% and > 40 % increases of risk factor in the age group of 70 years [11].

There have been several epidemiological studies on fatty liver in the individual over 70 years, the first study being conducted in Israel, which recruited 91 inpatients from 3 rehabilitation hospitals, and the subsequent study was conducted in a British clinic, recruiting 351 outpatients. In a study conducted in Israel, Kagansky et al, used ultrasound and CT scan as diagnostic modalities for NAFLD, while Frith et al used liver biopsy. Both studies found a prevalence of NAFLD exceed 40% in individuals 70 years of age or older. However, Frith et al. study found a high prevalence of fibrosis (40%) and cirrhosis (14%) with biopsies of these elderly individuals in contrast to the study of Kagansky et al, which no signs of chronic liver disease were found on physical examination of the patients. The weakness of the Kagansky study was that it relied too much on clinical examination to detect advanced liver disease, which had low sensitivity especially in the absence of decompensated cirrhosis [12].

There is a strong association between fatty liver and dyslipidemia, in a study conducted by Ma et al. conducted a multivariate analysis on 949 retired elderly workers and reported that triglyceride and HbA1c results are independent markers of NAFLD. Approximately 20-80% of patients with NAFLD also have dyslipidemia [13]. In a study conducted by Han et al in Korea in 2019, stated that subjects with fatty liver had a higher risk of developing dyslipidemia compared to subjects without fatty liver. Subjects with fatty liver had a 2.4 times risk of developing dyslipidemia compared to those without fatty liver. This study has similar results to previous studies conducted by Targher et al and Chatrath et al, that patients with fatty liver are characterized by increased triglyceride and LDL levels and decreased HDL levels [14].

Obesity is one of the major health problems worldwide, and is indicated as a risk factor that plays a major role in the occurrence of metabolic disorders. A study conducted by Ganjooei et al, analyzed the lipid profile of 90 morbidly obese patients with a body mass index above 40 kg/m2, and reported, 60% of the patients had histologically proven to have fatty liver. The mean level of total cholesterol in patients with fatty liver had a significantly higher value than patients without fatty liver. The majority of obese patients in the study of Ganjooei et al showed a dyslipidemic profile. NAFLD is increasingly being shown to be a multifactorial disease associated with genetic, metabolic disorders including obesity, dyslipidemia, insulin resistance and cardiovascular disease [15]. In a study conducted by Li et al, compared the clinical characteristics of obese patient and non-obese patients with the incidence of NAFLD. As has been known

previously that NAFLD often occurs in obese individuals, but there are also individuals with a normal body mass index who can suffer from NAFLD. Due to the normal body mass index, if there is NAFLD in the individual it will be very hard to identified. The results of this study showed that the incidence of NAFLD was higher in the obese group compared to those without obesity [16]. Kwon et al reported study from general health check in 29.994 subjects, that the prevalence of NAFLD in the non-obese group (BMI <25 kg/m2) was found to be around 12.6% at the time of the study. In studies that have been reported, NAFLD patients who are thin, usually male predominant, relatively young, have high hemoglobin levels, and low blood pressure [17].

The weakness of this study is that there is no etiology that can distinguish between fatty liver including the absence of comorbid data, body mass index and severity in the research subjects. In this study there is no statistically significant relationships between fatty liver in abdominal CT scans with an increased lipid profile in research subjects

CONCLUSION

The highest proportion of samples based on gender, as many as 16 people (64%) were male. The highest age of patients with fatty liver in this study was the sample group aged over 50 years. There is no significant relationship between the appearance of fatty liver on abdominal CT scan with lipid profile in these research subject. Suggestion for the next study with addition of its etiology and body mass index from the research subjects.

DECLARATIONS

Ethics approval and consent to participate. Permission for this study was obtained from the Ethics Committee of Universitas Sumatera Utara and Haji Adam Malik General Hospital.

CONSENT FOR PUBLICATION

The Authors agree to publication in Journal of Society Medicine.

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COMPETING INTERESTS

None.

AUTHORS' CONTRIBUTIONS

The study concept was developed by Fariz Nugraha Akbar, Elvita Rahmi Daulay, and Taufik Sungkar. They were also involved in the study's design, data collection, analysis, and interpretation, as well as manuscript drafting and revision. Taufik Sungkar and Elvita Rahmi Daulay provided rigorous evaluation of the manuscript. The final version of the manuscript has been reviewed, read, and approved by all authors.

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