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Characterization of the Liver for Alcoholic Volunteers Using Ultrasonography in Sudanese Males

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Abstract: *Alcoholic liver disease is a result of over consuming alcohol which damages the liver, leading to a buildup of fats, inflammation, and scarring. It can be fatal. And one of the modalities used in the liver evaluation is Diagnostic Ultrasound, also called diagnostic medical sonography, which is an imaging method that uses high-frequency sound waves to produce images of structures within the body. This study highlights the Characterization of the liver of alcoholic volunteers to see its impact on the liver, the population of this study includes 100 volunteers divided into 65 as alcoholic consumers and 35 as none-consumers. For comparing them, all went through an abdominal ultrasound exam for liver evaluation and has been prepared for the exam previously, then liver echogenicity was evaluated along with the liver size measurement, also other demographic data such as age, duration of consumption, body mass index, etc..., were taken for analysis. This study was conducted in the period from March 2021 till May 2021 in (Elraqi Hospital). We finalized that there's a significant correlation between liver size and the duration of alcohol consumption and between an alcoholic, nonalcoholic with values of (.054) (.000) respectively.*

Background: *Alcoholic liver disease is a result of over-consuming alcohol that damages the liver, leading to a buildup of fats, inflammation, and scarring. It can be fatal. There are 3 types of liver disease related to alcohol consumption: fatty liver (steatosis), alcoholic hepatitis and cirrhosis. Fatty liver disease occurs after acute alcohol ingestion and is generally reversible with abstinence. Fatty liver is not believed to predispose a patient to any chronic form of liver disease if abstinence or moderation is maintained.*

Materials and Methods: *The data was collected form 100 volunteers divided into 65 as alcoholics and 35 as normal (non-alcoholic) for comparing they all went through ultrasound abdominal exam for liver and has been prepared for the exam previously then liver exam by ultrasound was done to detect the echognicty, liver angle and the liver size measurement. Also other demographic data such as age, duration of consumption and BMI were collected. Volunteers were also checked for having hypertension and diabetes. All these data were analyzed by using SPSS package version 17 for quantitative data to find out indicators aimed by this study.*

Results: *This study shows a significant correlation between fatty liver, and duration of alcohol consumption with value of (.054) and between alcoholic, non-alcoholic with p value (.000). In liver for normal people increase linearly by (0.2 cm^2/year) staring at (9.3 cm^2) which means yearly liver increase by an obvious amount, in case of abnormal in respect to normal their increase was very minimal i.e. (0.04 cm^2/year) and normally start at (13.52 3 $cm^{2)}$ which means at the time of scan regardless the age the liver size already increase as result of alcoholic effect.*

Conclusion: *In conclusion Ultrasonography is a sufficiently reliable tool for the characterization and detection of alcoholic fatty liver. In which alcohol affects the liver in different ways, as an increase in size or in appearance in fatty liver disease on ultrasound images. Our result shows that the longer the duration of alcohol consumption the more relatively increased size of the liver and appearance of fatty liver*

Key Word: ultrasound; fatty liver; alcoholic.

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I. Introduction

The liver is one of the most complex organs in the human body, with over 500 functions. These include filtering out blood toxins, storing energy, making hormones and proteins, and regulating cholesterol and blood sugar. Liver damage can affect the whole body.[1] once damage begins, it can take a long time to become noticeable. Alcoholic liver disease is a result of over-consuming alcohol that damages the liver, leading to a buildup of fats, inflammation, and scarring. It can be fatal. There are 3 types of liver disease related to alcohol consumption: fatty liver (steatosis), alcoholic hepatitis and cirrhosis. Fatty liver disease occurs after acute alcohol ingestion and is generally reversible with abstinence.[2] Fatty liver is not believed to predispose a patient to any chronic form of liver disease if abstinence or moderation is maintained. Alcoholic hepatitis is an acute

form of alcohol-induced liver injury that occurs with the consumption of a large quantity of alcohol over a prolonged period. Alcoholic hepatitis can range in severity from asymptomatic derangement of biochemistries to liver failure and death. Cirrhosis is when a large amount of hepatic tissue is permanently replaced with nonfunctional scar tissue also known as fibrosis.[2] One of the modalities used in liver evaluation is Diagnostic ultrasound, also called sonography or diagnostic medical sonography, is an imaging method that uses high-frequency sound waves to produce images of structures within your body. The frequencies of ultrasound required for diagnostic medical imaging are in the range of (1-20) MHZ. The images can provide valuable information for diagnosing and treating a variety of diseases and condition.[3]

II. Material And Methods

This Cross sectional study was carried out on patients of Department ultrasound at alraqi hospitals from March 2021 to May 2021. Total 300 adult male of aged ≥ 18, years were for in this study.

Study Design: Cross sectional study

Study Location: This study was conducted in Sudan - Khartoum in alraqi hospitals

Study Duration: march 2021 to May 2021.

Sample size: 100 patients.

Sample size calculation: The sample size was estimated on the basis of a single proportion design. The target population from which we randomly selected our sample was considered 100.

Subjects & selection method: The data will was collected from 100 individuals, 35 non-alcoholic volunteers with mostly normal liver ultrasound images and 65 alcoholic volunteers with mostly abnormal ultrasound images. The data were used for analysis.

Inclusion criteria:

1. Patients with a history of drug or alcohol abuse.
2. Male gender only
3. Aged ≥ 18 years,

Exclusion criteria:

1. Women volunteer
2. Patients with genetic disorders
3. Patient with liver disease
4. Covid Patients.

Procedure methodology

The data was collected form 100 volunteers divided into 65 as alcoholics and 35 as normal (non-alcoholic) for comparing they all went through ultrasound abdominal exam for liver and has been prepared for the exam previously then liver exam by ultrasound was done to detect the echognicty, liver angle and the liver size measurement. Also other demographic data such as age, duration of consumption and BMI were collected. Volunteers were also checked for having hypertension and diabetes

Statistical analysis

All these data were analyzed by using SPSS package version 17 for quantitative data to find out indicators aimed by this study. The level $P < 0.05$ was considered as the cutoff value or significance.

III. Result

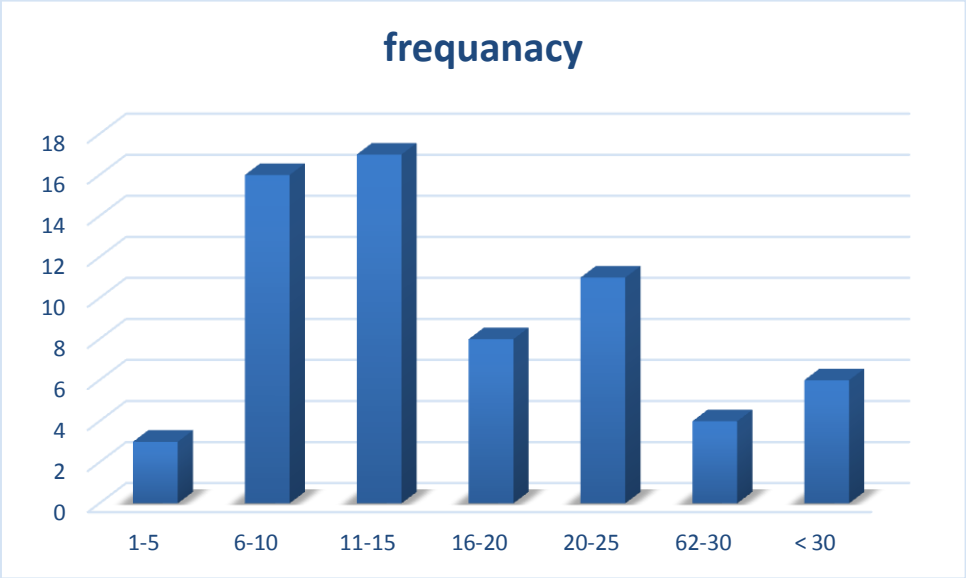

Figure (4.1) shows frequency duration of alcoholic drinking

Table (4.1) shows Descriptive Statistics for age and BMI

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
age	65	20	78	30.88	12.868
BMI	65	14.90	30.67	23.1766	3.42769
liver_volume	65	12.1	18.5	14.799	1.2617

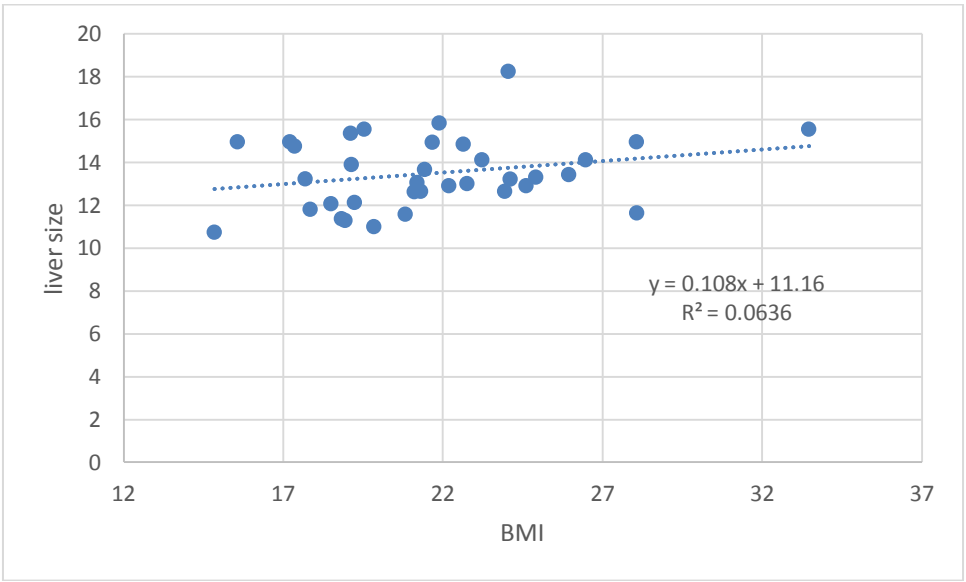

Figure (4.2) scatter plot shows correlation between BMI and Liver volume In normal

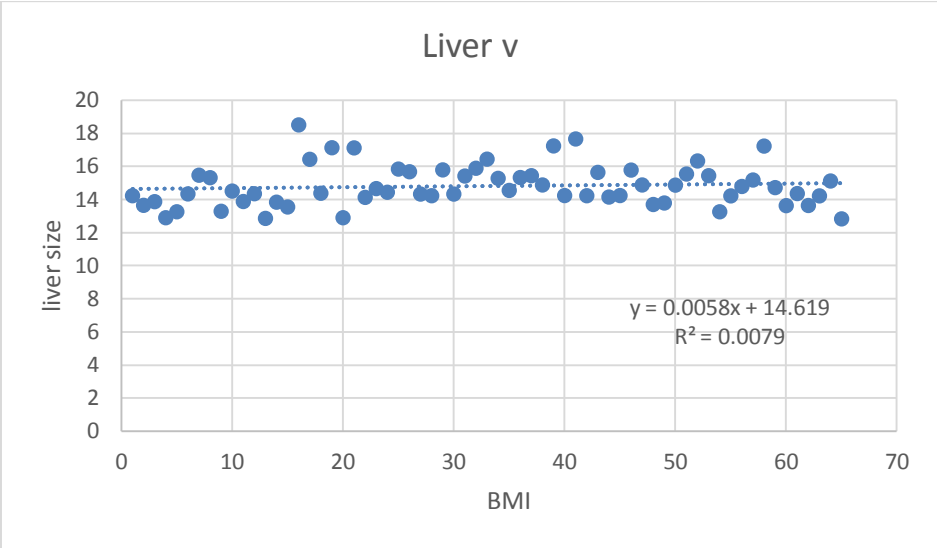

Figure (4.3) scatter plot shows correlation between BMI and Liver volume In alcoholic

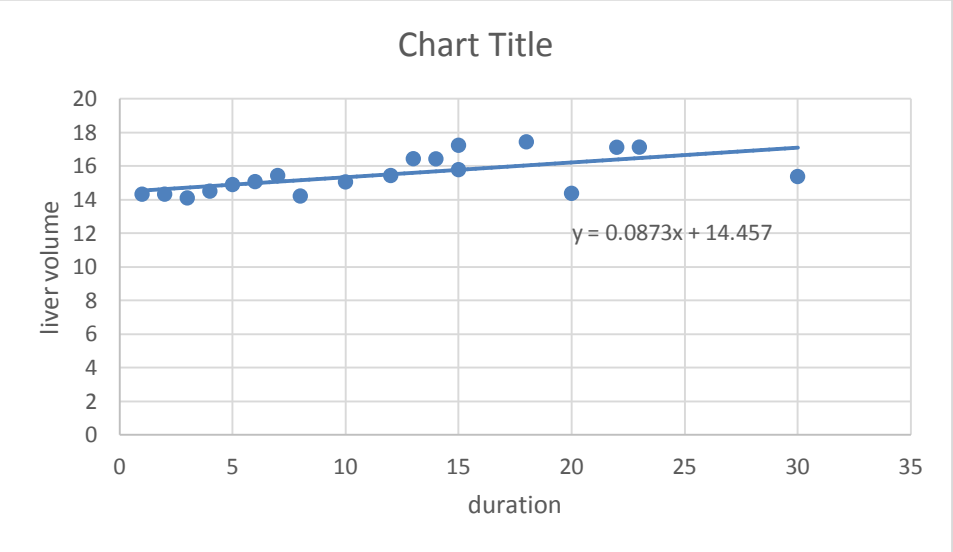

Figure (4.4) scatter plot shows correlation between Liver volume and duration of alcoholic drinking

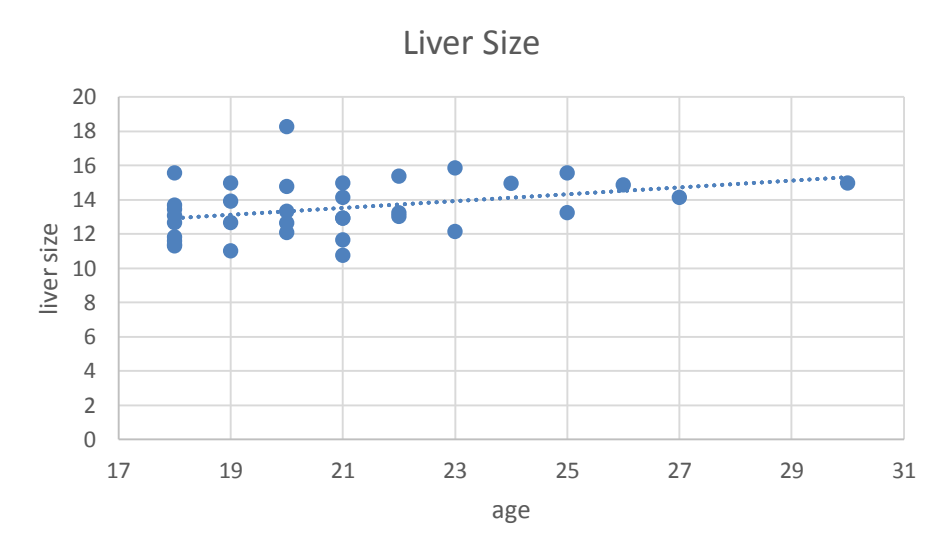

Figure (4.5) scatter plot shows correlation between Liver size and age of normal

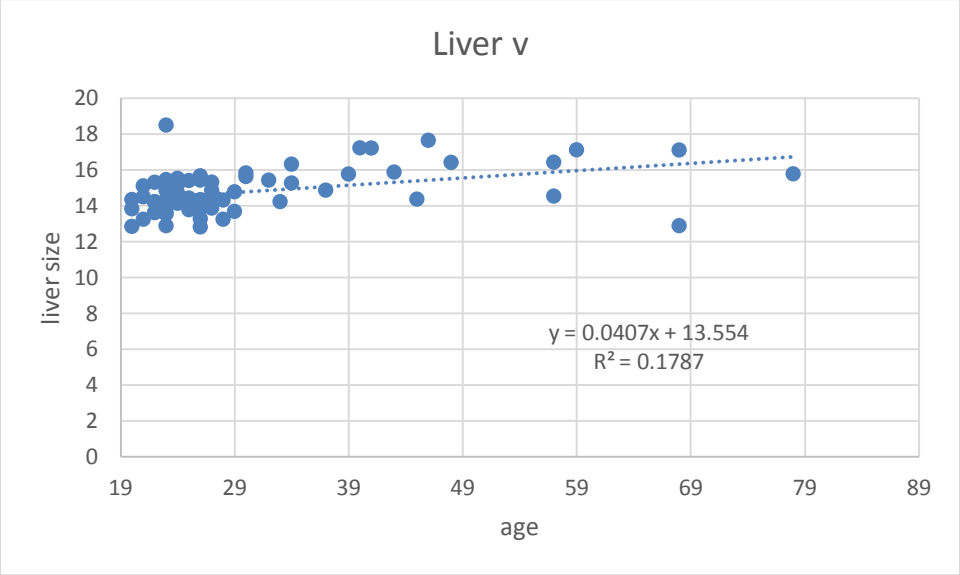

Figure (4.6) scatter plot shows correlation between Liver size and age of alcoholic drinking

Table (4.2) shows statistical test for of fatty liver and duration of alcoholic drinking

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.393[a]	6	.054
Likelihood Ratio	17.057	6	.009
Linear-by-Linear Association	5.895	1	.015
N of Valid Cases	65		
a. 9 cells (64.3%) have expected count less than 5. The minimum expected count is 1.25.			

Table (4.3) shows statistical test for of liver volume and duration of alcoholic drinking

One-Sample Test						
	Test Value = 13.4					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
liver_volume	8.940	64	.000	1.3991	1.086	1.712

IV. Discussion

the aim of this study is the characterize the liver in alcoholic and non-alcoholic individuals, the data were collected for analysis from (100) volunteers, (65) alcoholic individuals and (35) non-alcoholic with an average age of (30.88) that holds a MAX of a 78 year old and a MIN of 20 year old, we calculated each of the 65 individuals BMI that came out with an average of a (23.1766kg/m^2) varied with a MAX of (30.67kg/m^2) and a MIN of (14.90kg/m^2) in addition to measuring liver size that came out with an average of (14.79cm) a MAX of (18.5cm) and a MIN of (12.1cm) as shows in table (4.1)

In figure (4.2) in normal we notice in the individuals with a high BMI a relatively bigger liver size with a correlation increase of (0.108), as in staring point of (11.1 cm) this result goes with -Monica Patzak, et al (2014) study- we verify that the BMI & HS are associated with relatively increasing effect on the liver size.

As well as an increase of (0.005) with the liver size in correlation with the individuals of a long duration of alcoholic drinking. And it Another similar result that was found, Ruben Hernaez, et al (2011) study- we verify the reliability of ultrasonography on the detection of fatty liver. As shows in figure (4.3). We also notice a hyperechoic appearance of the liver suggesting Fatty Liver Disease in the individuals with a long duration of alcoholic consumption which begins to highly manifest in most individuals of a (6 years) duration of consumption. Figure (4.4)

While on the other hand a (30 years) duration of alcohol consumption in one individual showed signs of a cirrhotic liver in which the liver shrinks in size. figure (4.5) beside of -Christophe Aube, et al (1999) study- we could not verify the accuracy of ultrasound in the detection of cirrhosis, possibly because we only had one incoming case of cirrhosis.

Referencing to both -Sarah H Wild, et al (2020) and Takao Kojima, et al (2012) studies- we had some incoming volunteers with a light/moderate and an inconsistent amount of drinking with duration of alcoholic

consumption ranged from (1-8 years) that showed no signs of Fatty Liver Disease. It may relate to the concentration and the amount of alcohol consumed.

In liver for normal people increase linearly by (0.2 cm^2/year) staring at (9.3 cm^2) which means yearly liver increase by an obvious amount, in case of abnormal in respect to normal their increase was very minimal i.e. (0.04 cm^2/year) and normally start at (13.52 3 $cm^{2)}$ which means at the time of scan regardless the age the liver size already increase as result of alcoholic effect. This also apply in BMI as notice in fig (4.2) and (4.3) respectively.

This study shows a significant correlation between fatty liver, andduration of alcohol consumption and between alcoholic , non-alcoholic with value of (.054) (.000) respectively as shows in table (4.2) and (4.3).

V. Conclusion

In conclusion Ultrasonography is a sufficiently reliable tool for the characterization and detection of alcoholic fatty liver. In which alcohol affects the liver in different ways, as an increase in size or in appearance in fatty liver disease on ultrasound images. Our result shows that the longer the duration of alcohol consumption the more relatively increased size of the liver and appearance of fatty liver.

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