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STUDY OF ALT & AST IN DIFFERENT AGE GROUP FOR THE ANALYSIS OF FATTY LIVER DISEASE

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Abstract: **Background**
Patients with fatty liver disease have an increased prevalence of high SGOT &SGPT. The study was designed to study the level of SGOT&SGPT in different age group for the analysis of Fatty liver disease.
Method
A total 120 patients were subjected for biochemical examination. About 5ml of whole blood was collected from each subject for biochemical analysis. This is a retrospective study done in biochemistry department of Lourdes Hospital Ernakulam, Kerala during one month period.
Result
SGOT &SGPT levels increases with increase in age and the highest is in the patients above 40years of age.
Conclusion
In my study I conclude the patients including in the age group of 20-30,the abnormality in AST,ALT levels are 23% and 27% respectively. In the age group 30-40, it has increased to 37% and 40% respectively. In the age group 40-50, the AST,ALT level shows a remarkable increase.It has increased to 67% and 70% respectively. And in the patients above 50 years of age, the AST level is 77% and ALT level is 70%. The study reveals that AST,ALT levels increases with increase in age and highest is in the patients above 40years of age. This indicates that the patients belonging to the age group above 40years are prone to fatty liver disease and thereby to liver damage.

I. INTRODUCTION

The term fatty liver means that yellow discolouration as a result of the accumulation of certain fats in the liver can be caused by alcoholic cirrhosis or pregnancy or exposure to certain toxins[1]. Fat molecules infiltrate the cytoplasm of the cell. These are seen as fat droplets which are merged together so that most of the cytoplasm become laden with fat. The nucleus is pushed to side of the cell. Nucleus disintegrates and ultimately hepatic cell is lysed. As a healing process the dead cell is replaced by fibrous tissue causing fibrosis of liver and otherwise known as cirrhosis. progresses through three stages:

- Your liver becomes inflamed (swollen), which damages its tissue. This stage is called steatohepatitis.
- Scar tissue forms where your liver is damaged. This process is called fibrosis.
- Extensive scar tissue replaces healthy tissue. At this point, you have cirrhosis of the liver[2].

Two types of fatty liver are there,

1. Alcoholic fatty liver
2. Non-alcoholic fatty liver

Alcoholism leads to fat accumulation in the liver, hyperlipidemia and ultimately cirrhosis. Ethanol consumption over a long period leads to the accumulation of fatty acids in the liver that are derived from endogenous synthesis rather than from increased mobilization from adipose tissue[3]. Non alchaholic fatty liver disease usually causes no signs and symptoms. When it does, they may include:

- Fatigue
- Pain or discomfort in the upper right abdomen
- Possible signs and symptoms of NASH and advanced scarring (cirrhosis) include:
- Abdominal swelling (ascites)
- Enlarged blood vessels just beneath the skin's surface
- Enlarged spleen
- Red palms
- Yellowing of the skin and eyes (jaundice)[4]

The main complication of fatty liver is cirrhosis, Cirrhosis occurs in response to liver injury and inflammation. As the liver tries to halt inflammation, it produces areas of scarring (fibrosis). If the process isn't interrupted, cirrhosis can lead to:

- Fluid build-up in the abdomen (ascites)
- Swelling of veins in your esophagus (esophageal varices), which can rupture and bleed
- Confusion, drowsiness and slurred speech (hepatic encephalopathy)
- Liver cancer

End-stage liver failure, which means the liver has stopped functioning.Between 5% and 12% of people with fatty liver will progress to cirrhosis[5]. Laboratory liver tests are broadly defined as tests useful in the evaluation and treatment of patients with hepatic dysfunction[6]. Liver function tests(LFT)are effective modalities to detect hepatic dysfunction[7].

Liver function test have four potential applications

- As an aid to establishing whether an individual has liver disease
- As an aid to making a specific diagnosis
- To establish the severity of liver dysfunction or damage once a specific diagnosis has been established
- To monitor the progression of the disease and any response to therapeutic intervention [8]

Some common liver function tests include[9]:

- Alanine transaminase (ALT)
- Aspartate aminotransferase(AST)
- Alkaline phosphatase(ALP)
- Albumin
- Bilirubin
- Total protein

ALT is found in plasma and in various body tissues, but is most common in the liver[10]. When liver cells are damaged, ALT leaks out in to the blood stream and the level of ALT in the blood become higher than normal[11]. Presence of bright liver and elevated plasma ALT level was independently associated with increased risk of the metabolic syndrome[6]. ALT catalyzes the transfer of an amino group from L alanine to α-ketoglutarate, the products of this reversible transamination reaction being pyruvate and L-glutamate[12]

ALT
L-glutamate + pyruvate ⟷ α-ketoglutarate + L-alanine

Normal value :- Up to 40U/L

Aspartate transaminase(AST) or aspartate aminotransferase or serum glutamate oxaloacetate transaminase (SGOT) is a pyridoxal phosphate(PLP)dependent transaminase enzyme[13]. Serum AST level, Serum ALT level, and their ratio are commonly measured clinically as a biomarker for liver health[14]. Very high level of AST is associated with acute hepatocellular damage, myocardial infraction, circulatory collapse(shock) and infectious mononucleosis[15].

NORMAL VALUE :- Up to 40U/L

MATERIALS AND METHODS

SOURCE OF DATA

This is a retrospective study done in biochemistry department of Lourdes Hospital, Ernakulam, Kerala during three month period.

SAMPLE SIZE

A total of 120 patients (30 in each age group) were subjected for biochemical examination. About 5 ml of whole blood was collected from each subject for biochemical analysis.

INCLUSION CRITERIA

- Patients above 20 years of age.

EXCLUSION CRITERIA

- People aged above 80 years.
- Patients who had pregnancy, diabetes and high lipid profile.

BLOOD COLLECTION: Venous blood collection

SAMPLE :- Serum

AUTOMATIC MACHINE :- Cobas pure

PRINCIPLE- Spectrophotometric method

ESTIMATION OF AST
PRINCIPLE –

Kinetic determination of Aspartate Aminotransferase(AST) based upon the following reaction

$$\text{L-Aspartate} + \alpha\text{-ketoglutarate} \xrightarrow{\text{AST}} \text{Oxaloacetate} + \text{L-glutamate}$$

$$\text{Oxaloacetate} + \text{NADH} + H^+ \xrightarrow{\text{MDH}} \text{L-Malate} + NAD^+$$

ESTIMATION OF ALT

PRINCIPLE

Kinetic determination of SGPT based on the following reaction

$$\text{L-Alanine} + \alpha\text{ keto glutarate} \xrightarrow{\text{ALT}} \text{Pyruvate} + \text{L-Glutamate}$$

$$\text{Pyruvate} + \text{NADH} + H^{+} \xrightarrow{\text{LDH}} \text{L – Lactate} + NAD^{+}$$

OBSERVATION

The study was done in Lourdes Hospital, Ernakulam for a period of two month. A total of 120 serum samples were collected for the analysis of SGOT SGPT in different age groups to detect the possibility of Fatty Liver disease.

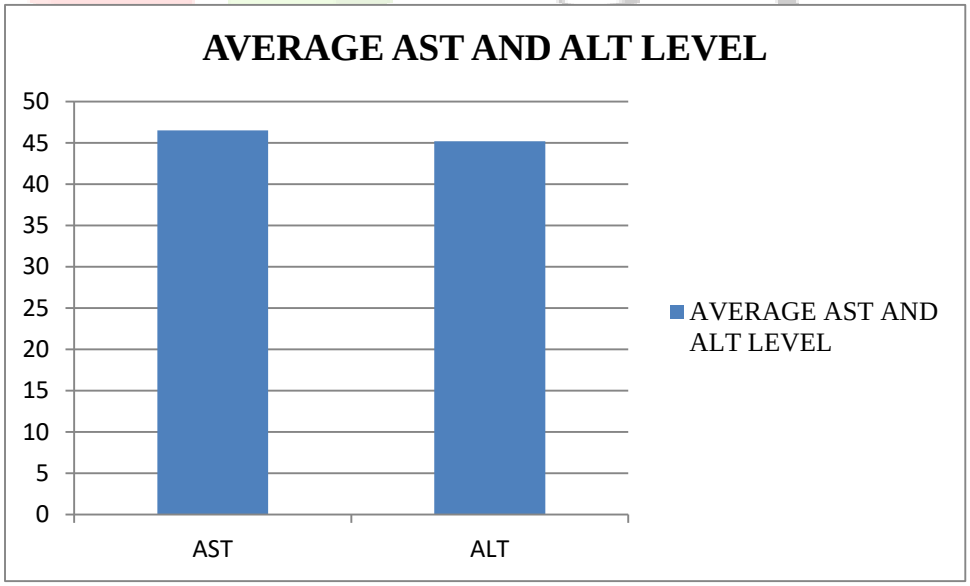
RESULT

GRAPHIC REPRESENTATION OF DATA

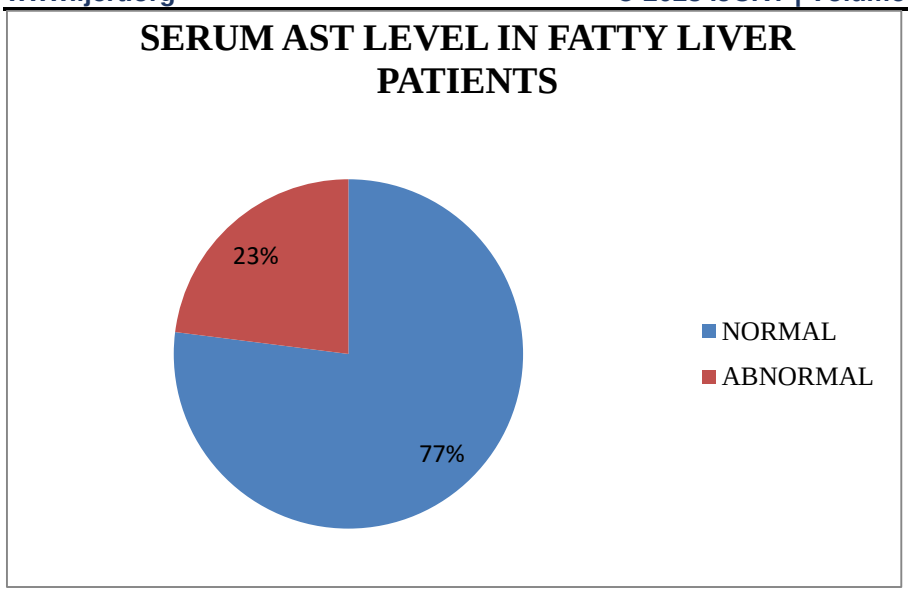
AGE GROUP 20-30

AVERAGE LEVEL OF AST AND ALT	
AST	ALT
46.5	45.23

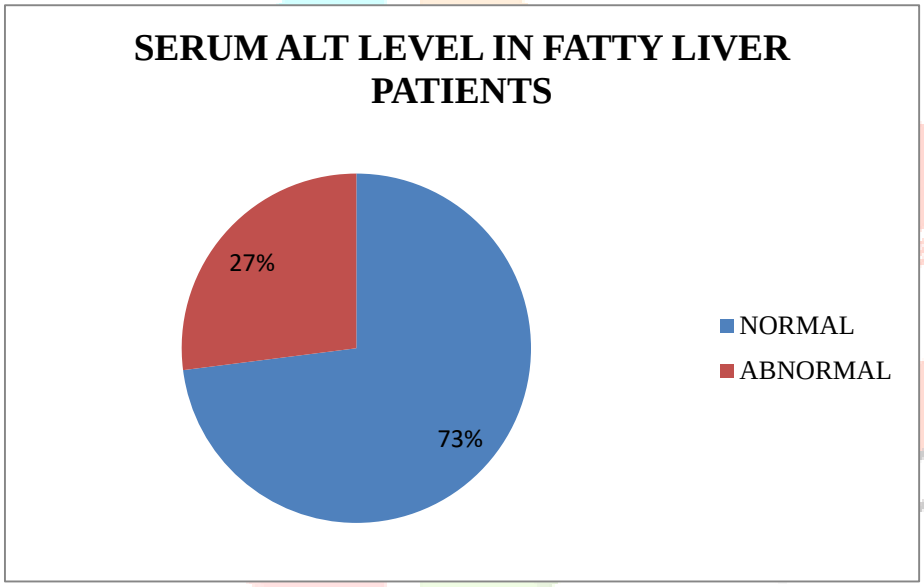
Table. 5



Graph. 1



Graph. 2

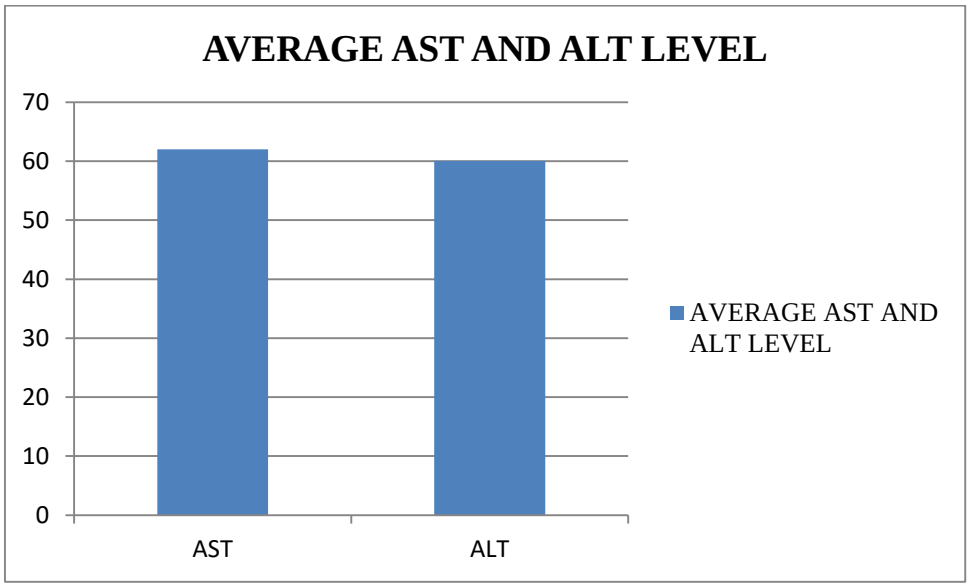


Graph. 3

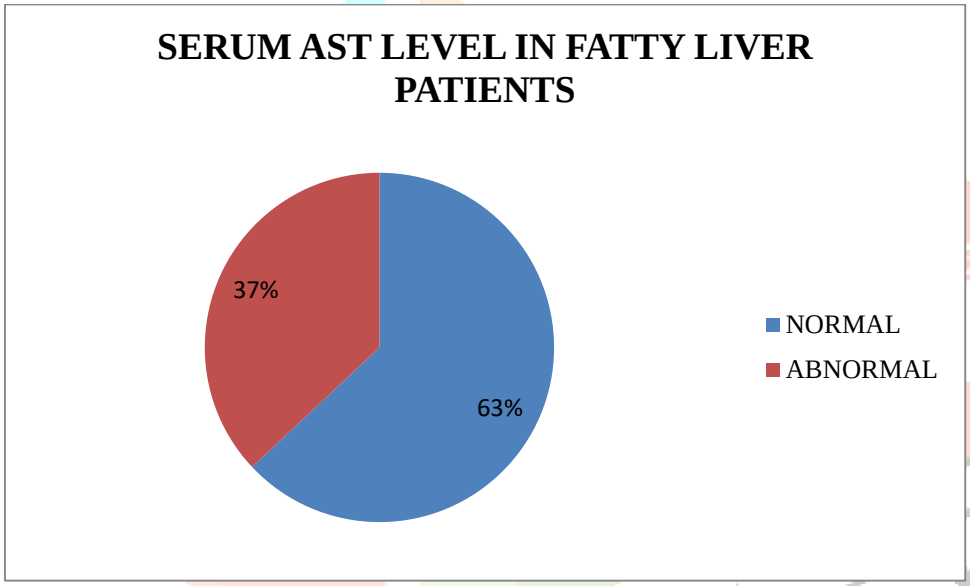
AGE GROUP 30-40

AVERAGE LEVEL OF AST AND ALT	
AST	ALT
62.03	66.06

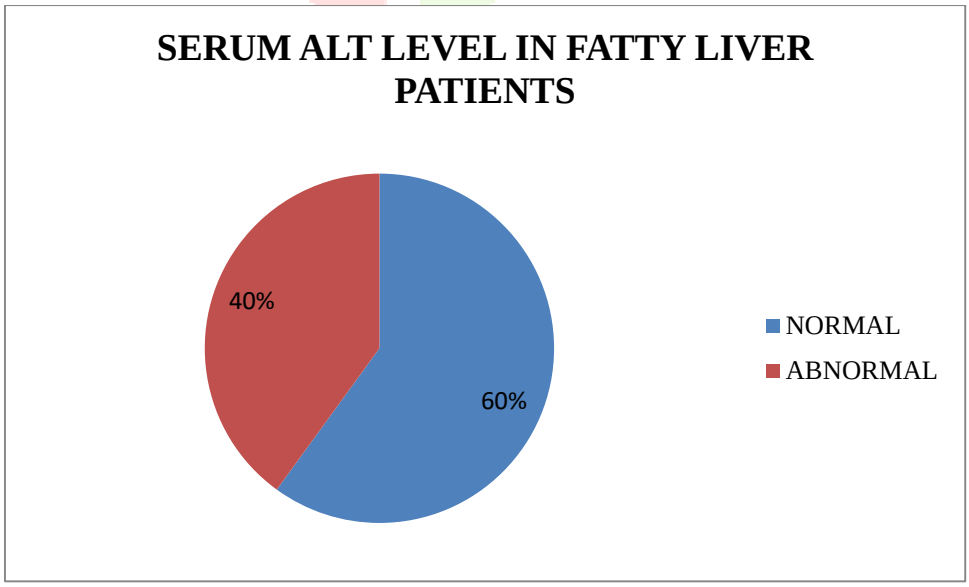
Table. 6



Graph. 4



Graph. 5

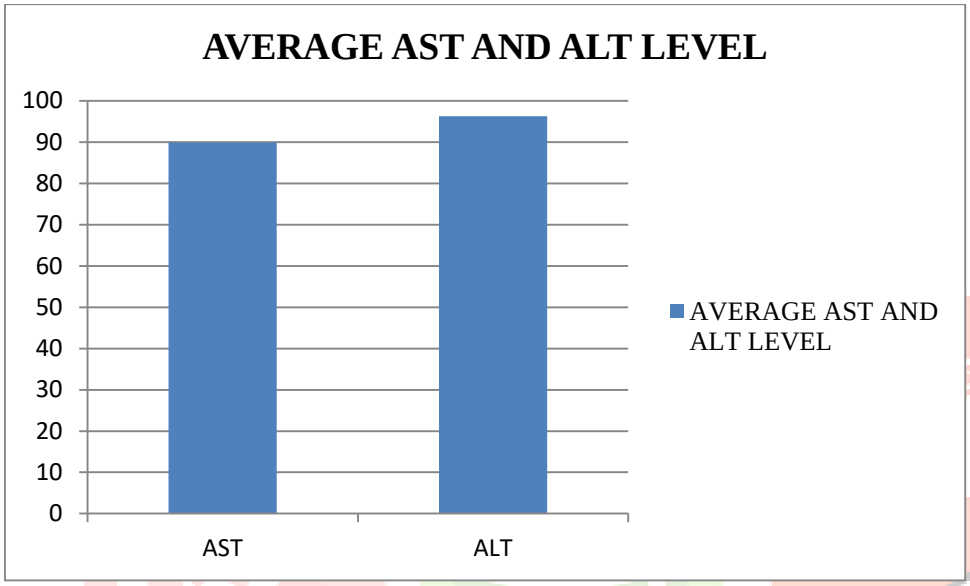


Graph. 6

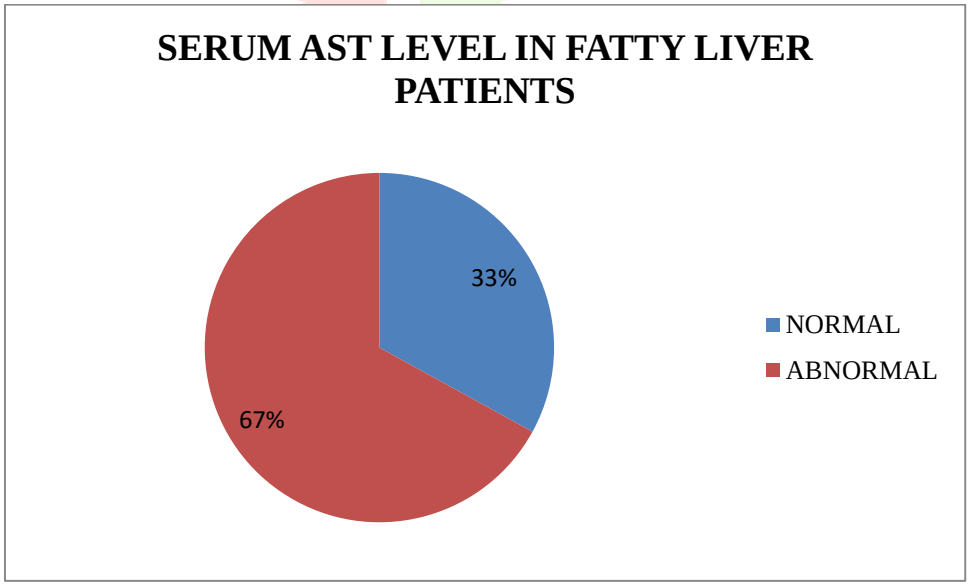
AGE GROUP 40-50

AVERAGE LEVEL OF AST AND ALT	
AST	ALT
89.9	96.23

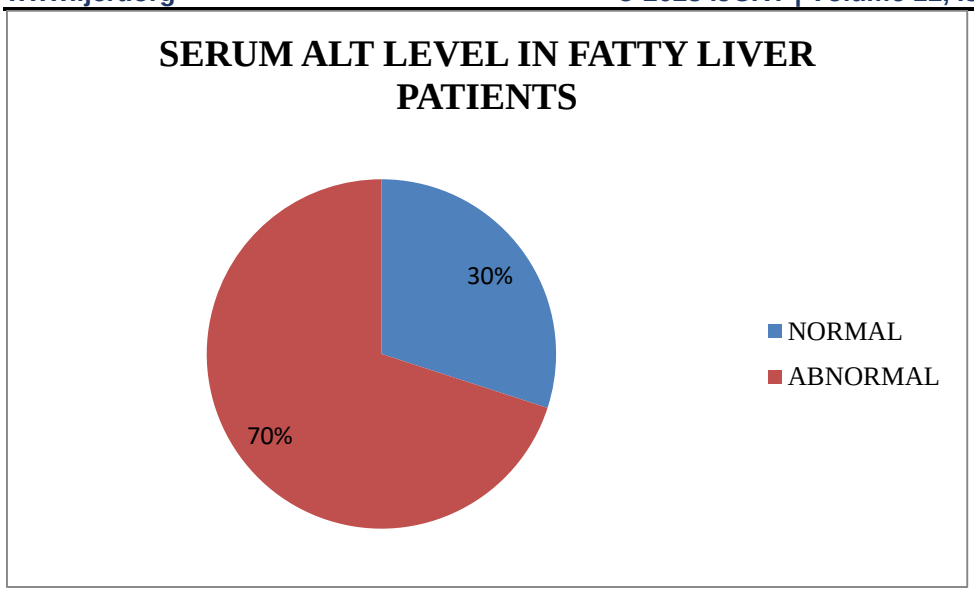
Table. 7



Graph. 7



Graph. 8

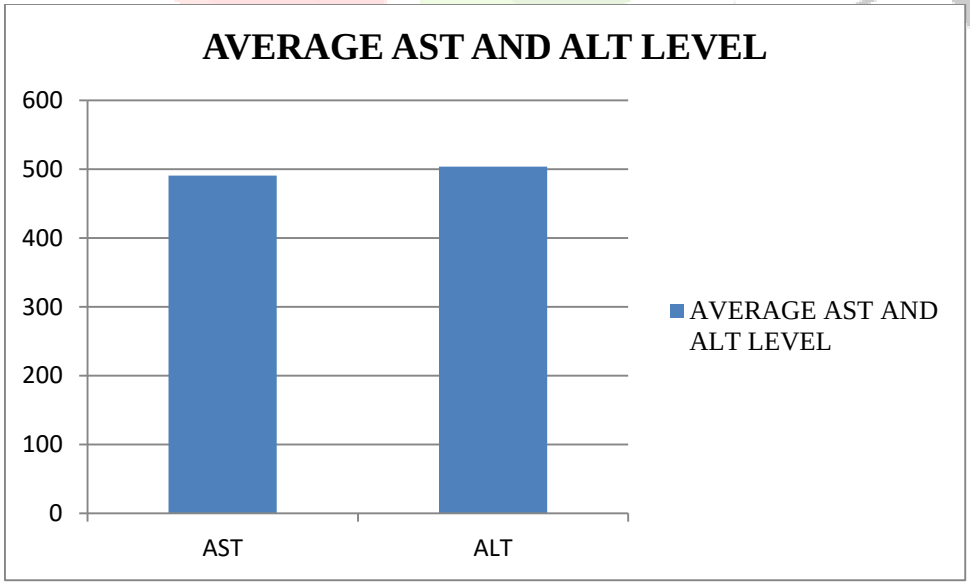


Graph. 9

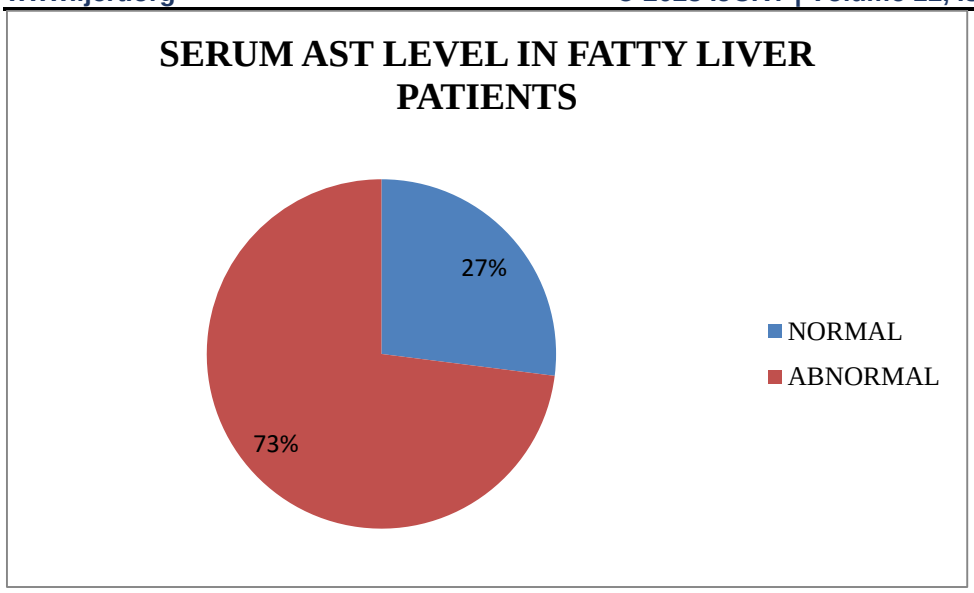
AGE GROUP ABOVE 50

AVERAGE LEVEL OF AST AND ALT	
AST	ALT
490.77	504.03

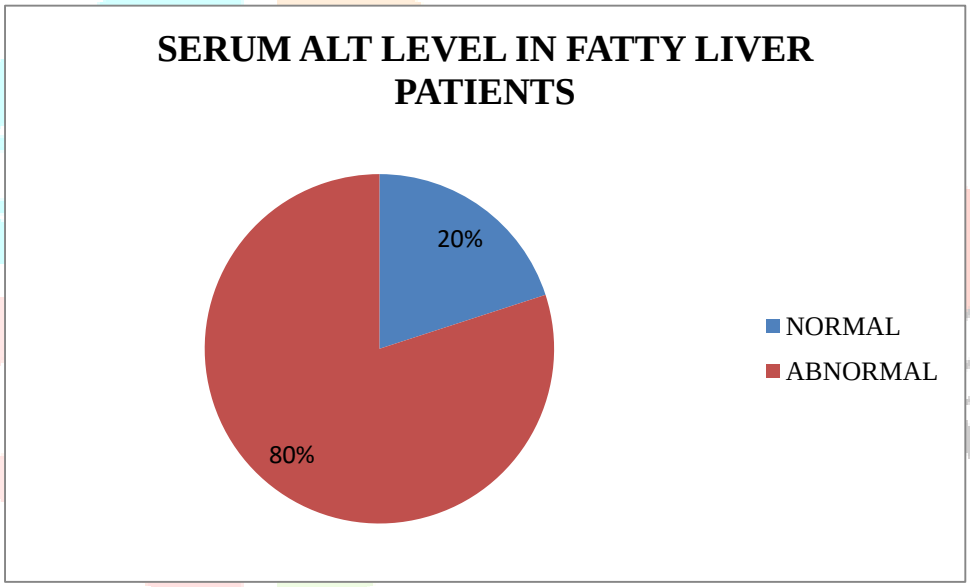
Table. 8



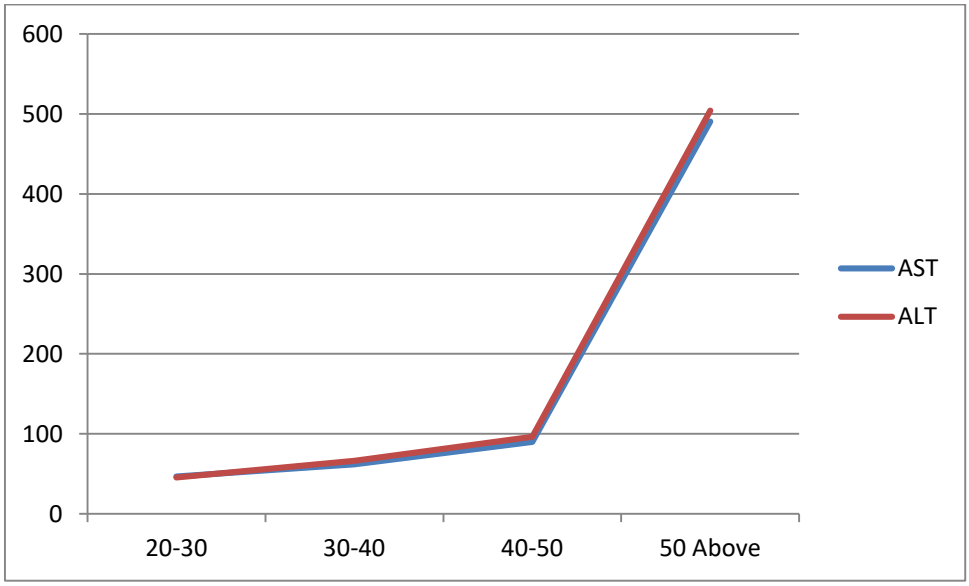
Graph 10



Graph. 11



Graph. 12



Graph. 13

Line graph showing increase in AST,ALT level with increasing age

DISCUSSION

In my study about SGOT SGPT IN DIFFERENT TYPES OF AGE GROUPS, 120 samples in 4 age groups (30 samples each) are selected and their SGOT, SGPT levels are observed. A significant rise in the serum SGOT, SGPT are observed in the patients above 40 years of age.

'Fatty researcher Liver disease highly prevalent in American adults.' A study by Sukanya Charuchandra (August 19, 2020). Based on the age the found fatty liver disease in 48% of all participants. The prevalence of the condition differed across age groups: 36% among those ages 18-39 years, 56% among those ages 40-59 years and 57% among those who were 60 years old[16].

'Non-alcoholic Fatty Liver Disease and Metabolic Syndrome'. A study by P. Paschos and K. Paletas (March-January, 2009) shows the prevalence of NAFLD increases with age and highest prevalence is in those between 40 and 49 years old[17].

'Prevalence of non-alcoholic fatty liver disease:population based study.' A study by Deepak Amarapurkar, Prafull Kamani, Nikhil Patel, Parijat Gupte, Pravin Kumar, Subhash Agal, Rajiv Baijal, Somesh Lala, Dinesh Chaudhary and Anjali Deshpande (July-September, 2007) shows fatty liver disease is more prevalent in people above 40 years of age[18].

CONCLUSION

According to the study in 120 patient samples that came to Lourdes Hospital, Ernakulam during one month, the following conclusions are made.

My study was based on the variation of AST, ALT levels in patients of different levels of age groups.

In the patients including in the age group of 20-30, the abnormality in AST, ALT levels are 23% and 27% respectively. In the age group 30-40, it has increased to 37% and 40% respectively. In the age group 40-50, the AST, ALT level shows a remarkable increase. It has increased to 67% and 70% respectively. And in the patients above 50 years of age, the AST level is 73% and ALT level is 80%.

The study reveals that AST, ALT levels increases with increase in age and the highest is in the patients above 40 years of age. This indicates that the patients belonging to the age group above 40 years are prone to Fatty Liver disease and thereby to liver damage.

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