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Prevention of chronic liver disease by applying therapeutic diet

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Abstract
Chronic liver disease (CLD) in the clinical context is a disease process of the liver that involves a process of progressive destruction and regeneration of the liver parenchyma leading to fibrosis and cirrhosis. It refers to disease of the liver which lasts over a period of six months. It consists of a wide range of liver pathologies which include inflammation (chronic hepatitis), liver cirrhosis, and hepato-cellular carcinoma. Portal hypertension is the earliest and most important consequence of cirrhosis and underlies most of the clinical complications of the disease. This study was carried out at AMRI hospital, Bhubaneswar to find the prevention of CLD by applying therapeutic diet. About 30 patients were chosen as a subject and analyzed in respect to their anthropometric, nutritional and bio-chemical parameters. In the study of anthropometric assessment it was found that CLD patients had lower BMI and MUAC level than standard level. The BMI and MUAC of CLD patient was found 19.66 ± 0.202 and 21 ± 0.967 respectively. The values were found significantly differ from the reference standard value with F-value for BMI and MUAC was 1.69 and 0.033 respectively at $p<0.001$, where as in biochemical assessment it was found that CLD patients had lower level of albumin and higher level of bilirubin, SGOT and SGPT than normal level. The SGOT and SGPT of CLD patient was found 46.4 ± 0.008 and 51.7 ± 0.031 respectively. The values were found significantly differ from the reference standard value with F-value for SGOT and SGPT was 5.813 and 3.970 respectively at $p<0.001$. During the analysis of nutritional assessment it was found that CLD patients consume low amount of protein, fat and carbohydrate and high amount of fat rich food and therapeutic diet was designed according to the condition of severity of disease. The patients were generally recommended for high protein, low fat, moderate amount of carbohydrate, moderate amount of energy, and low sodium diet.

Keywords: Albumin, bilirubin, SGOT, SGPT, BMI, MUAC, therapeutic diet

Introduction
Liver is the one of the most important largest organ in our body, its weight (1.44-1.66) kg, it is radish brown in colour and it is present in the right site of the abdominal cavity. Mainly four cells are present in the liver like hepatocyte cell, sinusoidal cell, kuppfer cell and fat storing cell. There are four stages of liver diseases that include first stage as fatty liver, followed by hepatitis, cirrhosis of liver and at last stage liver cancer (hepato-cellular carcinoma). Non alcoholic fatty liver disease (NAFLD) encompasses a spectrum of liver disorders characterized by macro vesicular hepatic fat accumulation alone (Steatosis), or accompanied by sings of hepatocyte injury, mixed inflammatory cell infiltrate and variable hepatic fibrosis (non alcoholic steato hepatitis) through to cirrhosis. Found that non alcoholic fatty liver disease is associated with an increased incidence of CKD in individuals with type II diabetes, independent of numerous baseline confounding factors.

Liver cirrhosis, cancers and heart disease take time to develop; chronic effects resulting directly from alcohol misuse are rarely seen among people. Thus it is the shorter-term acute effects of alcohol consumption that are more evident in this population. In particular, acute intoxication can occur rapidly and by surprise in children and young people which is probably due to a combination of physiological factors (e.g. limited ability to metabolism alcohol and lower body weight) and socio-cultural reasons (including a lack of experience of the effects of alcohol and drinking in unsupervised contexts). The most common impacts of alcohol intoxication are vomiting and coma, which in cold environments can result in fatal hypothermia.

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Different types of diagnostic test are available to diagnose the chronic liver disease. Liver function test (LFTs) is the main diagnostic test, in this test Albumin, bilirubin, SGOT and SGPT level are measured. The SGOT and SGPT test is a blood test that's part of a liver profile. It measures one of two liver enzymes, called serum glutamic-oxaloacetic transaminase and serum glutamin pyruvic transamylase. This enzyme is now usually called AST and ALT, which stands for aspartate aminotransferase and alkaline transaminase or amino transferase respectively. An SGOT test (or AST test) evaluates how much of the liver enzyme is in the blood. An SGOT/SGPT ratio greater than 2 is highly suggestive of alcoholic hepatitis and cirrhosis. It occurs in 70% of these patients compared with 26% of patients with post necrotic cirrhosis, 8% with chronic hepatitis, 4% with viral hepatitis and none with obstructive jaundice. Liver biopsy is another test to know the liver condition, in this condition small amount of liver tissues are collected and observed under the microscope. Ultra sound is also used to know the ascites condition.

To prevent the liver disease, therapeutic diet is very important. Therapeutic diet is diets which given to the person who are suffer from any disease condition, it is prepared depending up on the illness of the patient; it is also known as routine hospital diet. In liver disease condition, mainly hepatic diet given to the patient, because hepatic diet provide high amount protein, moderate amount of carbohydrate, low amount of fat and restricted amount of sodium and fluid to reminding the protein energy mal nutrition (PEM), ascites and edema condition. Approximately 1800 kcal is required to recover the catabolic state, protein requirement is 1.2 gm/kg body weight for only chronic liver disease patient and 1.5 gm/kg body weight is required for both chronic liver disease and malnutrition patient. Fat requirement should be restricted because in this condition fat is not digest and absorbed in patient body. Sodium and fluid also restricted to reduce ascites and edema condition.

The main aims of nutritional regulations in chronic liver diseases are to aid hepatic healing and regeneration as possible, to prevent and correct protein-calorie malnutrition, and to improve quality of life and prognosis. The nutritional management is also crucial for the treatment of some important complications including as cites, edema and hepatic encephalopathy. To be able to achieve these goals, patients first need an objective assessment of their nutritional status, regular supplementation of macro-and micronutrients when needed, specific regulations for different conditions and most importantly an effective interaction between dietitians and patients. Thus, the objective of the study aims to find the effect of therapeutic diet on nutritional and biochemical status of chronic liver disease patients.

Materials and methods
About 30 patients were chosen as a subject from the Department of Gastrology, at Amri Hospital, Bhubeneswar conducted between February and April, 2018 to establish access and collaboration. Under the anthropometric assessment, height, weight, BMI and MUAC were measured.

For the height measurement anthropometric height measurement tape was used, for weight measurement weight machine was used, for BMI (body mass index) measurement used the calculation that is weight in kg/ height in m². And MUAC tape was used to measure the MUAC. under the nutritional assessment, 24 hours recalled methods were used to know the carbohydrate, protein, fat and energy intake. In case of bio-chemical assessment, liver function test was used to measure the albumin, bilirubin, SGOT and SGPT level. Also measured the sodium and potassium level. As soon as patients were admitted in the hospital and blood samples of the subjects were collected and analyzed the blood test to determine the severity of the condition.

Statistical analysis
One-way ANOVA analysis (F value) was undertaken to test for differences in mean of BMI and MUAC of CLD and non-CLD person. Data processing and statistical analyses were done using the SPSS for Windows statistical software package (Version 10.0, SPSS Inc., Chicago, IL, USA, 2001). Descriptive statistics were used for all the variables studied. The p value of ≤0.001 was considered statistically significant.

Result
The distribution of the study subjects with respect to their BMI and MUAC were presented in Table 1.Under the anthropometric assessment it was found that, mainly BMI and MUAC are affected in CLD patient, because they are suffer from the protein energy malnutrition.

Table 1: BMI and MUAC of CLD patient with Non-CLD person

	BMI (kg/m²)	**MUAC (cm)**
Non-CLD	21±1.52	24±1.4
CLD mean	19.6±0.20	21±0.96

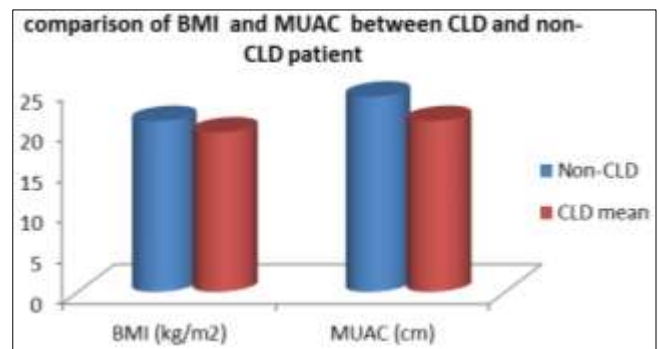*Non-CLD person Vs chronic liver disease -*p<0.001

Fig. 1: Mean BMI and MUAC of CLD patient with respect to non-CLD person

The distribution of the study subjects by carbohydrate, protein, fat and energy are presented in Table 2.In case of nutritional assessment it was found that CLD patients consumes low amount of protein rich food that non-CLD person, as a result they suffer from the protein energy malnutrition.
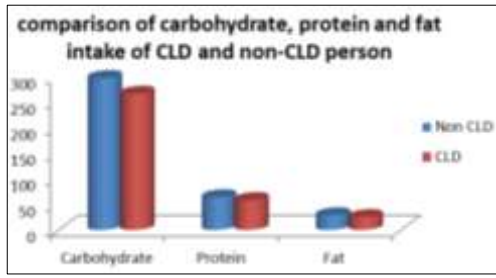
Table 2: Comparison of nutritional status of CLD and non-CLD person

Group	Carbohydrate (gm)	Protein (gm)	Fat (gm)	Energy (Kcal)
Non-CLD	297.5±5.10	63.75±5.00	28.33±5.00	1700 ±5.00
CLD	266.7±0.68	58.1.3± 0.84	24.8±0.39	1507.2±0.60

*Non-CLD person Vs chronic liver disease -*p<0.001

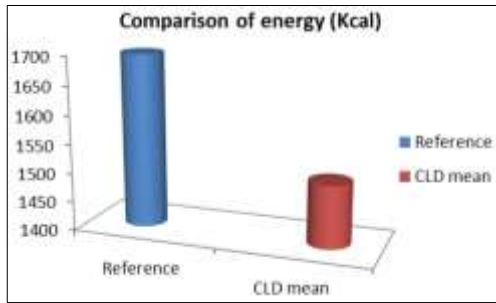**Fig 2:** Carbohydrate, protein and fat intake of CLD and on-CLD person

Fig 3: Energy intake of CLD patient and non-CLD person

Under the bio-chemical assessment it was found that, mainly sodium, potassium, albumin, bilirubin, SGOT and SGPT are effected in CLD patient, because economic status mainly effect on the SGOT and SGPT level of the CLD patient as shown in Table3. The diet given to the CLD patients include approximately 1800 Kcal. The subjects were recommended for green tea in morning, garlic rich soup and rice pancakes in mid-morning and breakfast. The green tea has antioxidant properties and reduces the fat storage from the liver. On the other hand, garlic is recommended for its ability to active the liver enzymes as well as good source of antioxidant. The major food of the day includes protein rich food like thick dahl and paneer to prevent protein energy malnutrition. At bed time, milk with supplementary powder i.e. rich in BCAA (Branch Chain of Amino Acid) was given to control breakdown of protein in the muscle. High and low economic status's patient has high SGOT and SGPT level than moderate economic status's patient because high status's patient intake high spices food and low economic status's patient intake unhygienic food so they are suffer from CLD, and in case of moderate economic status's patient, they are maintain health than high and low economic status's patient.

Table 3: Biochemical status of CLD patient with Non-CLD person

Parameter	Before Therapeutic Diet (mean value)	After Therapeutic Diet (mean value)
Sodium (mMol/lit)	139	136
Potassium (mMol/lit)	4.6	4.3
Albumin (gm/dl)	2.3	3.1
Bilirubin (gm/dl)	2.9	0.9
SGOT (U/L)	51.7	27
SGPT (U/L)	46.4	30

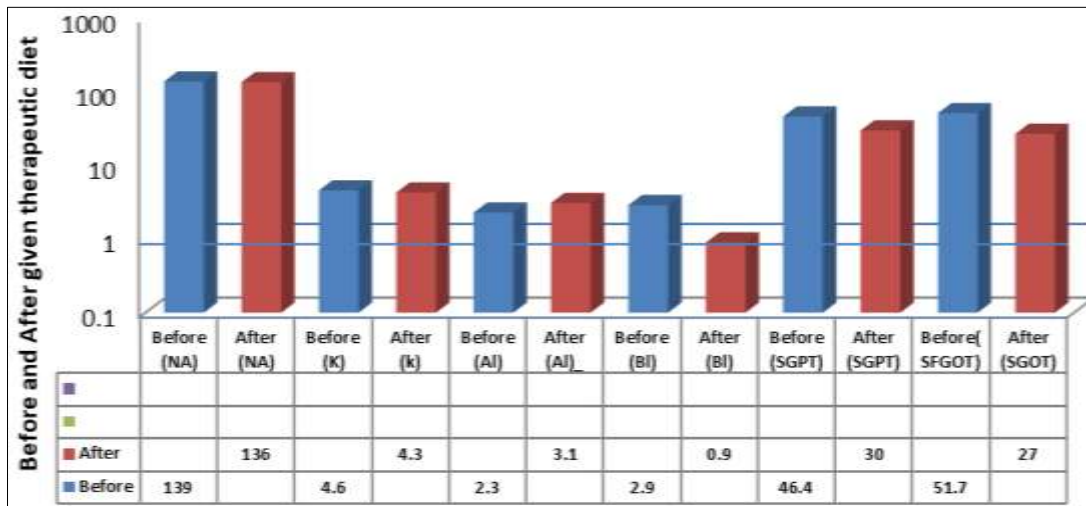*Non-CLD person Vs chronic liver disease -*$p < 0.001$

Fig 4: Biochemical status before and after therapeutic diet.

From the fig.4, it was found that the level of sodium, potassium, bilirubin, SGPT and SGOT were decreased by 2.15%, 6.52%, 68.96%, 35.34% and 47.77% respectively whereas, albumin level was increased by 34% after given therapeutic diet (hepatic diet) to the patients. The increase in albumin and decrease in bilirubin, SGPT and SGOT level are major indicator for recovery of the CLD patients through the hepatic diet.

Discussion
The present section summarizes the results derived in the multiple data analysis conducted above. Analysis is done in order to compare between chronic liver disease patient and normal persons. It tried to find the anthropometrical, nutritional and biochemical status of category has been considered. The samples have been collected from hospital.
In the study of anthropometric assessment, it was found that the mean BMI of CLD patient is lower than the non CLD person's mean BMI. The mean ± SE. of BMI of CLD Patient is 19.66 ±0.202 is significantly (*) different between sample mean and non CLD (p<0.001). In the study of patient's MUAC, it was found that the mean MUAC of CLD patient is lower than the normal person's mean MUAC. The mean ± SE. of weight of CLD Patient is 21 ±0.967 is significantly (*)

different between sample mean and non CLD (p<0.001). The values were found significant in all the parameters, for BMI F-1.699; P<0.001; for MUAC F-0.033; P>0.001.

In nutritional study it was found that, carbohydrate consumption of CLD patient was lower than the standard value. The mean ±SE of carbohydrate is 266.7 ± 0.685 is significantly (*) different between sample mean and standard value (P<0.001). Protein consumption of CLD patient was lower than the standard value. The mean ±SE of protein is 58.13 ± 0.848 is significantly (*) different between sample mean and standard value (P<0.001). Fat consumption of CLD patient is lower than the standard value. The mean ±SE of fat is 24.8± 0.399 is significantly (*) different between sample mean and standard value (P<0.001). Energy consumption of CLD patient was lower than the standard value. The mean ±SE of energy is 1507.2 ± 0.607 is significantly (*) different between sample mean and standard value (P<0.001). The values were found significant in all the parameters, for carbohydrate F-0.384; P>0.001; for protein F-0.166; P<0.001; for fat F-0.95; P<0.001; for energy F- 0.508; P>0.001.

In case of biochemical analysis it was found that, the SGOT of CLD patient it was higher than non CLD person. The mean ±SE of CLD patient is 46.4 ±0.008 is not significantly different between sample mean and non CLD person (p<0.001). In the study of SGPT of CLD patient it was higher than the non CLD person. The mean ±SE of CLD patient is 51.7 ±0.031 is not significantly different between sample mean and non CLD person (p<0.001). In the study of bilirubin of CLD patient it was higher than non CLD person. The mean ±SE of CLD patient is 2.9 ±0.24 is not significantly different between sample mean and non CLD person (p<0.001). In the study of albumin of CLD patient it was lower than non CLD person. The mean ±SE of CLD patient is 2.3 ±0.18 is not significantly different between sample mean and non CLD person (p<0.001).The values were found significant in all the parameters, for SGOT F-5.813; P>0.001; for SGPT F-3.97; P<0.001; for albumin F-0.55; P<0.001; for billirubin F-1.714; P>0.001.

Conclusion

The finding of the present study revealed the requirement of nutrient (protein, fat, carbohydrate, total energy, sodium and fluid) in chronic liver disease patients. The patients were generally recommended for high protein, low fat, moderate amount of carbohydrate, moderate amount of energy, and low sodium diet. As in this condition high protein is required to recover the protein energy malnutrition. Fat requirement should be restricted to control deposition of fat in the liver, sodium and fluid requirement should be restricted because these increase the ascites and edema condition. Mainly hepatic diet is needed to control this condition because hepatic diet provide low fat, low sodium, high protein, and moderate amount of carbohydrate. Different types of supplement powder also used to maintain the dietary requirement, as the supplements are good source of protein and poor source of fat, mainly BCAA (branched chain of amino acid) that inhibit the breakdown the protein in the muscle. In this study it was found that medicine do not effect on the albumin, bilirubin, SGOT and SGPT level, in acute casesmost of the medicines are used for the control of the side sign and symptoms, hence therapeutic diet is most important to control the disease.

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