CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

http://doi.org/10.5281/zenodo.1036540

Available online at: http://www.iajps.com Research Article

# GLUCOSE TOLERANCE IN PATIENTS WITH CHRONIC LIVER DISEASE

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**Abstract:**

***Objective:*** *To evaluate the glucose tolerance in patients with chronic liver disease.*

***Patients and Methods:*** *This cross sectional study of six months was conducted at tertiary care hospital and studied the demographical and clinical manifestations and OGTT in thirty patients with chronic liver disease. The inclusion criteria were the patients diagnosed with chronic liver disease between the age group 12-60 years of either gender. All the relevant patients should have detail history, clinical examination and advised fasting and random blood sugar level and the oral glucose tolerance test accordingly while the response of test was also observed. The frequency and percentages was calculated while the numerical statistics were used to compute mean ±SD.*

***Results:*** *During six months study period total thirty patients with chronic liver diseases were recruited, enrolled and evaluate for the glycemic status. The mean age ±SD for whole population was 47.53±5.82 years, of thirty individuals 17 (56.6%) were males and 13 (43.3%) were females. The common etiologies detected for chronic liver disease were Hepatitis B (30%), hepatitis C (33.3%), hepatitis B & C (10%), alcoholic liver disease (10%) and hepatoma (10%). The OGTT response revealed as normal 16 (53.3%), impaired glucose tolerance 08 (26.6%) and diabetes mellitus 06 (20%) respectively.*

***Conclusion:*** *The positive correlation between chronic liver disease and glucose tolerance. Thus, the impaired glucose response is most common in liver cirrhosis.*

**Keywords:** *Oral glucose tolerance test, chronic liver disease, Liver cirrhosis, impaired glucose tolerance and Diabetes Mellitus.*

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*Please cite this article in press as Tariq Zaffar Shaikh et al* ***, Glucose Tolerance in Patients with Chronic Liver Disease****, Indo Am. J. P. Sci, 2017; 4(10).*

## INTRODUCTION:

The liver plays major role in blood sugar monitoring and not surprising that errors of CHO metabolism detected in chronic liver disease as liver cirrhosis, chronic hepatitis, hepatoma, etc [1, 2]. Metabolic abnormalities are found in subjects with late stage liver disease and the manifestation varies in relation to etiologic insult [3]. The liver maintains normal blood glucose level gluconeogenesis, glycogenesis and glycogenolysis. The metabolic alterations in liver cirrhosis are complex and not fully known and understand [4]. In fulminant acute hepatic failure the blood sugar levels may be low but is rarely seen in CLD. In fasted subjects with liver cirrhosis the contributions of CHO to generate energy is reduced to 3% as compared to control 40%) with contributions of fat increasing 87% as compared to control 40% [5]. This might be due to impaired hepatic glucose release or reduced glycogen storage in liver [6]. However in cirrhosis fallowing glucose load or meal there is raised blood sugar level (hyperglycemia) due to inability of liver to metabolize glucose, probably because of insulin resistance [7]. Cirrhotic patients have raised serum lactate levels reveals decrease hepatic capacity to utilize lactate for gluconeogenesis [8].

Diabetes is also associated with chronic viral hepatitis C virus infection and disturbances of carbohydrate metabolism in hepatic disorders were directly proportional to the degree of hepatocellular damage [9]. Oral glucose tolerance test (OGTT) can be used for evaluating the hepatic glucose homeostatic power in chronic liver disease where the storage function reduced [10]. OGTT is superior to intravenous GTT because glucose is presented to body through a natural route and normal stimulation of insulin secretion by different hormones of GIT. Thus, this study was conducted to evaluate the status of blood sugar level and response of OGTT in patients with chronic liver disease.

## PATIENTS AND METHODS:

This cross sectional study of six months was conducted at tertiary care hospital and studied the demographical and clinical manifestations and OGTT in thirty patients with chronic liver disease. The inclusion criteria were the patients diagnosed with chronic liver disease between the age group 12- 60 years of either gender while the exclusion criteria were know diabetes mellitus already on treatment, pregnant ladies, the patients had connective tissue / autoimmune disorders and other evidence like history of taking drugs and other causes that interfere the glucose homeostasis were excluded. All the relevant patients should have detail history, clinical examination and advised fasting and random blood sugar level and the oral glucose tolerance test accordingly while the response of test was also observed. The informed consent was taken and the data was collected and analyzed in SPSS version 16. The frequencies, percentages and means ±SD were computed.

## RESULTS:

During six months study period total thirty patients with chronic liver diseases were recruited, enrolled and evaluate for the glycemic status. The mean age ±SD for whole population was 47.53±5.82 years, of thirty individuals 17 (56.6%) were males and 13 (43.3%) were females. The demographical, clinical and response of OGTT for the patients with chronic liver disease are shown in Table 1-2.

**TABLE 01: THE DEMOGRAPHICAL AND CLINICAL PROFILE OF THE PATIENTS**

| **AGE** (years) | **FREQUENCY (N=30)** | **PERCENTAGE (%)** |
|---|---|---|
| 12-19 | 02 | 6.6 |
| 20-29 | 06 | 20 |
| 30-39 | 09 | 30 |
| 40-49 | 06 | 20 |
| 50-59 | 05 | 16.6 |
| 60 | 02 | 6.6 |
| | | |
| **GENDER** | | |
| Male | 17 | 56.6 |
| Female | 13 | 43.3 |
| | | |
| **RESIDENCE** | | |
| Urban | 12 | 40 |
| Rural | 18 | 60 |
| | | |
| **Etiology of chronic liver disease** | | |
| Hepatitis B | 09 | 30 |
| Hepatitis C | 10 | 33.3 |
| Hepatitis B & C | 03 | 10 |
| Alcoholic liver disease | 03 | 10 |
| Hepatoma | 03 | 10 |
| Non alcoholic fatty liver disease | 02 | 6.6 |
| | | |
| **Child-Pugh class** | | |
| A | 10 | 33.3 |
| B | 18 | 60 |
| C | 02 | 6.6 |

**TABLE 02: THE RESPONSE OF ORAL GLUCOSE TOLERANCE TEST**

| **Oral glucose tolerance test (OGTT)** | **Frequency (N=30)** | **Percentage (%)** |
|---|---|---|
| Normal | 16 | 53.3 |
| Impaired glucose tolerance | 08 | 26.6 |
| Diabetes mellitus | 06 | 20 |

## DISCUSSION:

The liver functions to maintain normal blood glucose by different metabolic pathways, although it has been presumed that sensitivity of liver cells to insulin is responsible for the oral glucose uptake load by the liver, the literature mentioned the importance of insulin mediated glucose uptake by the liver cells [11, 12] In the fasting state, the liver reveals glucose homeostasis by gluconeogenesis & glycogenolysis in response to hypoinsulinemia & hyperglucoganemia [13-15]. In present study the mean age was 47.53 ± 5.82 years and correlated correlates to the study by Amarapurkar D, et al [16] as 45.93 ± 3.73 and also the gender ratio of current study correlates with that of Amarapurkar D, et al [16] study had male gender preponderance. The diabetic, IGT and normal responses are seen 20%, 26.6% and 53.3% respectively which correlates to the study by Majumdar G, et al (20%, 22.3% & 58%) [17]. Mild to moderate impaired glucose response is seen in 35% in the studied by Megyesi C, et al [18] while the diabetic response was seen in 50% alcoholic cirrhosis studied by Kruszynska YT [19]. Thus, the findings of present study also consistent with the relevant former studies [20, 21]. In current series, cirrhosis due to chronic viral hepatitis is the most common (73.3%) etiology to impaired glucose response; this correlates with 18% impaired response observed by Megyesi C, et al [18]. In current study alcoholic liver disease and NAFLD, cause impaired response in 4% & 14% respectively, while in study by Majumdar G et al [17] alcohol liver disease and NAFLD are most common causes for impaired response as 18% each whereas the chronic cholestatic disorders not included in study but contributes to impaired glycemic response in the study by Majumdar G, et al [17]. Approximately 80% of individuals with liver cirrhosis shown glucose intolerance & 10-20% of them had diabetes mellitus [17]. The huge prevalence of diabetes mellitus has been reported in chronic viral hepatitis patients as compared to etiologies, thus both insulin resistance & impaired insulin secretion has been known to play a major role in the pathogenesis of diabetes mellitus in patients with chronic liver disease [22, 23]. The

insulin resistance & type 2 diabetes mellitus are are associated with HCV infection and along with interferon therapy (IFN α) may contribute to the development of type 2 and type 1 diabetes mellitus by several mechanisms as chemokines, proinflammatory cytokines & other immune mediated processes that can worsen the outcomes in patients with HCV infection [24, 25].

## CONCLUSION:

The present study concluded the positive correlation between chronic liver disease and glucose tolerance. The impaired glucose response is most common in liver cirrhosis especially due to viral etiologies with male gender predominance whereas paradox response as fasting hypoglycemic status was observed in cirrhotic individuals with hepatoma.

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