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PREVALENCE OF TYPE 2 DIABETES AMONG HEPATITIS C VIRUS SEROPOSTIVE SUBJECTS IN DUTSE METROPOLIS, JIGAWA-NIGERIA

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Abstract:

The relationship between hepatitis C virus (HCV) and type 2 diabetes (T2DM) is still unclear, but there are a lot of data hypothesizing the prevalence of T2DM among HCV seropositive patients. The current research consisted of 62 HCV seropositive and 33 apparently healthy subjects attending Rasheed shekoni specialist hospital Dutse. Serum biochemical parameters were determined using chemistry analyzer (Selectra Pro). Results revealed a statistical increase of all the liver enzymes of HCV subjects compared to controls, all parameters for metabolic syndrome varies between HCV and controls, our findings also revealed that age may be factor in developing type2 diabetes among HCV. A percentage prevalence of 16.1% and 19.4% in male and female respective HCV subjects have fasting sugar levels beyond 7.0 mmol/l. conclusively, a high prevalence of type 2 diabetes was documented among HCV subjects.

Keywords **— Hepatitis C Virus, Type 2 Diabetes, Prevalence, Metabolic syndrome.**

Introduction:

HCV infection and T2DM are among the major public health threats with increasing morbidity and mortality throughout the world (WHO, 2013). HCV infection is known to cause chronic liver disease, cirrhosis, and hepatocellular carcinoma (HCC) Lonardo *et al,* (2009). HCV infection afflicts more than 170 million individuals globally (Poynard *et al.,* 2003; Afdhal, 2004; Lonardo *et al,* 2009). Evidence is accumulating that both HCV and T2DM have the potential in coexisting within an individual (Seeff and Hoofnagle, 2003). It's reported that more than 412 million people have diabetes in 2015 and it is predicted that number will rise to 642million by the year 2040 (IDF, 2015). The decreased mortality of people with diabetes, together with increasing frequency of obesity and the sedentary lifestyle of the population point to a dramatic increase in the prevalence rates of type 2 diabetes (Wild *et al.,* 2004). Glucotoxicity due to insulin resistance is the etiologic bases for complications in type 2 diabetic subjects (IDF, 2015). Several mechanisms were hypothesized to induce T2DM in HCV infection such as increasing mitochondrial reactive oxygen species by HCV non structural protein specifically NS3 through oxidation of NADPH oxidase and nox2 (Bureau, 2001), others includes, TNFα and other

inflammatory cytokines pathway (Elsammak *et al,* 2005; Durante-Mangoni, *et al,* 2006), direct alterations in insulin signaling by HCV (Banerjee *et al,* 2008; Bose, *et al,* 2012) and beta cell dysfunction (Narita *et al,* 2004; Masini *et al,* 2005). It is documented that HCV infections predisposes patients to increase risk of developing type 2 diabetes by interfering with normal glucose homeostasis in the liver (Negro and Alaei, 2009; Negro, 2011). The current study aimed at reporting the prevalence of type 2 diabetes among the HCV infected individuals in Dutse metropolis Jigawa.

Materials and Methods:

Participants

The study population consisted of sixty two (62) confirmed HCV patients and thirty-three (33) apparently healthy individuals as controls attending Rasheed shekoni specialist hospital general outpatient department.

Blood Specimen Collection

Venous samples were collected from the test subjects and controls using standard venopuncture and delivered into well labeled clean plain test tubes and EDTA container for biochemical and molecular detection of HCV respectively. The blood samples were allowed to clot for 30minutes and then centrifuged at 5,000 rpm for 5minutes to obtain the serum; the separated sera were stored at -20^0c

Detection of HCV using Rapid test strip

One drop about (30µl) of both serum and buffer were transferred onto the test strip using dropper avoiding air bubbles. The results are read in 15 minutes time.

Determination of Liver enzymes.

Liver enzymes were determined using chemistry analyzer; Selectra Pro.

Statistical Analysis:

The results were presented as Mean±SD. One way analysis of variance (ANOVA) was conducted, followed by Turkey Kramer multiple comparison test using SPSS Software 16.0. Differences were considered as significant when $P<0.05$.

Results:

Mean Age, BMI and Serum biochemical parameters among HCV Subjects and Controls

All the results are presented as Mean ±SD. Mean average age, BMI, FBS, TG and HDL of test and control groups were evaluated. The findings revealed no statistical difference between the groups

Serum Levels of Some Liver Enzymes Among HCV Infected Patients Compared to Control Groups

Of the ninety five (95) subjects recruited in this study, Liver enzymes (ALT, AST and ALP) of HCV and control were determined, there is significant increase of all serum liver enzymes of HCV compared to controls.

Age and Sex Distribution of Fasting Blood Sugar Among HCV and Control Subjects

Both HCV and Control subject`s fasting plasma glucose was evaluated, they were categorized according to WHO standard for diabetes. Both male and females in HCV group are at increased risk of developing type 2 compared to control group.

Table 1: Mean age, BMI and Serum biochemical parameters among HCV Subjects and Controls

Parameters	HCV Subjects (n=62)	Control Subjects (n=33)
Mean Age (yrs)	39.4±8.9	29.7±8.3
BMI(kg/m^2)	23.4±2.4	21.1±2.0
FBS(mmol/l)	6.9±1.9	5.7±0.9
HDL(mmol/l)	0.74±0.16	0.82±0.10
TG(mmol/l)	1.07±0.15	0.94±0.14

KEY
BMI=Body mass index; FBS=Fasting blood sugar; HDL=High density lipoprotein; TG=Triglyceride; n=number of subjects

Table 2: Serum Levels of Some Liver Enzymes HCV Infected Patients Compared to Control Group

Parameters	ALT(U/l)	AST(U/l)	ALP(U/l)
HCV Subjects(n=62)	52.1±19.9	67.5±26.7	113.8±8.6
Control (n=33)	15.6±8.6	21.5±9.0	47.0±12.4

KEY
HCV=Hepatitis C Virus; ALT=Alanine amino transferase; AST=Aspartate amino transferase; ALP= Alkaline phosphatase; n=number of subjects.

Table 3: Sex Distribution of Fasting Blood Sugar Among HCV and Control Subjects

	HCV		CTRL	
FBS (mmol/l)	Male (n=31)	Female (n=31)	Male (n=19)	Female (n=14)
< 7.0	21(33.9%)	19(30.6%)	18(54.5%)	12(36.4%)
>7.0	10(16.1%)	12(19.4%)	01(3%)	02(6.1%)

KEY
HCV=Hepatitis C Virus; n=number of subjects.

Discussion:

Both HCV and T2DM are among leading public health issue and the association between the two has been documented for over 30 years ago (Allison *et al.,* 1994). World health organization (WHO) defined diabetes as FBS ≥7mmol/l for three consecutive days. According to the results

obtained from the current study, 16.1% and 19.4% of male and female HCV subjects have fasting blood glucose above 7mmol/l, while only 3% and 6.1% of male and female control subjects reported to have fasting sugar levels beyond 7mmol/l, this is indicating the likelihood of developing T2DM by HCV patients compared to apparently healthy group. Serum liver enzymes namely ALT, AST and ALP were determined for both HCV and control. The results showed a statistical difference ($p<0.005$) of all the enzymes in HCV patients compared to the control group, the increase may be signifying the degree of liver injury. Some of the parameters for diagnosis of syndrome X which are also risk factors for T2DM were evaluated for both groups. HCV subjects have abnormal results compared to controls, although the derangement is not statistically significant ($p>0.005$). Ageing may be a factor in the development of T2DM among HCV infected patients as it was reported by Thuluvath and John (2003) and Butt *et al.,* (2004). The average mean age of HCV subjects in the present research is higher than controls. This is in accordance with report of National Health and Nutrition Examination Survey (NHANES III) which stated that HCV subjects ≥40 years are three times more likely to develop T2DM than normal individuals (Mehta *et al.,* 2001). Our findings revealed a higher prevalence of T2DM in HCV infected individuals than that of control and this is in line with several authors (Özyilkan *et al.* 1994; Mason *et al.* 1999; Ryu *et al.,* and Garrido *et al.,* 2001; Lecube *et al.,* 2004 and Parolin *et al.,* 2004), the results are also in contrast to that of Balogun *et al.* (2006).

Conclusion:

In conclusion, as it was documented previously, regarding relationship between existence of T2DM in HCV infection, the current research revealed a higher prevalence of type 2 diabetes among the HCV seropositive patients in Dutse metropolis, while factors such as age, BMI, Triglyceride and HDL may play an important role in the process.

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