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STUDY OF PREVALENCE OF DIABETES MELLITUS IN NORTH INDIAN ADULTS WITH CHRONIC HEPATITIS C VIRUS INFECTION

General Medicine

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ABSTRACT

Hepatitis C virus (HCV) is a ribonucleic acid (RNA) blood-borne virus of the Flaviviridae family that infects millions of people worldwide. Globally, in 2017, there were approximately 115 million HCV infected people. HCV is considered as an important root to extra-hepatic manifestations. This includes autoimmune thyroiditis, rheumatoid arthritis, cryoglobulinemia, glomerulonephritis and diabetes mellitus (DM). The slow progression of HCV infection is the major cause of DM; notably, the virus appears to affect glucose metabolism through alteration of the host innate immune response. **Materials & Methods:** This prospective study was conducted on 200 HCV seropositive adult patients in the Department of Medicine, Government Medical College, Amritsar. The study protocol was approved by the institutional ethics committee. The patients were enrolled in the study after obtaining written informed consent. All the patients were interviewed and clinically examined. Enzyme Linked Immunosorbent Assay (ELISA) for HCV, Fasting Blood Glucose (FBG), Random Blood Glucose (RBG), HbA1c (Glycosylated Hemoglobin), Ultrasonography (USG) abdomen, Liver function Test (LFT) and Complete Blood Count (CBC) was done for every patient. The results were then analysed.

KEYWORDS

Hepatitis C Virus, Diabetes Mellitus, Glycosylated Hemoglobin, Insulin Resistance.

INTRODUCTION

Hepatitis C virus (HCV) infection is a growing global health threat; approximately 150–200 million people have been infected with it. HCV causes chronic, life-long infections, resulting in progressive liver damage that leads to cirrhosis and hepatocellular carcinoma.[1,2] The estimated prevalence of HCV in India is between 0.5 and 1.5% with higher prevalence in the northeast, in tribal populations and in Punjab.[3] Diabetes Mellitus (DM) is a chronic metabolic disorder characterized by persistent hyperglycemia. It may be due to impaired insulin secretion, resistance to peripheral actions of insulin, or both. According to the International Diabetes Federation (IDF), approximately 415 million adults between the ages of 20 to 79 years had DM in 2015. DM can lead to the development of various complications, most prominent of which are microvascular (retinopathy, nephropathy, and neuropathy) and macrovascular complications (cerebrovascular and cardiovascular diseases).[4]

HCV infection primarily predisposes to DM through the induction of hepatic steatosis.[5] HCV structural core protein has been demonstrated to induce an increase in reactive oxygen species, mitochondrial dysfunction, and Endoplasmic Reticulum (ER) stress by possibly overwhelming glutathione stores and ER chaperones during viral replication.[6,7] The intense inflammatory response to HCV is deemed central to the development of peripheral and hepatic insulin resistance in chronic HCV infection. Several studies have reported that TNFα can directly interfere with insulin signalling in HCV patients.[8] The present study was conducted to find out the prevalence of type 2 diabetes in patients infected with hepatitis C virus.

MATERIALS AND METHODS

After obtaining the ethical clearance from the Institutional Ethical Committee, the present study was conducted in the Department of Medicine, Government Medical College, Amritsar over a period of 2 years. A total of 200 patients were enrolled after fulfilling the inclusion criteria. The informed consent before their participation was obtained from all participants.

Inclusion Criteria-

- Newly diagnosed or previously known HCV positive adults aged between 18-75 years.

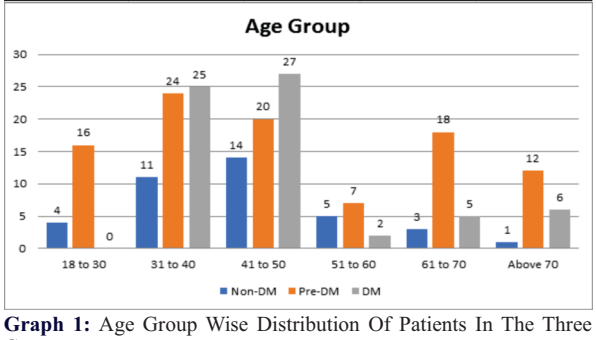
Exclusion Criteria-

- History of alcohol abuse,
- Known (familial) hyperlipidemia,
- Co-infection with hepatitis B virus or Human Immunodeficiency Virus (HIV),
- Hepatocellular carcinoma.

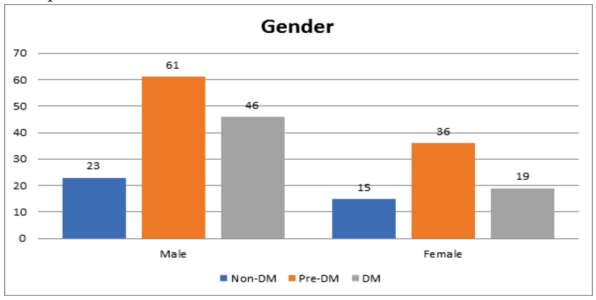
All patients in the study were subjected to complete clinical evaluation. Biochemical tests, like liver function tests, complete blood counts, renal function tests, and ultrasonography of the abdomen, HbA1C , FBG, RBG, HCV ELISA. The prevalence of non-DM, pre-DM and DM was calculated amongst HCV-seropositive patients. The results of observations of individual patients were tabulated and analysed using appropriate statistical tests.

Table 1: Age Group Wise Distribution Of Patients In The Three Groups

Age Group	Non-DM	Pre-DM	DM	Total
18 to 30	4	16	0	20(10%)
31 to 40	11	24	25	60(30%)
41 to 50	14	20	27	61(30.5%)
51 to 60	5	7	2	14(7%)
61 to 70	3	18	5	26(13%)
Above 70	1	12	6	19(9.5%)
Total	38	97	65	200



Graph 1: Age Group Wise Distribution Of Patients In The Three Groups



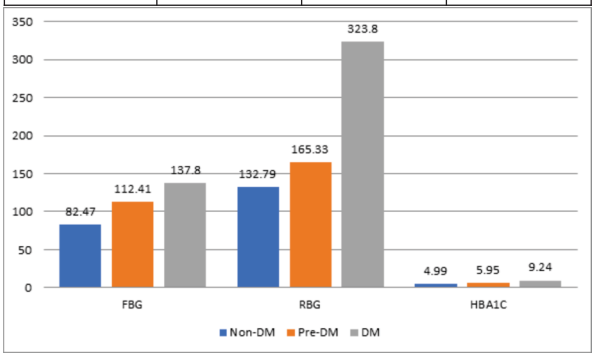
Graph 2: Gender Wise Distribution In The Three Groups

Table 2: Gender Wise Distribution In The Three Groups

Gender	Non-DM	Pre-DM	DM	Total
Male	23	61	46	130
Female	15	36	19	70
Total	38	97	65	200

Table 3: Mean Value Of FBG, RBG And HBA1C In The Three Groups

	Non-DM	Pre-DM	DM
FBG	82.47 ± 12.86	112.41 ± 8.12	137.8 ± 9.14
RBG	132.79 ± 5.29	165.33 ± 14.85	232.8 ± 22.97
HbA1C	4.99 ±0.46	5.95 ± 0.25	9.24 ± 2.03



Graph 3: Mean Value Of FBG, RBG And HBA1C In The Three Groups

RESULTS

Baseline data of patients: The study had a male population of 130 patient (65%) and female population of 70 patients (35%). Among males, 46 (35.4%) were diabetic, 61 (46.9%) were pre-diabetic, and 23 (17.7%) were non-diabetic. Among females, 19 (27.1%) were diabetic, 36 (51.4%) were pre-diabetic, and 15 (21.4%) were non-diabetic. The maximum number of patients were from the age group 41-50 with 61 patients (30.5%) followed by age group 31 - 40 with 60 patients (30%). The mean age of study population was 45.47+14.23 years. DM group had the age slightly higher as 45.4+ 11.8 years, compared to the non - DM group (43.6+12.2). Prevalence of DM was higher in males (35.4%) than in females (27.1%). 40 patients(20%) out of 200 were hypertensives while 160 patients were normotensives. 5 (2.5%) of these 40 patients with HTN were in the non DM group, 17 (8.5%) were in the group Pre DM group, and 18 (9%) were in the DM group. Development of DM was independent of hypertensive status.

The mean FBG values for Non-DM, Pre-DM, and DM groups were 82.47± 12.86 mg/dL, 112.41±8.12 mg/dL, and 137.8±9.14 mg/dL, respectively. The mean RBG values for Non-DM, Pre-DM, and DM groups were 132.79±5.29 mg/dL, 165.33±14.85 mg/dL, and 232.8±22.97 mg/dL, respectively. The mean HbA1C values for Non-DM, Pre-DM, and DM groups were 4.99±0.46%, 5.95±0.25%, and 9.24±2.03%, respectively.

Prevalence of DM was significantly higher in HCV- seropositive patients 32.5% compared to the population prevalence of DM in general population (8.8% according to IDF). 81% of the patients in study population had deranged glucose metabolism either in the form of pre-DM (48.5%) or DM (32.5%). Development of abnormal glucose metabolism was independent of cirrhosis, fatty or normal liver. (p value<0.001; highly significant).

Clinical and Laboratory Investigations:

The mean Hb level for Non-DM individuals was 9.15 ± 1.71, for Pre-DM individuals it was 9.11 ± 1.74, and for DM individuals it was 8.92 ± 1.69. The mean Platelet level for Non-DM individuals was 164064.06 ± 66525.37, for Pre-DM individuals it was 142130.60 ± 63649.20, and for DM individuals it was 148691.79 ± 52339.12. We can observe that the mean platelet count for Non-DM individuals was higher than that for Pre-DM and DM individuals.

The mean bilirubin level for Non-DM individuals was 1.10 ± 0.13, for Pre-DM individuals it was 1.9 ± 0.12, and for DM individuals it was 1.10 ± 0.12. The mean SGOT level for Non-DM individuals was 45.45 ± 5.77, for Pre-DM individuals it was 47.72 ± 6.81, and for DM individuals it was 48.62 ± 6.77. The mean SGPT level for Non-DM individuals was 46.37 ± 6.62, for Pre-DM individuals it was 48.70 ± 7.23, and for DM individuals it was 49.45 ± 7.75. The mean DSP level for Non-DM individuals was 3.08 ± 0.63, for Pre-DM individuals it was 3.36 ± 2.59, and for DM individuals it was 3.10 ± 0.51.

CONCLUSION:

The present study found that prevalence of DM was higher (32.5%) in the HCV population as compared to general population (8.8% according to International Diabetes Federation). The finding of the study suggests that HCV-positive population can be established as a high risk group for DM.

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Ethical approval: The study was approved by the Institutional Ethics Committee

Declaration of Conflicting Interests: The author(s) declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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