

HIGH PREVALENCE OF HCV AND DIABETES MELLITUS IN MULTI-TRANSFUSED SUBJECTS

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Abstract

The characteristics of the multitransfused patients remain unknown. They are exposed to chronic physiological and psychosocial stress. They bear the risk of many infectious diseases like malaria, hepatitis B and C, HIV etc. They are also exposed to chronic psychosocial stress that may lead to Type 2 diabetes mellitus (T2DM). This study was designed to address two important diseases in the multitransfused patients – hepatitis C virus (HCV), an infectious disease and T2DM, a non-communicable but stress related one. The study was conducted in two tertiary care centers in Dhaka City. These centers have the standard facilities for blood transfusion. The study was conducted from July 2006 to July 2007. Detect-HCV (V.3), an Anti-HCV was used for detecting HCV while oral glucose tolerance test (OGTT) was done for diagnosing T2DM. The WHO criteria of 1997 for diagnosing T2DM and impaired glucose tolerance (IGT) were employed. A total of 125 multitransfused patients were investigated. Overall, the crude prevalence of HCV was 15%, T2DM was 28% and IGT was 13%. Of the diabetic subjects, 31.4% were positive for HCV and among the IGT subjects 12.5% were HCV positive. In contrast, of the total 74 non-DM and non-IGT subjects, only 8.1% were found to be positive for HCV. This study suggests that, the prevalence of diabetes mellitus and HCV are higher in multitransfused patients. This study also revealed that the prevalence of HCV is much higher in T2DM and IGT subjects than observed in non-DM, and non-IGT subjects. Further study is needed to determine other communicable and non-communicable diseases in the multitransfused population.

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Introduction

Blood and blood products are necessary supportive options for thalassaemia, cancer, hemodialysis, blood loss and in various medical, gynecological and surgical emergencies.¹ Diabetes is common among multitransfused patients having various blood diseases and bleeding disorders.¹ An increased prevalence of hepatitis C virus (HCV) infection in patients with diabetes and a higher prevalence of diabetes in HCV-infected patients have been reported.^{2,3,4} Impaired glucose tolerance and diabetes are common in beta thalassaemic multitransfused patients.^{2,4} Iron overload,

chronic liver disease, viral infection and genetic factors may play an important role in diabetes mellitus.⁴ Existing hemosiderosis may mark the effect of HCV infection on glucose metabolism.^{2,4} There is high frequency of diabetes in thalassaemic patients with HCV. Chronic hepatitis is usually evident in patients over twenty five years.^{2,3} Multitransfused adult beta thalassaemic patients also show higher prevalence of HCV infection due to transmission of HCV infected blood.^{1,2,4,5} Diabetes mellitus is one of the common cause of end stage renal disease who need

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haemodialysis which itself is a risk factor for transmission of hepatitis C virus.^{6,7} Prevalence of HCV in haemodialysis patients with diabetes mellitus is two times higher.⁶ Thus diabetes acts as an important factor for the increase in ferritin level in patients with HCV and worsen the situation further.²⁻⁴ The seroprevalence of HCV infection in our country has been reported at 4.6% in apparently healthy individuals and 4.8% in professional blood donors.⁸ In transfused recipients, the HCV incubation period is 40 to 60 days which is considerably shorter than the 90 to 180 days with HBV.⁹ The residual risk of HCV transmission due to donations in the anti-HCV window period at present is about 1 in 100000 transfusions of cellular products.⁹

The aim of the study was to assess the prevalence of HCV and Type 2 Diabetes mellitus (T2DM) among multitransfused patients attending the Department of Transfusion Medicine.

Materials and Method

The study was conducted in two tertiary care centers in Dhaka City from July 2006 to July 2007. These centers (Department of Transfusion Medicine of BIRDEM, Department of Transfusion medicine and Haematology Department, BSMMU and Bangladesh Thalassaemia Society) have the experience of blood transfusion with well equipped standard facilities. Hundreds of patients get transfusion every year. We selected those subjects who come to the transfusion center and got transfused with at least five units of blood. Three ml. of venous blood was drawn from the ante-cubital vein aseptically by using disposable syringes. Blood was collected in plain, dry and sterile test tubes. Serum was separated and stored at -20° C until testing. All samples were tested for Anti-HCV by ELISA using kits from Detect-HCV (V.3) as per guideline of manufacturer of kits. Device sensitivity was 98.2%. In brief, in plate dilution method (IPD) 20 micro litre sample added to wells with 200 micro liter sample diluent and incubated for 60 minutes at 37° C. Aspiration was done and washed 5 times with wash solution. Then addition of 100 micro liter peroxidase conjugate solution reincubated for 30 minutes at room temperature and reaspirated and rewashed 5 more times with wash solution. Reading of absorbance was taken at 450 nm. After a second wash during incubation, a blue color developed in proportion to the amount of anti-HCV antibody bound to the well. Wells containing

samples negative for anti-HCV antibody remained colorless. Positive sera were re-tested using the same method. Positive results were interpreted according to the manufacturer's recommendations.

For diagnosis of T2DM and IGT, oral glucose tolerance test (OGTT) was done using the WHO criteria of 1997. Additionally, T2DM was presumed if the patient had any history of diabetes or reported use of insulin or an oral hypoglycemic agent at the time of the study.

Results

A total of 125 multitransfused patients who received more than 5 units of blood were included in this study. Of them, 95 (76%) were males and 30 (24%) were females. The disease prevalence according to T2DM and IGT are shown in Table 1. The crude prevalence of HCV was 15%, T2DM was 28% and IGT was 13%. Of the diabetic subjects, 31.4% were found positive for HCV and among the IGT subjects 12.5% were HCV positive. In contrast, of the total 74 non-DM and non-IGT subjects, only 8.1% were found positive for HCV. Of the total HCV positive subjects, 48%

Table-1: Diseases found in multitransfused patients with type 2 diabetes mellitus (T2DM) and impaired glucose tolerance (IGT) (n = 51)

Diseases	Diabetic (n=35)	IGT (n=16)
Thalassaemia	10 (29)	5 (31)
Chemotherapy	5 (14)	4 (25)
Gynecological	1 (3)	1 (6)
Gastro-intestinal bleeding	2 (6)	1 (6)
Surgical cause	3 (9)	2 (13)
Haemodialysis	12 (33)	2 (13)
Cardiac surgery	2 (6)	1 (6)

(Percentages in parenthesis)

Table-2: Categories of diseases in the HCV positive multi-transfused patients

Diseases	HCV positive (n=19)
Thalassaemia	7 (37)
Leukaemia	1 (5)
Haemophilia	1 (5)
GIT bleeding	1 (5)
Haemodialysis	9 (48)

(Percentages in parenthesis)

attended for hemodialysis and 37% with thalassaemia (Table 2). Among the non-DM subjects, 42% were anti-HCV positive in the age group of 51 - 60 years of age; whereas, in T2DM subjects, 94% were anti-HCV positive in the age group ≥ 40 years, indicating an earlier onset of HCV in the hyperglycemic subjects.

Discussion

Higher prevalence of HCV in T2DM and IGT subjects observed in this study is consistent with other studies.^{1-4,10} When glycaemic status and age of onset of HCV was considered, 42% had T2DM in age group 51 to 60 years, whereas, 94% of anti-HCV positive in T2DM were of age forty years or older. This observation is similar to other studies.^{2,4,11,12} In USA, HCV infection was three times more common in T2DM than those without.¹¹ Highest percentage of positive HCV were among the patients having hemodialysis (48%), next to those in the thalassaemic group (37%) which were consistent with other studies.^{6,7} In this study, highest number of diabetic patients was in the haemodialysis group followed by the thalassaemic group. So the haemodialysis and thalassaemic patients were suffering from both diabetes and positive HCV viral marker, the same being reported in other studies.^{2,4,6,7,13,14} In USA, the prevalence of HCV infection is higher in patients with maintenance haemodialysis ranging from 5 to 25%,¹⁵ very similar to this study. Various studies show T2DM was present with a higher HCV infection such as 15.2% in Iran,⁴ 20.8% in Turkey¹⁶ and 21.2% in Saudi Arabia;¹² which has similarity with this study (31.43%). Impaired glucose tolerance is more among thalassaemic (31%) also supports different studies.^{2-4,14,15,17,18} In USA, 25% patients were diabetic with iron overload, 19.5% of patients were diabetic among multitransfused beta-thalassaemic and 8.5% had impaired glucose tolerance.¹⁴ Among the total 125 patients 19 (15%) had positive hepatitis C viral marker which is consistent with other studies.^{2,4,6,7,10,11,13,16,19}

Conclusion

A higher prevalence of type 2 diabetes and hepatitis C was observed in the multitransfused subjects. The HCV prevalence was found most common in the diabetics and more common in IGT and least common in the non-hyperglycemic multitransfused subjects. The study also revealed a younger aged onset of HCV infection

in the hyperglycemic subjects. Additionally, it showed the distribution of types of diseases in multitransfused subjects encountered in the blood transfusion centers in Dhaka City. As this sample was small, further elaborative studies are needed among thalassaemic and dialysis patients where the parameters of HCV and diabetes were found to be more common.

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