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ORIGINAL ARTICLE

Seroprevalence of Hepatitis B and Hepatitis C in Patients with Thalassemia and Sickle Cell Anemia in a Long-term Follow-up

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Background. Transfusion-dependent patients are more prone to acquiring various transfusion-transmitted infections such as hepatitis B (HBV), hepatitis C (HCV) and human immunodeficiency virus (HIV). The aim of the study was to investigate the prevalence of these infections in patients with thalassemia and with sickle cell anemia (SCA) receiving multiple blood transfusions.

Methods. The subjects of the present study were 399 multi-transfused patients with β-thalassemia major or intermedia and SCA who have been registered at the two regional hemoglobinopathy centers in Turkey since 1996. Hepatitis B surface antigen (HBsAg), hepatitis C virus antibodies (anti-HCV) and human immunodeficiency virus antibodies (anti-HIV) tests were assayed by a second-generation enzyme-linked immunosorbent assay method.

Results. Of the 399 patients, 3 were HBsAg positive (0.75%), 18 were anti-HCV positive (4.5%), and none was anti-HIV positive. All patients with HBsAg and 14 (77.7 %) patients with HCV received initial blood transfusions before second-generation tests were performed. Patients who were anti-HCV positive had a significantly higher mean number of blood transfusions and peak serum alanine transaminase level than anti-HCV-negative patients.

Conclusions. These results showed that after introduction of more sensitive screening tests and stringent donor selection procedures, incidence of HCV infection was significantly reduced, but there was still a serious risk for HCV infection, and there was a minor risk for HBV infection in patients with thalassemia and SCA.

Key Words: Thalassemia, Sickle cell anemia, Hepatitis B, Hepatitis C, Human immunodeficiency virus.

Introduction

Thalassemia and sickle cell anemia (SCA) are the most common hereditary hematologic diseases worldwide. Both thalassemia and sickle cell anemia are important public health problems in southern Turkey. Overall estimated frequency of β-thalassemia trait is 2% in Turkey (1). Sickle cell disease, however, is not distributed homogeneously in Turkey. According to the studies carried out in southern Turkey, the incidence rates vary from 1.4 to 10.8% for β-thalassemia trait and from 0.5 to 44.2% for sickle cell trait (2).

Patients with thalassemia and SCA require multiple blood transfusions and therefore are at increased risk for blood-transmitted infections such as hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV) (3–5). However, the risk for acquiring these infections from blood transfusion has decreased significantly since the initiation of routine blood donor screening for HBV,

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HCV and HIV (6). Preventing these infections is one of the most important goals of the management of both thalassemia and SCA. The aim of this study was to investigate prevalence of HBV, HCV and HIV infections in multiple-transfused patients with thalassemia and SCA.

Materials and Methods

Patient Selection

The records of 399 patients admitted to two regional hemoglobinopathy centers (320 patients from Hemoglobinopathy Center of Antakya State Hospital and 79 patients from Hemoglobinopathy Center of İskenderun State Hospital) during the years between 1996 and 2005 in Hatay, Turkey were retrospectively evaluated. Of the 399 multi-transfused patients, 189 were β-thalassemia major or intermedia (96 males, 93 females; age range 2–26 years with a mean of 10.1 ± 5.1 years) and 210 were SCA (124 males, 86 females; age range 2–35 years with a mean of 12.3 ± 6.9 years).

Data Collection

The following information was recorded: age, gender, and diagnosis of the patients, number of blood transfusions, length of the time for blood transfusions, laboratory results for hepatitis B surface antigen (HBsAg), antibody to hepatitis C virus (anti-HCV), antibody to hepatitis B surface antigen (HBsAb), antibody to human immunodeficiency virus (anti-HIV) and the level of alanine aminotransferase (ALT).

Detection of HBV, HCV and HIV Infections

HBsAg, anti-HCV and anti-HIV tests in blood donors in the study region were assayed by counterimmune electrophoresis method, indirect hemagglutination method, or rarely first-generation enzyme-linked immunosorbent assay (ELISA) from January 1996 to March 2001 and thereafter were assayed by a second-generation ELISA method using Abbott kits (AxSYM version 2.0, 3.0, Abbott Laboratories, Rome, Italy) by June 2005. ALT tests were determined by routine laboratory analysis.

Statistical Analysis

Statistical analysis was performed using Mann-Whitney U test; p values <0.05 were considered statistically significant. All values are expressed as mean ± SD. Statistical Package for Social Sciences (SPSS, ver 10.0) software was used for data analyses.

Results

HBsAg was positive in three (0.75%) of the 399 patients enrolled in this study. HBsAg was positive in 1 (0.52%) of the 189 patients with β-thalassemia and in two (0.99%) of the 210 patients with SCA. HBsAb was positive in 205 (69.7%) of the 294 patients. Of the 205 patients, 134 (65.3%) were given vaccination against hepatitis B. Anti-HCV antibodies were positive in 18 (4.51%) of the 399 patients enrolled in this study. Anti-HCV was positive in 13 (6.87%) of the 189 patients with β-thalassemia. Anti-HCV was positive in 5 (2.38%) of the 210 patients with SCA. None of the patients was positive for HIV. HCV prevalence in patients who received transfusion before March 2001 (3.5%) was higher than in those receiving transfusion after March 2001 (1.0%).

The mean duration of blood transfusions in the anti-HCV-positive patients and anti-HCV-negative patients was 88.7 ± 31.5 and 91.7 ± 30.5 months, respectively, which was not statistically different from each other ($p > 0.05$). The mean number of blood transfusions per month in the anti-HCV-positive patients and the anti-HCV-negative patients was 1.47 ± 0.4 and 0.7 ± 03, respectively, which was statistically different from each other ($p < 0.05$). ALT levels had statistically significant difference between the anti-HCV-positive patients (224 ± 33 U/L) and anti-HCV-negative patients (68 ± 43 U/L) ($p < 0.05$) (Table 1).

Discussion

Survival of patients with thalassemia and SCA has increased with the advances in therapy. Repeated blood transfusion is necessary for patient survival. Multi-transfused patients with thalassemia and SCA are at high risk for transfusion-associated infectious diseases such as HBV, HCV and HIV. Prevalence of these infections in multi-

Table 1. Characteristics of anti-HCV-positive and -negative multi-transfused patients

Variables	Anti-HCV positive	Anti-HCV negative
Total patients (n = 399)	18 (4.5%)	381 (95.4%)
Patients with thalassemia (n = 189)	13 (6.9%)	176 (93.1%)
Patients with SCA (n = 210)	5 (2.4%)	205 (97.6%)
Transfused patients before 2001*	14 (3.5%)	385 (96.5%)
Transfused patients after 2001**	4 (1%)	395 (98.9%)
Male	10 (55.5%)	210 (55.1%)
Female	8 (44.4%)	171 (44.8%)
Age (years)***	11.6 ± 5.7	11.9 ± 6.4
Transfusion amount (month)***	1.47 ± 0.4	0.7 ± 0.3[a]
Transfusion duration (month)***	88.7 ± 31.5	91.7 ± 30.5[b]
ALT level (U/L)***	224 ± 33	68 ± 43[a]

*Patients received blood assayed by counterimmune electrophoresis method, indirect hemagglutination method, or rarely first-generation ELISA from January 1996 to March 2001.

**The patients received blood assayed by a second generation ELISA method by June 2005.

***Values are mean ± SD, significance of difference.

[a] $p < 0.05$.

[b] $p > 0.05$.