Prevalence of Hepatitis C Virus, Hepatitis B Virus and Human Immunodeficiency Virus among Egyptian Blood Donors

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بسم الله الرحمن الرحيم

وقُلِ اعْمَلُوا فَسَيَرَى اللَّهُ عَمَلَكُمْ
ورَسُولُهُ والْمُؤْمِنُونَ

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Souzan El SayedKhalaf

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LIST OF ABBREVIATIONS

Abbrev.	Full term
AABB	: American Association of Blood Banks
AIDS	: Acquired immunodiffeiency
ALT	: Alanine aminotransferase
ANC	: Absolute neutrophil count
anti-Hbc	: Anti-hepatitis B core antigen
AS	: Additive solutions
BSE	: Bovine spongiform encephalitis
BT	: Blood transfusion
CBS	: Canadian blood services
CDC	: Centre for disease control
CJD	: Creutzfeldt-Jacob disease
CMV	: Cytomegalovirus
COPD-1	: Citrate phosphate dextrose adenine
DIC	: Disseminated intravascular coagulation
EBV	: Epstein-Barr virus
EIA	: Enzyme immunoassay
FFP	: Fresh frozen plasma
FNHTR	: Febrile non hemolytic transfusion reactions
HAM/TSP	: HTLV-related myelopathy/tropical spastic paraparesis
HAV	: Hepatitis A virus
HbsAg	: Hepatitis B surface antigen
HBV	: Hepatitis B virus
HCV	: Hepatitis C virus
HEV	: Hepatitis E virus
HGV	: Hepatitis G virus

LIST OF ABBREVIATIONS (Cont.)

Abbrev.	Full term
HHV-6&8	: Human herpes virus 6&8
HIV	: Human immunodeficiency virus
HPV-B19	: Human parvovirus B-19
HTLV	: Human T cell lymphotropic virus
INR	: International Normalized Ratio
IV	: Intravenous
MB	: Methylene blue
MI	: Myocardial infarction
MPAC	: Malaria Policy Advisory Committee
MP-NAT	: Minipool nucleic acid testing
NAT	: Nucleic acid testing
PCR	: Polymerase chain reaction
PLT	: Platelet concentrates
RBC	: Red blood cells
RMSF	: Rocky Mountain Spotted Fever
RNA	: Ribonucleic acid
SARS	: Severe acute respiratory syndrome
SD	: Solvent-detergent
T. gondii	: Toxoplasma gondii
T.cruzi	: Trypanosomacruzi
TTIs	: Transfusion transmissible infections
TTV	: Transfusion transmitted virus
vCJD	: Variant Creutzfeldt-Jacob disease
WHO	: World Health Organization
WNV	: West Nile Virus

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Introduction

Blood transfusion is a life-saving intervention. However, it may be associated with certain risks which can lead to adverse consequences. Despite progress made in the prevention of transfusion transmitted infections (TTIs) in the last few years, they continue to be a problem in many parts of the world ***(Lopez et al., 2005).***

The TTI problem is directly proportional to the prevalence of infection in the blood donor community. The most commonly screened infections in blood donors are; human immunodeficiency virus (HIV), hepatitis C virus (HCV), and hepatitis B virus (HBV) ***(Glynn et al., 2000).*** Blood transfusion is a main risk factor for transmitting viral hepatitis ***(Jain et al., 2008).***

Egypt has also a low prevalence rate of HIV& HBV. However HCV prevalence is considerably high. So it's prevention in Egypt must become a national priority.

The prevalence of the transfusion transmitted infections (TTIs), among blood donors allows for assessment of epidemiology of these infections in the community ***(Bhattacharya et al., 2007).***

The acquisition of the infections in the healthy blood donor Population can be a serious threat to safety of the collected blood donations.

Evaluating trends in blood donor infectious disease rates is essential for monitoring blood supply safety and donor screening effectiveness ***(Glynn et al., 2000)***.

Aim of The Work

To estimate the seroprevalence of hepatitis C virus, hepatitis B virus and human immunodeficiency virus among Egyptian blood donors to:

Identify the prevalence of TTIs in this apparently healthy population

Blood and blood products

Blood transfusion is a life saving procedure however there is debate in the medical literature concerning the appropriate use and safety of blood and blood products ***(Lacroix et al., 2007).***

There are different blood derivatives of clinical importance in addition to the whole blood.

1.Whole blood:

In most circumstances, blood component therapy has replaced the use of whole blood. However, whole blood is still occasionally used for massive transfusion in circumstances in which rapid correction of acidosis, hypothermia and coagulopathy is required. This mainly occurs in military situations for trauma patients who require resuscitation (**Repine *et al.*, 2006)**.

2.Red blood cells:

RBCs are prepared from whole blood by removal of most of the plasma. RBC transfusions are used to treat hemorrhage and to improve oxygen delivery to tissues. Transfusion of RBCs should be based on the patient's clinical condition ***(Klein et al., 2007)*.**

Indications for RBC transfusion include acute sickle cell crisis (for stroke prevention), or acute blood loss of greater than 1,500 mL or 30 percent of blood volume ***(Klein et al., 2007)***.

Patients with symptomatic anemia should be transfused if they cannot function without treating the anemia ***(Klein et al., 2007)***. Symptoms of anemia may include fatigue, weakness, dizziness, reduced exercise tolerance, shortness of breath, changes in mental status, muscle cramps, and angina or severe congestive heart failure. The 10/30 rule—transfusion when a patient has a hemoglobin level less than or equal to 10 g per dL (100 g per L) and a hematocrit level less than or equal to 30 percent—was used until the 1980s as the trigger to transfuse, regardless of the patient's clinical presentation ***(Klein et al., 2007)***.

Red cell units have a haematocrit of 70% (citrate phosphate dextrose adenine (COPD-1) solution) or 55-60% (additive solutions (AS) with a shelf life of 35 days and 42 days respectively when refrigerated at 1-6°C. A decision to give a transfusion should be reached both on the patient's clinical situation and laboratory findings, not on Hb alone (***Perrotta et al., 2003).*** Transfusion is often not considered until Hb <7 g/dL, and maintenance

of a hemoglobin level between 7 to 9 g per dL ***(Hébert et al., 1999)*** but patients with unstable angina or acute myocardial infarction (MI) may require transfusion at Hb <10 g/dL. A single unit of red blood will typically increase Hb by 1g/dl.

A recently updated supports the use of restrictive transfusion triggers in patients who do not have cardiac disease ***(Carless et al., 2010).***

Other RBC products include leukocyte-reduced components, which limit febrile non hemolytic transfusion reactions(FNHTR) and are considered cytomegalovirus safe ***(King and Bandarenko, 2008)***. Also, washed components (RBC and platelets) remove harmful plasma antibodies.

3. Platelets :

Platelet transfusion may be indicated to prevent hemorrhage in patients with thrombocytopenia or platelet function defects. Contraindications to platelet transfusion include thrombotic thrombocytopenic purpura and heparin-induced thrombocytopenia. Transfusion of platelets in these conditions can result in further thrombosis ***(Schiffer et al., 2001)***.

One unit of apheresis platelets should increase the platelet count in adults by 30 to 60 × 10^3 per μL (30 to 60 × 10^9 per L) ***(King and Bandarenko, 2008)***. In neonates, transfusing 5 to 10 mL per kg of platelets should increase the platelet count by 50 to 100 × 103 per μL (50 to 100 × 109 per L) ***(Poterjoy and Josephson, 2009)***. One apheresis platelet collection is equivalent to six pooled random donor platelet concentrates ***(Slichte, 2007).***

Spontaneous bleeding through intact endothelium does not occur unless the platelet count is no greater than 5 × 10^3 per μL (5 × 10^9 per L) ***(Liumbruno et al., 2009)***. One randomized controlled trial evaluated a threshold for prophylactic platelet transfusion in patients with acute myeloid leukemia ***(Rebulla et al., 1997)***.

Patients were randomized based on platelet transfusion triggers of 10 × 10^3 per μL (10 × 10^9 per L) or 20 × 10^3 per μL (20 × 10^9 per L). Patients in the lower trigger group received 21.5 percent fewer transfusions than the higher trigger group. Gastrointestinal bleeding was more common in the lower trigger group; however, there was no difference in blood transfusions between groups.