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MICROBIOLOGICAL SURVEY OF BLOOD COMPONENTS AT STAND ALONE BLOOD BANK

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ABSTRACT **Background:** Blood transfusion is a potential source of infection by a variety of known and unknown transmissible agents. Transfusion-associated bacterial sepsis remains an important health-care concern. The aim of this study was to determine the prevalence and type of bacterial contamination in blood products, at the stand alone blood bank in Rajkot, Gujarat, INDIA. **Methodology:** A total of 300 units of screened blood components were randomly sampled following aseptic procedure. Samples were incubated at 37°c for up to 5 days in nutrient broth. Isolates were identified by standard microbiologic techniques. **Results:** Of the 300 samples collected between December 2016 and February 2017, 18 (6%) samples showed growth. The contaminants were Coagulase Negative *Staphylococci* (CoNS) 15/18 (83.33%), *Staphylococcus aureus* 2/18 (11.11%) and *Enterococcus sp.*1/18 (5.56%). **Conclusion:** The study shows bacterial contamination and it is critical to improve hygiene precautions in order to minimize bacterial contamination and ensure patient safety.

KEYWORDS : Blood products, Contamination, Patient Safety

INTRODUCTION

One can almost say that blood is that magic potion which gives life to another person. Bernard Fantus is the person to conceive the term "Blood Bank" and he opened first blood bank at Cook County Hospital, Chicago-U.S.A. on 15-3-1937.[8] It traditionally handles donor registration, their screening and bleeding (phlebotomy), serologic testing, preparation of their different components, testing for transmissible diseases, appropriate storage and their transportation to the needy patients.[7] The transfusion of blood began with the use of whole blood and continued for many years. Now-a-days, blood is separated into its cellular and protein components to be used in specific blood disorders and illnesses.[4] However, unfortunately these blood products/components are associated with the risk of transmission of microbial diseases.[12] Handling and storage of blood, its components and products at room temperature as well as 4°c may provide sufficient time and opportunity for microbial growth.[1] Blood safety is essential that a patient who comes for treatment is not made sicker by another illness.[3] Bacterial contamination of blood, first identified more than 70 years ago, is the most prevalent infectious risk of blood products. As early as 1939, just 2 years after Fantus opened the first hospital blood bank, a publication detailing the risks of bacterial contamination of blood appeared in the *Journal of the American Medical Association*.[2] A well-organized Blood Transfusion Service, with quality systems in all areas, is a prerequisite for the safe and effective use of blood and blood products. An integrated strategy for blood safety is required for elimination of transfusion transmitted infections (TTI).[11] The concept "vein to vein" is fulfilled only if the sterility of blood product is maintained.[5]

MATERIALS & METHODS:

This was a single-site study carried out at the stand alone blood bank – Life Blood Centre, Rajkot, over a period of three months (December 2016 – February 2017). Blood and blood products included in this study were those that had been screened and found negative for HIV, HBC, HCV, *Treponema pallidum* and Malaria. Random sampling of 300 stored blood products (100-RCC, 100-PC and 100-FFP) meant for transfusion was done for all samples included in the study. Sample processing was done using standard bacteriological safety and aseptic techniques. A small portion of an integral tubing of blood bag was collected. The tubing was cleaned with methanol and cut with sterile scissors. The samples were dispensed into Nutrient broth.

All of the sample suspensions were incubated at 37°C for 5 days and observed daily for any possible signs of bacterial growth (pellicle formation and turbidity). For the samples showing signs of bacterial growth, a gram smear was made and examined microscopically. At the same time, the samples were subculture using standard methods onto Nutrient agar, Blood agar and MacConkey agar. These plates were incubated at 37° C. Plates were inspected for bacterial growth at 24 hours and 48 hours. The identities of bacteria growing on the culture plates were determined by colonial morphology, gram stain, as well as standard biochemical tests. A blind subculture was performed for samples which showed no growth on the fifth day. Quality control of each step was checked and maintained.

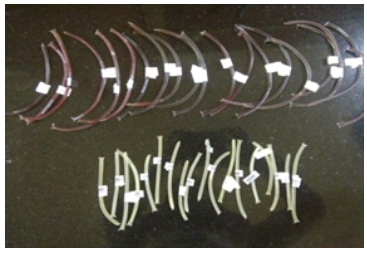

Figure1: Segments of Blood Components

RESULTS

Over the study period, 300 randomly selected units of blood components were tested and 18 (6%) were found to be contaminated. Platelets had a significantly higher level of bacterial contamination rate (8%) compared to other blood products (RCC and FFP).The different levels of contamination of blood products are summarized in Table-1.

Table-1: Level of Contamination in Blood Products

Blood Product	No. of blood product tested	No. of blood product Contaminated (%)
PC	100	8 (8%)
RCC	100	7 (7%)
FFP	100	3 (3%)
TOTAL	300	18 (6%)

All the bacterial species isolated were Gram positive, namely Coagulase negative *Staphylococcus sp.* (CONS), *Staphylococcus aureus* and *Enterococcus* sp. (Table-2)

Table-2: Level of Contamination According to Type of Bacteria

Isolates	No. of Blood product contaminated			
	RCC	PC	FFP	Total
CoNS	7	6	2	15 (83.33%)
S. aureus	0	2	0	2 (11.11%)
Enterococcus sp.	0	0	1	1 (5.56%)
TOTAL	7	8	3	18 (100%)

DISCUSSION

The importance of the prevalence and source of bacterial contaminants of blood and blood components cannot be over-emphasized particularly in the planning of preventive measures at blood transfusion centers across the world. [9]

Knowledge of the prevalence of bacterial contamination in blood products and their source is important for the planning of prevention and reduction measures that reduce mortality and morbidity arising from transfusion of contaminated blood products. [10]

Numerous studies demonstrated that contaminating bacteria, usually representing skin flora from the donor, could be cultured in approximately 1/3000 platelet units. Clinically apparent septic transfusion reactions were thought to occur following 1/25,000 platelet transfusions.[6] In this present study we report a prevalence of 6%. Studies done in other parts found higher prevalence rates: Ghana 9%, Nigeria 8.8% and Ethiopia 12.5%. [10] However the prevalence of bacterial contamination is reported to be lower in developed countries, with prevalence rates of 0.2% in US and 0.1% in France. [10]

In the present study platelets had the highest prevalence of bacterial contamination than did any other product. Platelets are stored between 22-24°C with constant agitation, which is favorable for bacterial proliferation.

CONCLUSIONS

We concluded that bacterial contamination of transfused blood is not so common in our clinical practice. Bacterial contamination of blood products was found to be 6%. Most of the isolated are known to be part of the skin normal flora. In blood banking and transfusion medicine, our paramount concern is to improve transfusion safety for patients, in our attempt to achieve a zero-risk blood supply.

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