Original Research Article

Sero prevalence and trends of TTI in voluntary and replacement blood donors in a tertiary care hospital blood bank - A 3 year retrospective study

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Abstract

Background: Blood Transfusion plays a vital role in patient management and is lifesaving in many instances. It plays a pivotal role as a specialized modality of treatment and saves millions of lives worldwide each year and reduces morbidity. It is well known to be associated with a large number of complications, some of them trivial while others are life threatening, demanding for meticulous pre transfusion testing and screening. The priority objective of BTS is to ensure safe, adequate accessible efficient blood supply at all times. The magnitude of TTI varies from country to country and depends directly on the TTI load of society and also effective screening of donors at blood bank.

Materials and methods: A retrospective study was conducted in our hospital blood bank from 2014-1016, to study the sero- prevalence and trends in TTI, including HIV, HBV, HCV, VDRL, and malaria. The total number of voluntary and replacement donors increased steadily in 3 years.

Results: The sero- prevalence of HBV, HCV and HIV decreased steadily over 3 years, whereas incidence of syphilis increased steadily. HBV was noted to be more in voluntary donors than in replacement donors. Blood unit utilization index was calculated and ranged from 90.9% in 2014 to 88.9% in 2015 and 91.6% in 2016. Most common cause for discard of the blood units was TTI followed by expiry of products.

Conclusion: Strict selection of blood donors is mandatory and is recommended to ensure safe blood supply. Voluntary blood donations need to be increased to decrease the incidence of TTI.

Key words

TTI, Sero prevalence, Blood donors.

Introduction

Timely transfusion of blood saves millions of lives, but if unsafe transfusion practices are practiced, the same puts millions of people at risk of transfusion transmissible infections (TTIs) [1]. The magnitude of the TTI varies from country to country depending on TTIs' load in that particular population from where blood units are sourced. Since a person can transmit an infection during its asymptomatic phase, transfusions can contribute to an ever widening pool of infection in the population. The economic costs of the failure to control the transmission of infection include increased requirement for medical care, higher levels o of dependency and the loss of productive labor force, placing heavy burdens on already overstretched health and social services and on the national economy [2]. A well-organized blood transfusion service (BTS) is an important component of the health care delivery system of any country. An integrated strategy for blood safety is required for elimination of transfusion transmissible infections (TTI) and for provision of safe and adequate BTS's to the people. Multiple measures are taken to minimize TTI transmission. The past several decades have witnessed great advantage in techniques of detecting these TTIs. With the advent of nucleic acid amplification technique (NAT), western countries have reduced the risk of TTIs to a major extent. The main component of an integrated strategy of BTS includes collection of blood only from voluntary, non-remunerated blood donors, screening for all TTIs and reduction of unnecessary transfusion [1]. According to the National AIDS Control Organization (NACO) guidelines all blood samples must be tested for human immuno deficiency virus (HIV) 1 and 2, hepatitis B, hepatitis C, syphilis and malaria [2]. We present a study of 3 years on the sero-prevalence and trends in TTI's in both voluntary and replacement donors at Gandhi Hospital blood bank, which is a blood bank run by Gandhi Hospital, a tertiary care center.

Materials and methods

The study was conducted at Gandhi Hospital Blood Bank, a government run blood bank under Gandhi Hospital, for a period of 3 years from 2014 to 2016. Prior consensus of the ethical committee and blood bank medical officer was taken. Written consent of donors was already taken at the time of donation. Voluntary donors were categorized as donors who came without any incentive on their own, and who were willing to donate without any remuneration. Donors who attended voluntary blood donation camps were included in this group. Replacement donors were donors who donated blood for their family members or friends admitted in the hospital. A total of 33142 blood units were collected, out of which 27745 were collected from voluntary donors and 5397 units were collected from replacement donors. 92% of total donors were males and 08% were females. 95% of female donors belonged to voluntary donor category and 5% of female donors were of replacement donor category. Blood was collected from these blood units in test tubes and was tested for HIV I and II, HBV, HCV, VDRL, and malaria as per the NACO guidelines. HIV test, HBV screening, and HCV were done using ELISA test / Rapid test approved by NACO. VDRL screening was done using RPR ELISA method. Malarial parasite screening was done manually and positive cases were reassessed using PV, PF antibodies by ELISA method for confirmation. The results were documented and assessed.

Results

Out of 33142 donors, 116 donors were found to be HIV positive for either I or II. 286 donors were positive for HBV, 76 donors were positive for HCV, and 39 donors were positive for VDRL. Malarial parasite was seen in only 1 donor. There was a decline in number of donors

screened as positive for HIV, HBV, and HCV indicating effective donor counselling and screening. Donors having positive VDRL screening steadily increased over 3 years. The small number of positive tests for various TTI's, indicated effective deferral of donors by eliminating donors having history of multiple partners, history of jaundice, drug abusers, patients with tattoos and other positive history. Percentage of patients affected with various TTI's was calculated and HIV was found to be 0.35%, HBV was 0.86%, HCV was 0.22%, VDRL was 0.12%, and malaria was negligible with 0.03%. The Blood unit utilization index was calculated using the entire number of cross matchings done and the discarded units. It was found to be 90.9% for the year 2014, 88.9% for 2015, 91.6% for the year 2016, thus indicating efficient and effective usage of blood units (**Table – 1, 2**).

Table - 1: Distribution of voluntary and replacement donors year wise.

Year	Voluntary donors Including donors from vbd camps	Replacement donors	Total
2014	6887+3001	1380	11268
2015	7233+1375	1776	10384
2016	7915+1334	2241	11490
Total	27745	5397	33142

Table - 2: Sero prevalence of TTI's in donors.

Year	HIV+ve	HBV+ve	HCV+ve	VDRL+ve	Malaria PV, PF+ve
2014	56	100	38	00	00
2015	33	94	27	14	00
2016	27	92	11	25	01
TOTAL	**116**	**286**	**76**	**39**	**01**

Discussion

With every unit of blood, there is 1% chance of transfusion associated problems including TTI [3]. The risk of TTI has declined dramatically in high income nations over the past two decades, primarily because of extraordinary success in preventing HIV and other established transfusion transmitted viruses from entering the blood supply [4]. But the same may not hold good for the developing countries. The national policy for blood transfusion services in our country is of recent origin and the transfusion services are hospital based and fragmented [5]. The majority (97.87%) of the donors in our study were males which is comparable to the studies done by others like Rao and Annapurna, et al. [6] in Pune, Rose, et al. [7] in Vellore, Arora D, et al. [3] in Southern Haryana, Singh K, et al. [8] in Coastal Karnataka, Pahuja, et al. [9] in Delhi and Singh B, et al. [10] noting more than 90%of the male donors. In our study, voluntary blood donors constitute the largest group of blood donors, which is comparable to that of the study done by Bembde, et al. [11]. Voluntary donors (VD) are motivated blood donors who donates blood at regular intervals and replacement donors (RD) are usually one time blood donors who donates blood only when a relative is in need of blood [12]. In the present study, of the total blood donors, Voluntary Donors constituted 83.71%, while Replacement Donors were 16.28%. This is comparable to the study done by Bhattacharya, et al, [13], who has noticed a predominance of VD. In contrast, a predominance of RD was noted by Singh, et al. (82.4%) [10], Kakkar, et al. (94.7%) [14], Singh, et al. (84.43) [8], Pahuja, et al. (99.48%) [9], and Arora, et al. (68.6%) [3]. It is shown that replacement donors constitute the

largest group of blood donors in India [15], reflecting the lack of awareness amongst the general population. Studies [8-10] have showed high seropositivity rate in RD compared to VD, a similar findings was noted in our study. Sero surveys are one of the primary methods to determine the prevalence of TTI. The assessment helps in determining the safety of blood products and also gives an idea of the epidemiology of these diseases in the community. Chandra, et al. [16] have found almost negligible infectivity rate in Voluntary Donors and also no Voluntary Donor was found to be positive for HIV by Arora D, et al. [3]. Kothari [17] observed that out of a total of 200 blood donors, 3% were positive for HBsAg, 1% for HIV, 2% for HCV and 4.5% for syphilis. By comparison, In our study, we found that 0.35% of donors were positive for HIV, 0.86% of donors were positive for HBV, 0.22% were positive for HCV, and 0.12% were positive for VDRL, which was considerably less. Awasthi [18] reported seropositivity for HIV was 0.1%, HBsAg 1.82%, HCV 0.83% and syphilis 0.13%. There was significant difference in seropositivity of HBsAg between replacement and voluntary donors. We found that HBV was more commonly seen in voluntary donors than replacement donors. Bembde A, et al. [11], reported the sero prevalence of HBV as 1.5%, HCV 0.2%, and HIV 0.15%. Agrawal [19] found that the overall sero prevalence of HBV and HCV was 1.5% and 0.8% respectively, while the prevalence of syphilis and HIV was 0.07% and 0.1% respectively. The highest prevalence was observed for HBV followed by HCV, HIV and syphilis in decreasing order. Prevalence of HBsAg in our blood donors was 0.86% comparable to study done by Sri Krishna, et al. [20] in Bangalore. On the other hand, the prevalence of HBV infection is lower in the United States and Western Europe (0.1–0.5%) and is reported to be higher, 5–15% in South East Asia and China [9]. Bhattacharya [13] explored a high rate of occult HBV infection prevalence among HBsAg negative/anti-HBC positive donors and thus emphasized the need for a more sensitive and stringent screening algorithm for blood donations. Gupta, et al. [21] have also found more anti HBC positivity than HBsAg, suggesting the ability to detect hepatitis B virus (HBV) infection in window period. We found highest incidence of HBV, followed by HIV, HCV, and VDRL in decreasing order re-emphasizing their findings. The VDRL reactivity in our study was 0.28%, a comparatively low value when compared to 1.6% noted by Sri Krishna, et al. [20] and 2.6% by Singh, et al. [10] in Delhi. Arora [3] have reported a 0.9% of VDRL reactivity while Bhattacharya [13] found 0.72% reactivity. Syphilis has also acquired a new potential for morbidity and mortality through association with increased risk of HIV infection, thus making safe blood more difficult to get. Studies related to this like those done by Gupta, et al. [21], Otuonye, et al. [22] and Patil, et al. [23] have observed a definite correlation between positivity of HIV and syphilis. There is no correlation between HIV and other infections noted in our study. Therefore, serological screening for syphilis serves as a surrogate test for HIV infected donors. A strict screening criteria for blood donors, to exclude those with multiple sexual partners is recommended, and all the affected donors should be treated appropriately [24]. The major concern in transfusion services today is increased seropositivity among Replacement Donors for HCV, HIV, HBsAg and syphilis. With the advent of nucleic acid amplification techniques (NAT), western countries have decreased the risk of TTI to a major extent [9]. This will decrease the window period and hence decrease the incidence of TTI. But the cost-effectiveness of NAT is poor [25]. The NAT has added benefits but its high financial cost is of concern, especially in economically restricted countries like India. Along with advanced technology such as NAT for donor screening, other factors such as public awareness, vigilance from time to time, and correction of errors , educational and motivational programs [9] addressed to both patients and general public with the help of voluntary organizations, philanthropists and political parties, help in decreasing the infection.

Conclusion

Our study showed that most of the donors were voluntary donors with male preponderance. In all the screening tests for TTI's, there was increased positivity rate amongst the replacement donors as compared to the voluntary donors. Based on these results, non-remunerated and repeat voluntary blood donor services are very much needed and should be encouraged. There should be an elaborate program at national level to improve the blood transfusion services. All blood units should be tested for compatibility and TTI's. Along with reduction in unnecessary blood transfusion, we can ensure safe blood supply to all the recipients. With the implementation of strict donor selection criteria, use of sensitive screening tests, and establishment of strict guidelines for blood transfusion, it is possible to reduce the incidence of TTI's in the Indian scenario.

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