Evaluation of blood donor deferral causes in a tertiary hospital, South India

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Abstract
Aims: Transfusion of blood saves millions of life all over the world every year. Paucity of donors has always been a problem faced worldwide. Potential blood donors are deferred for several reasons. The rate and reasons of deferral differs from region to region and center to center. To ensure safe blood and blood products are provided by the blood bank, donors and recipients undergo stringent donor screening. All the donors are screened to ensure the blood drawn is safe for transfusion. Thus keeps the recipients protected from transmissible diseases and other problems. This study aims to analyze the donor deferral rates, various causes of deferrals and to take proper referral and follow up measures to decrease the temporary deferral rate by which we could increase the pool of voluntary donors without compromising on the quality of the blood and safety to the recipient.

Methods: A two year retrospective study of donors, carried out in a tertiary hospital in south India, and also includes voluntary donors from outdoor camps conducted by blood bank during the period January 2012 to December 2013.

Results: A total of 16,805 people came to donate during the period of study. Male constituted around (95.08%) of the donors who came to donate blood. A major proportion (89.70%) were replacement donors. 858 (5.12%) of the entire donor population were deferred due various reason. The major causes of deferral in this study were hypertension 12.70%, followed by anemia 9.09%, tissue transmissible diseases. Those who were deferred were categorized into temporary constituting (58.04%) and permanent (41.96%). The Leading cause of permanent deferral was hypertension 30.3%, whereas the leading cause among temporary deferral was anemia 15.66%. One of the major cause of deferral among males were hypertension whereas anemia was the major cause of deferral among females.

Conclusion: Donor deferral rate of 5.12% was found in this study, similar rates have been reported by other studies. The major proportions were replacement donors. Females coming forward for blood donation were found to be significantly low. The major causes of deferral in our study were hypertension and anemia.

Keywords: Deferral, Blood donation, Donor

1. Introduction
Blood transfusion is life saving procedure in many situation specially in trauma cases. Therefore the importance of availability of blood and blood products in an emergency situation cannot be emphasized. Safe and adequate supply of blood and products is major public health issue faced globally. According to National AIDS control organization’s statistics, the annual rate of blood donation is about 7.4 million units against the requirement of 10 million units in India [1].

The rate and reasons of deferral differs from region to region and center to center. A voluntary donor is one who donates without any rewards or compulsion whereas a replacement donor is one who donates blood upon request of specific patient or patent’s family which intended to be used specifically for the treatment of that a patient. Potential blood donors may not be able to donate for several reasons. All the donors will be screened properly to ensure the blood drawn is safe for transfusion. There are large number of healthy individuals are not suitable to
donate blood they are labeled as “deferred” donors. A donor who has been deferred can be due to temporary or permanent reasons. A temporarily deferred donor are deferred for a specific time period, but most often these prospective donors are then less likely to return in future for donation thinking they have been deferred for life time. Therefore individual deferred must given proper counseling and education regarding the reason for their deferral and advice them how to rectify the issue before the next visit.

To protect blood donors and recipients, stringent donor screening criteria are necessary[2]. Screening also helps prevent transfusion transmitted diseases to the recipient. At the same time ensure blood collection does not harm both the donor as well as the recipient. This study aims to analyze the donor deferral rates, various causes of deferrals and to take proper referral and follow up measures to decrease the temporary deferral rate by which we could increase the pool of voluntary donors without compromising on the quality of the blood and safety to the recipient.

2. Materials and methods

A retrospective study of donors carried out in the blood bank of a tertiary hospital and also includes the voluntary donors from outdoor camps conducted by blood bank during the period January 2012 to December 2013. Data was collected from the records maintained in the center. A donor questionnaire were used to collect the data annexure[1]. Each and every donor where evaluated on the basis of a medical history, physical examination, hemoglobin estimation, weight, age, blood pressure, pulse rate, temperature. Criteria laid down by Director General Health services and Drug’s controller of India were followed. Hemoglobin level of 12.5gm/dl, weight not less than 45kg, age limit between 18-60, systolic BP 100-180 and diastolic pulse 50-100 were preset standards. Details of all those who where deferred were recorded in the deferral register. The deferred donor where analyzed on the basis of sex, cause of deferral. All the donors were screened properly to ensure the blood drawn is safe for transfusion.

Annexure 1

Blood Donor Questionnaire

1. Do you feel well today? :Yes/ No
2. Did you have something to eat in the last 4 hours? :Yes/ No
3. Did you sleep well last night? :Yes/ No
4. Have you any reason to believe that you may be infected by Hepatitis, Malaria, HIV/AIDS, and/or venereal disease? :Yes/ No
5. In the last 6 months have you had any history of the following? Unexplained weight loss; Repeated Diarrhoea; Swollen glands; Continuous low-grade fever
6. In the last 6 months have you had any:- Tattooing; Ear Piercing; Dental Extraction
7. Do you suffer from or have suffered from any of the following diseases? Heart Disease Kidney Disease Cancer/Malignant Disease Epilepsy Diabetes Tuberculosis Abnormal bleeding tendency Hepatitis B/C Allergic Disease Jaundice Sexually Trans. Diseases Malaria Typhoid (last 1 yr.) Fainting spells Are you taking or have taken any of these in the past 72 hours? Antibiotics Alcohol Steroids Vaccinations Rabies vaccine (1 yr.) Aspirin
8. Is there any history of surgery or blood transfusion in the past 6 months? Major Surgery; Minor Surgery; Blood Transfusion
9. For women donors, Are you pregnant :Yes /No Have you had an abortion in the last 3 months :Yes/ No Do you have a child less than one year old? :Yes/ No Is the child still breast-feeding? :Yes/ No Are you having your periods today? :Yes/ No
10. Would you like to be informed about any abnormal test result at the address furnished by you? :Yes/ No
11. Have you read and understood all the information presented and answered all the questions truthfully, as any incorrect statement or concealment may affect your health or may harm the recipient. :Yes/ No
3. Results

A total of 16,805 people came to donate during the period of study, of whom 15,978 (95.08%) were males and the rest 827 (4.92%) were females. Of the total 16,805 donors registered, about 858 (5.12%) were deferred due to various reason. Among the deferred donors 463 were males and 395 were females. Percentage of deferral among total no of registered males and females were (2.9%) and (47.8%) respectively. (Table 1) shows the demographic profile of donors.

A major portion of donors were those who donated in the hospital (90.57%) and the remaining (9.43%) were from camps conducted near by. (Table 2) shows the donor distribution based on site of blood collection and the type replacement and voluntary donors. Of the 16,805 donors registered, 15,074 (89.70%) were replacement donors and only a few were voluntary donors 1731 (10.30%).

The deferred 858 cases were categorized into temporary constituting (58.04%) with 95% CI: 54.66%-61.37% and permanent (41.96%) with 95% CI: 38.63%-45.34% in (Table 3, 4, 5). Among the 498 temporarily deferral cases, anemia was the number one cause of deferral constituting (15.66%), followed by medications (11.65%), fever (9.44%) as shown in (Table 3). Where as out of 360 permanent deferred cases the leading cause was hypertension constituting (30.3%), followed by HIV (18.9%), HBsAg (17.2%), HCV (17.8%) as shown in (Table 4).

One of the major cause of deferral among males was hypertension whereas anemia was the major cause of deferral among females. (Table 6) Leading causes of deferrals among males were hypertension followed by HIV positive cases, alcohol consumption. Among females they were anemia followed by medication, HBsAg positive cases. (Table 7) shows the distribution based on transfusion transmissible infection among deferred donors. (Table 8) shows the number of male deferral due high bp were almost thrice that of female deferral and number of females deferred due to lo Hb were almost six times than the no of deferred males. (Table 9) shows the age sex wise distribution among donors, majority of donors among males (45.4%) were young in 18-30 age group where as in females majority falls (66.7%) between 30-40 age range.

| Table 1: Demographic profile of donors |
|---------------------------------------|
| No of registered | No of deferred | % of deferrals of total Registration |
| Male | 15978 | 463 | 2.9% |
| Female | 827 | 395 | 47.8% |
| Total | 16805 | 858 | 5.1% |

| Table 2: Donor distribution based on site of blood collection and type replacement and voluntary |
|-----------------------------------------------|
| No of donors | % of total donors (16805) |
| In-hospital | 15221 | 90.57% |
| Camp | 1584 | 9.43% |
| Replacement | 15074 | 89.70% |
| Voluntary | 1731 | 10.30% |

| Table 3: Showing causes of temporary deferrals and their proportions. |
|--------------------------|
| Male | Female | Total | % Temporary Deferral | % of total Deferral |
| Hemoglobin | 11 | 67 | 78 | 15.66 | 9.09 |
| Medication | 24 | 34 | 58 | 11.65 | 6.76 |
| Fever | 25 | 22 | 47 | 9.44 | 5.48 |
| Alcohol | 44 | 0 | 44 | 8.84 | 5.13 |
| Low BP | 12 | 29 | 41 | 8.23 | 4.78 |
| Recent donor | 29 | 10 | 39 | 7.83 | 4.55 |
| Jaundice | 17 | 19 | 36 | 7.23 | 4.19 |
| Low weight | 5 | 26 | 31 | 6.22 | 3.61 |
| Dental procedure | 11 | 16 | 27 | 5.42 | 3.15 |
| Under age | 6 | 19 | 25 | 5.03 | 2.91 |
| Recent surgery | 14 | 5 | 19 | 3.82 | 2.21 |
| Menstruation | 0 | 17 | 17 | 3.41 | 1.98 |
| Recent Vaccine | 7 | 2 | 9 | 1.81 | 1.05 |
| Tuberculosis | 8 | 0 | 8 | 1.61 | 0.93 |
| Skin lesions | 2 | 4 | 6 | 1.20 | 0.70 |
| Tattoo | 4 | 0 | 4 | 0.80 | 0.47 |
| Ear Pierce | 0 | 3 | 3 | 0.60 | 0.35 |
| Malaria | 1 | 2 | 3 | 0.60 | 0.35 |
| Breast feeding | 0 | 2 | 2 | 0.40 | 0.23 |
| Allergy | 0 | 1 | 1 | 0.20 | 0.12 |
| Total | 498 | 100% | 58.04% |

| Table 4: Showing causes of permanent deferrals and their proportions |
|--------------------------|
| Male | Female | Total | % Permanent Deferral | % of total Deferral |
| Hypertension | 85 | 24 | 109 | 30.3 | 12.70 |
| HIV positive | 47 | 21 | 68 | 18.9 | 7.93 |
| HBsAg positive | 30 | 32 | 62 | 17.2 | 7.23 |
| HCV positive | 45 | 19 | 64 | 17.8 | 7.46 |
| Uncontrolled Diabetes Mellitus | 16 | 7 | 23 | 6.4 | 2.68 |
| Cirrhosis | 3 | 0 | 3 | 0.8 | 0.35 |
| Asthma | 10 | 7 | 17 | 4.7 | 1.98 |
| Heart disease | 3 | 6 | 9 | 2.5 | 1.05 |
| Epilepsy | 4 | 1 | 5 | 1.4 | 0.58 |
| Total | 360 | 100% | 41.96% |
Table 5: Distribution of temporary and permanent deferrals

| No of deferrals | % of total deferrals | Statistical indices |
|-----------------|----------------------|---------------------|
| Temporary       | 498                  | 58.04%              | 95% CI: 54.66%-61.37% Z statistic: 759.837 P < 0.0001 |
| Permanent       | 360                  | 41.96%              | 95% CI: 38.63%-45.34% Z statistic: 549.142 P < 0.0001 |
| Total           | 858                  | 100%                |                                                  |

Table 6: Leading causes of deferrals among male and female

| Cause            | Male 463 | Female 395 | Statistical indices |
|------------------|----------|------------|---------------------|
| Deferral Males   |          |            | Chi-squared 68.541  |
| Hypertension     | 85       | 67         | DF 2 Significance level P<0.0001 |
| HIV              | 47       | 34         |                     |
| HCV              | 45       | 32         |                     |
| Alcohol          | 44       | 29         |                     |
| HBsAg            | 30       | 26         |                     |

Table 7: Distribution based on transfusion transmissible infection among deferred donors

| No of deferred | % of total deferred |
|----------------|--------------------|
| HIV            | 68                 | 7.93%             |
| HBsAg          | 62                 | 7.23%             |
| HCV            | 64                 | 7.46%             |
| Total          | 194                | 22.62%            |

Table 8: Blood pressure and Hemoglobin level distribution among donors

| Deferred cases due to high blood pressure | Males 15978 | Female 827 | Total 16805 | Statistical indices |
|-----------------------------------------|-------------|------------|-------------|---------------------|
| Normal blood pressure range             | 85          | 24         | 109         | Chi-squared 68.541  |
| Deferred cases due to low hemoglobin <12.5 | 15967    | 760        | 16727       |                     |
| Normal hemoglobin                       |             |            |             |                     |

Table 9: age wise distribution of blood donors

| Age  | Male 15978 | Female 827 | Total 16805 | Statistical indices |
|------|------------|------------|-------------|---------------------|
| 18-30 | 7249 (45.4)| 264 (31.9) | 7513        | Chi-squared 645.335 |
| 30-40 | 4396 (27.5)| 552 (66.7) | 4948        | DF 6               |
| 40-50 | 3848 (24.1)| 8 (1.0)    | 3856        | Significance level P<0.0001 |
| 50-60 | 485 (3.0)  | 3 (0.4)    | 488         |                     |

4. Discussion

Total of 16,805 donors who came forward for blood donation, of which about 858 cases 5.12% were deferred due various reasons. Several studies have reported a similar deferral rate (5.20%) by Unnikrishnan et al [3], (6%) by Sundar et al [4], and (5.6%) by Rabeya et al [5]. Some studies have even had a higher deferral rate of (16.4%) Chaudhary et al [6], (35.6%) Charles et al [7]. Even though deferral rate were found to be similar, the major reasons for deferral varies reflecting disparity in socioeconomic status. The deferral rate differs from region to region and center to center. These varied differences in the rate could be due to different donor selection criteria. Male constituted around 95.08% of the donors who came to donate blood. Which shows that the number of females volunteering for the donation were few only 4.92% similar rate has been reported by Pandey et al [8]. This is because of prevalence of false belief that females cannot donate. Although, due to physiological factors, women may be more prone to conditions such as anemia, but a pre-donation counseling will help decide whether one should or shouldn’t donate.

The major causes of deferral in this study were hypertension 12.70%, followed by anemia 9.09%, tissue transmissible diseases (HIV, HBsAg, HCV), on medication, fever. Those who were deferred were categorized into temporary constituting 58.04% (95% CI: 54.66%-61.37%) and permanent 41.96% (95% CI: 38.63%-45.34%). A similar rate have been found in study by Rehman et al with temporary (63.73%) and permanent (36.3%) [9]. Whereas Arslan et al have reported a rate of 10% and 90% among permanent and temporary deferrals respectively [10]. The Leading cause of permanent deferral was hypertension 30.3%. Hypertension often goes undetected and could be an incidental finding while screening, at the same time hypertension could be due to fears of phlebotomy, white-coat hypertension, exercise, stress, etc... Tissue transmissible diseases (HIV, HBsAg, HCV) accounted for the second most leading cause of permanent deferral. Transmissible diseases together constituted 1.15% of the donor population, a similar rate of (1.58%) came up in the study by Unnikrishnan et al [3], where as much a higher rate of (8.7%) have been reported by Ekwere et al [11]. In the study
0.4% of the sample was found to be positive for HIV, and was much lower than other reported studies (0.8%) Singh et al [12], (0.6%) Kaur et al [13]. Withdrawal of blood from these people pose potential threat to recipient by transfusion. Therefore more detailed history has to be elicited while screening, history of tattooing, piercing, high risk sexual practice etc. cause in some rare occasions even a screening test can turn as false negative.

The leading cause among temporary deferral was anemia 15.66%, a similar rate of (17.95%) has been reported by Rehman et al [9], while a much higher rate of (46%) has been reported by Halperin et al [14]. The other causes were medications, followed by fever, alcohol consumption and low blood pressure. Most of these temporary deferrals could be reduced for the next visit by taking proper measures. Those with anemia have to be referred of further evaluation and treatment. Studies have show by lowering hemoglobin standard levels and offering iron treatment for pre-menopausal woman could increase female eligibility Newman et al [15]. People in the community should informed regarding some of common causes of temporary deferrals like abstaining from smoking and alcohol prior to visit, age limit, menstruation, breastfeeding women, drugs that cannot be consumed prior to donation etc..may help pre-screen them self. The major problem faced is that, most of the deferred donors are less likely to return in future for donation thinking they have been deferred for life time. Zou et al have reported potential donor loss after a deferral [16]. Therefore all deferred individuals must informed about the cause and period deferral and proper counseling to help them overcome the problem before the next visit.

A major portion of donors were those who donated in the hospital 90.57% and the remaining 9.43% were from camps conducted nearby. Majority of the donors who donated in the hospital were replacement donors. The study shows, of the 16805 donors registered, 89.70% were replacement donors and only a few were voluntary donors 10.30%. Therefore more number of awareness programs regarding importance of blood donation and outdoor camps has to be conducted to increase the voluntary donors. In the study by Shahshahani et al, free predonation medical checkups, free blood investigations could also help motivate people to donate blood [17]. Help them clear misconception about donating blood, blood donation is safe and there is no risk of contracting a blood borne infection, within 24 hours of a blood donation, body replaces the lost fluids and the lost red blood cells in a few weeks.

5. Conclusion
The donor deferral rate obtained in this retrospective study is 5.12% similar rate has been reported by some study. However some have reported much higher rates which could be due to different donor selection criteria. Females constituted only 4.92% of the total no of people who came forward for voluntary blood donation. This could be because of a prevalent false belief that being a female hampers her ability to donate blood. A major portion of the donors were replacement group 89.70%. The major cause of deferral among males and females were hypertension and anemia respectively. Anemic individuals should referred for further workup and treatment. The Leading causes of permanent and temporary deferrals were hypertension and anemia respectively. Temporarily deferred individuals must inform about the reason as well as the period of deferral. They must encourage and given counseling to help them overcome the problem before the next visit, thus we could reduce huge percent of temporary deferral. Educating the people in the community a week prior to the scheduled camp regarding some of common causes of deferrals like abstaining from smoking and alcohol prior to visit, age limit, menstruation, breastfeeding women etc. may help pre-screen them self and avoid unnecessary deferrals.

Conflict of interest: No conflict of interest among authors.

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