

Analysis of pre-donation deferral causes in blood donors at a Rural Medical Institute of Rohilkhand Region, India

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Abstract

Aims: Deferral of potential blood donors due to various reasons at the time of pre-donation medical examination and interrogation leads to the scarcity of blood for the treatment of patients requiring blood transfusion. The aim of this study was to analyze the reasons for deferral and the demographic profile of these deferred blood donors, so that necessary changes in donor recruitment policies could be made in future.

Methods: Deferral record of five years from January 2010 to December 2014 which included reasons for deferral and demographic details of both replacement and voluntary blood donors were compiled and analyzed in this retrospective study. SPSS Version 23 was used for data analysis, Z test for difference between two proportions, χ^2 test for association and logistic regression method for odds ratio were used.

Results: A total of 12,206 donors were selected for blood donation, comprising 97% males and 3% females. Rate of deferral was 7.9%, rates of deferral being significantly higher in females than males, 6.09% and 45.12% respectively (OR 12.62, p-value < 0.05 at 5% level of significance). Replacement and voluntary donors comprised 86.60% and 13.40% of the total deferred blood donors. Rate of deferral was significantly higher in voluntary donors than replacement donors, 30.47% and 7.17% respectively (OR 5.67, p-value < 0.05 at 5% level of significance). Almost same numbers of donors were deferred from rural (48.80%) and urban areas (51.20%). Educational level had a significant association (χ^2 value 63.62) with voluntary and replacement donors at 5% level of significance. Low haemoglobin was the most common cause of deferral among temporary causes (76.89 %) followed by history of jaundice (7.73%) while hypertension was the most common cause of permanent deferral (7.36%) and their prevalence was significantly higher in males (p-value < 0.001 at 1% level of significance).

Conclusion: Deferral rate was 7.9% in this study which was comparable to that found in other studies and most of the donors deferred were in the age group of 18-30 years. Replacement donors and males comprised the predominant population, however rates of deferral were significantly higher in females and voluntary donors. Irrespective of gender, low haemoglobin was the most common cause of deferral among temporary causes and hypertension among permanent causes. Level of education had a significant association with voluntary and replacement donors in this study.

Keywords: Donor deferral, Blood donation, Temporary deferral, Permanent deferral.

1. Introduction

Blood transfusion is an important modality for several medical and surgical conditions, for which the only source is a healthy blood donor. The estimated annual requirement of blood in India in the year 2013-14 was 12 million units. A total of 57 lakhs units were collected of which 84% was through voluntary blood donation through the network of Department of AIDS Control (DAC) blood banks [1], a step towards the achievement of 100% voluntary blood donation by 2020 following the issue of framework for global action in 2010[2]. Voluntary blood donation takes a

back seat in several parts of the country particularly in several Non Government Medical Institutions and hospital based blood banks, hence blood transfusion services at such places is largely dependent on replacement donors to meet the requirements of the patients. Lack of availability of self motivated blood donors, compounded by donors deferred for blood donation for various reasons adds to the deficiency in the blood donor pool.

As blood donors represent a group of healthy individuals in a population, the deferral data base of various studies undertaken across the country provide an insight into

the prevailing medical and social problems that still remain undiagnosed for long periods and could assist health professionals in the field of preventive and social medicine to develop health and educational policies for future. This study was undertaken with the aim to observe the various temporary and permanent reasons for deferral of potential blood donors visiting this rural based tertiary care medical institute of Rohilkhand region, who were deferred at the time of pre-donation medical examination and interrogation. Their demographic profile which included age, gender, place of residence and educational status along with donor category (Replacement/Voluntary) was also statistically analyzed for any inter-variable association and their chances of deferral, if present. This study could be informative and valuable for reviewing and modifying existing local donor recruitment, selection and rejection policies.

2. Materials and Methods

This retrospective study was conducted at the blood bank of Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly (SRMS-IMS), U.P. Donor records of five years from January, 2010 to December, 2014 were reviewed. As per the standard operating procedures, process of donor selection and deferral in the blood bank are based on the standard guidelines [3]. Complete demographic information was obtained. Whole blood donors included replacement (family members, relative and friends) and voluntary donors. All were counselled to answer questions in the donor questionnaire correctly and disclose all facts related to their medical history that could compromise the recipient's health. Screening for haemoglobin was done by two methods, copper sulphate specific gravity method and colorimetric method based on alkali hematin.

Information related to blood donors like age, gender, donor category (voluntary/replacement) along with

information related to their place of residence (urban/rural) and educational status, classified as per Indian standards of classification of Education [3], were all compiled and analyzed using statistical software SPSS version 23.

2.1 Statistical Methods

χ^2 test was applied to evaluate association of donor category with age group and educational status of the deferred blood donors, Z test for difference between two proportions and Logistic regression method was used to identify odds ratio (OR) for deferred donors with respect to gender and donor category (voluntary/replacement). P-value < 0.05 was considered to be significant at 95% confidence interval. All reported p-values are two sided.

3. Results

Total number of registered blood donors in the blood bank of SRMS-IMS was 13,266, male - female ratio being observed as 20:1. Out of the total donors registered, 12,206 donors were selected for blood donation comprising 11,852 (97.00%) males and 354(3.00%) females, male-female ratio being 33:1 [Figure 1]. Replacement and voluntary donors contributed 11,882(97.35%) and 324(2.65%) respectively. Donors deferred for various reasons were 1060, total rate of deferral being 7.90%. Deferred males contributed 769(72.55%) while females contributed 291(27.45%) of the deferred cases [Table 1], male-female ratio being 3:1. Rates of deferral in males and females were 6.09% and 45.12% respectively. Replacement and voluntary deferred donors comprised 86.60% and 13.40% respectively [Table 1]. Significant difference between proportions was found in the rates of deferral of replacement and voluntary donors, 7.17% and 30.47% respectively after applying Z test for proportion. Deferred donor populations from rural and urban areas were almost same comprising 517(48.80%) and 543(51.20%) respectively [Table 2].

Figure 1: Gender and donor category distribution of blood donors

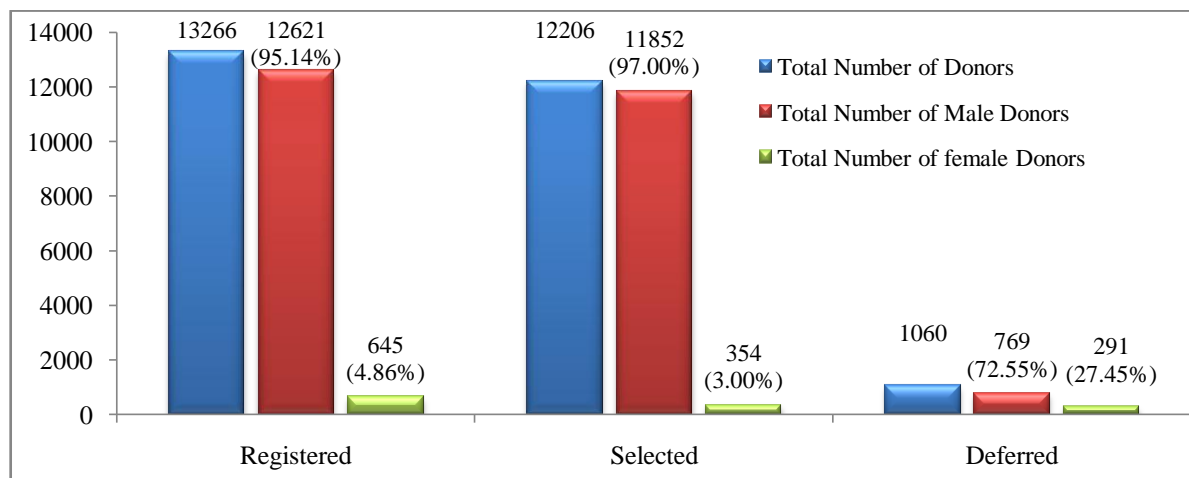


Table 1: Age distribution of blood donors with respect to Gender and Donor Category (Replacement and Voluntary)

Age Group/ Gender	Female		Male		RD		VD		Total	
	N	%	N	%	N	%	N	%	N	%
<18	3	0.30	5	0.5	5	0.47	3	0.28	8	0.8
18-30	179	16.90	409	38.6	497	46.89	91	8.58	588	55.5
31-40	83	7.80	235	22.2	283	26.70	35	3.30	318	30.0
41-50	23	2.20	101	9.5	113	10.66	11	1.04	124	11.7
51-60	3	0.30	19	1.8	20	1.89	2	0.19	22	2.1
Total	291	27.50	769	72.5	918	86.60	142	13.40	1060	100.0

Table2: Distribution of age group with respect to donors' place of residence

Age Group/ place of residence	Rural		Urban		Total	
	N	%	N	%	N	%
<18	4	(0.4)	4	0.4	8	0.8
18-30	283	(26.7)	305	28.8	588	55.5
31-40	162	(15.3)	156	14.7	318	30.0
41-50	57	(5.4)	67	6.3	124	11.7
51-60	11	(1.0)	11	1.0	22	2.0
Total	517	(48.8)	543	51.2	1060	100.0

Educational status of the deferred donors had significant association with replacement and voluntary deferred donors. Voluntary donors included mostly senior secondary and undergraduates each comprising 2.74% (n=29) of the total deferred donors. Number of donors who did not

receive any formal education was 12(8.45%). Among the deferred replacement donors maximum number of donors had received secondary education (n=173, 18.84%) while number of donors who had not received any formal education were 172(18.74%). [Table 3]

Table 3: Distribution of replacement and voluntary donors with respect to their educational status

Educational status	Total Number (N)	Total (%)	RD (N)	RD (%)	VD (N)	VD (%)
Primary (P)	79	7.45	73	6.89	6	0.57
Upper primary (UP)	135	12.74	124	11.70	11	1.04
Secondary (S)	189	17.83	173	16.32	16	1.51
Senior secondary (SS)	167	15.75	138	13.02	29	2.74
Under graduate (UG)	64	6.04	35	3.30	29	2.74
Graduate(G)	156	14.72	134	12.64	22	2.08
Post graduate	80	7.55	65	6.13	15	1.42
Diploma	6	0.57	4	0.38	2	0.19
Nil	184	17.36	172	16.23	12	1.13
Total	1060	100	918	86.60	142	13.40

Most of the donors deferred with respect to age, gender, donor category and place distribution was in the age range 18-30 years. χ^2 values for association of donor category with age and education status were 10.30 and 63.62 respectively and were found to be significant at 5% level of significance. Logistic regression method was applied for defining the risk factor (Odds ratio) of being deferred with respect to gender and donor category. Chances of deferral were significantly higher in females and voluntary donors, Odds ratio being 12.62 and 5.67 respectively and significant at 5% level of significance as p-value are less than 0.05.

After thorough medical examination as per Drugs and cosmetic rules, donors were deferred temporarily or permanently comprising 1021 (96.32%) and 39 (3.68%) cases respectively. The common causes of temporary deferral were low haemoglobin (n=785, 76.89%), history of jaundice (n=79, 7.73%), medication (n=41, 4.01%), alcohol (n=26, 2.54%) and under weight (n=23, 2.25%). Other causes were as given in Table 4. Hypertension was the most common cause for permanent deferral comprising 7.36% (n=29) of the cases while asthma, epilepsy, rheumatoid arthritis and uncontrolled diabetes on medication were amongst the other less common causes [Table 5].

Table 4: Distribution of causes temporary deferral

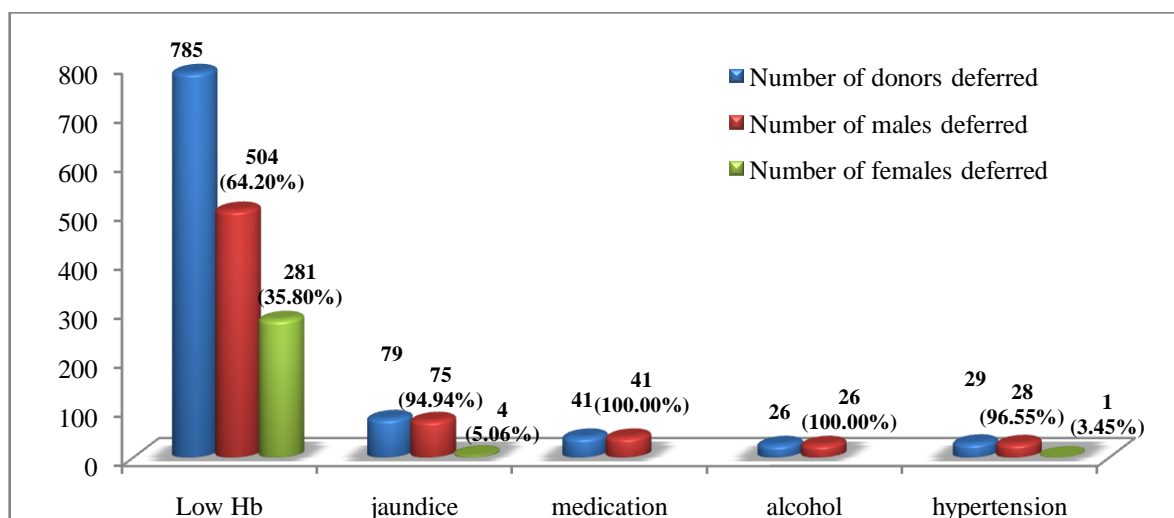
Temporary deferral	N	% of Temporary deferral	% of Total deferral
low Hb	785	76.89	74.05
Jaundice	79	7.73	7.45
Medication	41	4.01	3.86
Alcohol	26	2.54	2.45
Under weight	23	2.25	2.16
Dog bite	19	1.86	1.79
Common Cold	13	1.27	1.22
Malaria	5	0.48	0.47
Low BP	5	0.48	0.47
Under age	4	0.39	0.37
Surgery	4	0.39	0.37
Donation within last three months	3	0.29	0.28
Allergy	3	0.29	0.28
Menstruation	2	0.19	0.18
Tattoo	2	0.19	0.18
Eczema	2	0.19	0.18
TB	2	0.19	0.18
UTI on Medication	2	0.19	0.18
Anxiety	1	0.097	0.09
Total	1021	100	96.21

Table 5: Distribution of cause of Permanent deferral

Permanent deferral	N	% of Temporary deferral	% Total deferral
Hypertension	29	74.35	2.73
Asthma	3	7.69	0.28
Epilepsy	2	5.12	0.18
RA	1	2.56	0.09
Uncontrolled diabetes	4	10.25	0.37
Total	39	100	100

Among the five leading causes of temporary and permanent deferral, as shown [Fig. 2] low haemoglobin was the most common cause in both males and females comprising 64.20% and 35.80% respectively, male-female ratio being approximately 2:1. History of jaundice and hypertension was also more common in males as compared to

females, the ratios being 19:1 and 28:1 respectively. Since the prevalence of low haemoglobin, jaundice and hypertension was higher in males, the difference between gender categories was found to be significant at 1% level of significance (p -value < 0.001). No donors amongst females were deferred due to medication and alcohol intake.

Figure 2: Gender distribution amongst five leading causes of deferral including both temporary and permanent causes

4. Discussion

Availability of adequate and safe blood to meet therapeutic requirements of several medically and surgically ill patients in India, where the supply falls short of the annual requirements, is a cause of concern. Apart from the losses due to the meticulous screening of blood for transfusion transmissible infections, blood inventory suffers great loss due to rejection of significantly large proportion of potential blood donors at the time of pre-donation screening in blood banks. Several studies have been undertaken in the country to analyze the causes of deferral in this pool of enthusiastic blood donors. In countries like India where voluntary blood donation still requires active promotion at several places, such losses matter more.

In the present study, number of registered blood donors was 13,266. Males outnumbered females almost twenty times. Preponderance of male blood donors has also been reported by several other authors [5-15]. Alfouzan [16] in his study reported high blood donation attitude score and significantly higher blood donation knowledge in males than females, which could be the probable reason of male preponderance in our study. Besides they can also make themselves easily available for blood donation, if required, as replacement donors. Out of the total donors registered, 12,206 were selected for donation and 1060 were deferred for various causes, rate of deferral being 7.9%. The rate of deferral in this study was comparable to the rates reported in their studies by Bahadur *et al.* [5] (9 %) from New Delhi and Vaseemdhara *et al.* [6] (9.11 %) from Telangana. Higher rates of deferral were reported by Agnihotri [7] (11.6%) from Western India and Arun *et al.* [8] (11.6%) from Tirupati. Much lower rates of deferral were reported by Kumar *et al.* [9] (2.50%) from Jagdalpur and Patil *et al.* [10] (3.95%) from Solapur. Most of the donors deferred in this study were in the age group 18-30 years (55.5%). Almost similar age related demographic profile was described in the studies undertaken by other authors [5-11].

Temporary and permanent deferred cases comprised 96.32% and 5.67% respectively which was comparable to that reported by several other authors [5,8,11,12] suggesting that across the country donors were predominantly deferred for temporary reasons, and addressing to the cause would facilitate these potential donors to re-enter the blood donor pool, either as voluntary or replacement donors. Adequate, proper and friendly donor counseling could motivate replacement donors to become voluntary donors and first time voluntary donors to become regular repeat voluntary donors thereby narrowing the existing gap in the annual requirement of blood units.

Low Haemoglobin was the most common cause of temporary deferral irrespective of gender, comprising 76.89% in our study, which was twice as common in males as females probably because higher number of males were registered and selected at our blood bank, male-female ratio being 33:1.

However, the rate of deferral due to low haemoglobin was much higher in females than males comprising 42.9% and 3.9% respectively. In the study undertaken by Bahadur *et al.* [5], females deferred due to low Haemoglobin was 2.6 times more as compared to males. Several other studies [5,7,11,12,15] reported low Haemoglobin as the most common cause of deferral. Only few studies reported causes other than low haemoglobin as the predominant cause of deferral. History of medication was the most common cause reported by Unnikishnan *et al.* [13], followed by hypertension and low haemoglobin. Alcohol was reported by Kumar *et al.* [9] and low body weight by Chaudhary *et al.* [14] as the most common cause of deferral.

Although, there is non-uniformity in the deferral rates reported from various places, low haemoglobin remains the most common cause of deferral in several studies highlighting the wide spread prevalence of anemia in the country. Globally, anemia affects 1.62 billion people, which corresponds to 24.8% of the population, highest prevalence seen in pre-school children (47.4%), and lowest seen in men (12.7%) [17]. Anemia is a major public health problem in India. Prevalence of anemia is high because of low dietary intake, consumption of food containing tannin and phytates that lead to poor bio-availability of non-heme iron, chronic blood loss due to hook worm and malaria, low iron, B12 and Folic acid intake [18,19]. In blood donor population low haemoglobin levels may be attributed to the fondness of junk food habits by youth and young adults, that lack nutritive value, or lack of availability of adequate nutrition due to low socio-economic factors. As blood donors represent the apparently healthy population of the society, deferral data from various blood centres and hospitals can highlight the magnanimity of the problem. Donor counseling, advice on nutritional supplements and discouragement of junk food habits in youth by health care professionals at blood centres can help to alleviate this widely prevalent public health problem. Variation in the deferral pattern of other causes could be attributed to the difference in lifestyle and authenticity of the information related to past medical history given by blood donors at the time of donor recruitment.

Unlike other studies, history of Jaundice was the second most common cause of deferral in this study. Agnihotri [7] reported a significantly higher deferral rate for voluntary donors (13.97%). Most of the donors deferred in the study were replacement donors (86.60%), however, the rate of deferral was significantly higher in voluntary donors (30.47 %) as compared to replacement donors (7.17%), the risk of deferral being 5.67. The probable reason in this study could be because young adults represented the predominant population of enthusiastic, self motivated voluntary donor pool and anemia being widely prevalent in them due to the reasons explained above, however, supportive data from studies undertaken with this viewpoint are essential for conclusion. In the study conducted by Sharma *et al.* [15],

replacement donors had a significantly higher rate of deferral (13.5%).

In a hospital based study carried out at Mumbai, Jashnani *et al.* [20], did not find any influence of level of education on the percentage of deferral. In the present study, which includes deferred donors from both rural and urban populations in almost equal proportions, educational status of the deferred donors had significant association with replacement and voluntary donors and therefore this warrants detailed analysis of the demographic profile and deferral patterns with respect to educational level for conclusive discussion.

Following salient points can be concluded from this study

- Males form the major population among both replacement and voluntary blood donors as they can make themselves easily available and probably due to better knowledge and attitude for blood donation.
- Rate of deferral of donors was 7.9 %, comparable to the rates reported in other studies. Temporary and permanently deferred cases comprised 96.32% and 5.67% respectively.
- Most of the donors deferred were in the age group 18-30 years and low haemoglobin was the most common cause of deferral, as also seen in other studies. Young adult males to a large extent are suffering from this ailment in India hence nutritional programmes should therefore not only focus on children and women but on the entire population irrespective of age and gender. Besides, the cause of haemoglobin should be further investigated in them.
- Rate of deferral was significantly higher in voluntary blood donors in this study as most of the donors represented the better educated class of the society who volunteered for blood donation and were unexpectedly deferred. Educating such donors for the necessity and benefits of blood donation and motivating them to adopt yearly medical check-up, healthy lifestyle and food habits, would enable them to re-enter the blood donor pool, thereby reducing the chances of being deferred and thus narrowing the gap towards 100 % voluntary blood donation, target set by WHO.
- Level of education had significant association with donor category (Replacement/Voluntary), however, the strength of association could not be commented upon and requires further detailed analysis for conclusion.

References

- [1] Department of AIDS Control Ministry of Health and Family Welfare Government of India Annual Report 2013-14:43-44 Available from Url: www.naco.gov.in
- [2] Towards 100% Voluntary Blood Donation: A Global Framework for Action, 2010, Geneva: Edited by Fordham J and Dhingra N, World Health Organization/ International Federation of Red Cross and Red Crescent Societies: p.5 Available from Url: www.who.int
- [3] Organization of Blood Transfusion Services: Transfusion Medicine Technical Manual, Second Edition 2003; Edited by Dr. R. K. Saran, WHO DGHS guidelines, Ministry of Health and Family Welfare:1-6
- [4] Indian Standard Classification of Education (InSCED), Government of India, Ministry of Human Resource Development, Department of Higher Education, New Delhi 2014:34. Available from Url: www.mhrd.gov.in
- [5] Bahadur S, Jain S, Goel RK, Pahuja S, Jain M. Analysis of Blood Donor Deferral Characteristics in Delhi, India. *Southeast Asian J Trop Med Public Health* Sep 2009; 40(5):1087-91.
- [6] Vaseemdhara A, Nalini MC, Laxmi R, Mrinalini VR, Shivachandran. Evaluation of Pre-donation Deferral causes in Whole Blood Donor Population at a Tertiary Rural Health Centre. *Int J Sci Res* Jul 2014; 3(7):668-71.
- [7] Agnihotri N. Whole blood donor deferral analysis at a centre in Western India. *Asian J Transfus Sci.* Jul 2010; 4(2):116-22.
- [8] Arun R, Subash S, Arumugam P. Analysis of Blood Donor Deferral Causes in Chennai, India. *Int J Med Health Sci.* Jul 2012; 1(3):61-65.
- [9] Kumar A, Prajapati S, Sharma SM, Narayan S Ingole, Gangane N. Impact of counseling on temporarily deferred donor in a tertiary care hospital, central India: A prospective study. *Int J Med Sci Public Health* Oct-Dec 2014; 4(4):400-3.
- [10] Sundar P, Sangeetha SK, Seema DM, Marimuthu P, Shivanna N. Pre-donation deferral of blood donors in South Indian set-up: An analysis. *Asian J Transfus Sci.* 2010; 4(2):112-5.
- [11] Gajjar H, Shah FR, Shah NR, Shah CK. Whole blood donor deferral analysis at General hospital blood bank – A retrospective study. *NHL J med Sci* Jul 2014; 3(2):72-76.
- [12] Patil RS, Mehete S, Rayate M, Karache AG. Analysis of Blood Donor Deferral causes in Solapur district. *Int J Biol Med Res* 2014; 5(3): 4227-30.
- [13] Unnikrishnan B, Rao P, Kumar N, Gant S, Prasad R, Amaranth A, *et al.* Profile of blood donors and reasons for deferral in Coastal South India. *AMJ* 2011; 4(7):379-85.
- [14] Chaudhary RK, Gupta D, Gupta RK. Analysis of donor-deferral pattern in a voluntary blood donor population. *Transfus Med* 1995; 5(3): 209-12.
- [15] Sharma T, Singh B, Bhatt GC. Profile of deferral of blood donors in regional blood transfusion centre in North India. *Asian J Transfus Sci.* Jul-Dec 2013; 7(2):163-64.
- [16] Alfouzan N. Knowledge, Attitudes, and Motivation towards Blood Donation among King Abdulaziz Medical City Population. *Int J Family Med.*2014; 2014 Article ID 539670, 8 pages, <http://dx.doi.org/10.1155/2014/539670>
- [17] Worldwide prevalence of anemia 1993-2005, WHO Database on anemia. Edited by Bruno de Benoist, Erin McLean, Ines Egli and Mary Cogswell, 2008:p.7, whqlibdoc.who.int/publications/2008/9789241596657_eng.pdf
- [18] ICMR Bulletin. Iron absorption and its implications to control Iron deficiency anemia, Feb 2000; 30(2), icmr.nic.in/bufeb00.pdf
- [19] Kalaivani K. Prevalence and consequences of anemia in pregnancy. *Indian J of Med Res.* Nov 2009; 130:627-33.
- [20] Jashnani KD, Patil LN. Blood donor deferrals: Can this be reduced?. *Asian J Transfus Sci.* Jan 2011; 5(1):60.