

Original Research Article

“Female Gender Contribution in Blood Donation and Alternatives: Fact & Factual”

Abstract

Background- Blood can neither be manufactured nor can be procured from other creatures and can only be taken from healthy human beings between the ages 18-65 years for providing safe blood/component to the needy human beings. So, equal participation from both genders should be an ideal situation.

Place of study- Study was conducted at Blood bank, J.A hospital and G. R. Medical College, Gwalior, India.

Materials and methods- This is a retrospective study. Data of blood donors, visiting at blood bank, J.A hospital, Gwalior from 2004-2014 for blood donation were retrieved, compiled and analyzed on gender basis.

Results- A total number of 1, 37,767 donors donated blood during the above mentioned period, 94,729 (68.8%) were voluntary and 43,038 (31.2%) were relative donors ($p= 0.00000$). Incidence of Male vs. Female blood donation came out to be 1, 32,470 (96.16%) & 5,297 (3.84%) respectively and it was found highly significant distribution statistically ($p=0.00000$).

Conclusion- From the present study it can be concluded that female gender participation in Gwalior region of India is significantly lower as compared to findings from developed countries. There is need to educate the female population to address the negative perceptions against blood donation and the importance of blood donation.

Key words-

Female gender, participation, blood donation.

Introduction

Blood Donation is service to humankind, by donating blood you help a needy and save a precious life. Human blood is a vital and an essential element of the human life and there are no substitutes for it [1]. In the treatment of human beings in routine and emergency blood/ blood component transfusion has a vital role in the patient management. Blood can be procured from the healthy person between the ages 18-65 years. Other possible ways to procure human blood for the treatment of patients is cord blood and cadaveric blood but unfortunately these are uncommon procedures even though are well documented in the history. In 1929, Professor Vladimir Shamov of Kharkiv, USSR, reported the experimental use of cadaveric blood and demonstrated the absence of toxicity [2]. Russian surgeon Sergei Yudin pioneered the transfusion of cadaveric blood and performed this successfully for the first time on March 23, 1930. Yudin also

41 reported his first seven clinical transfusions with cadaveric blood at the Fourth
 42 Congress of Ukrainian Surgeons at Kharkiv in September 1930 [3]. Advantages
 43 of cadaveric blood is that 1.5 to 2 liters blood from a cadaver can be procured
 44 and transfused to a person which requires massive transfusion to avoid multiple
 45 exposure. Niranjan bhattacharya stated that umbilical cord whole blood
 46 transfusion is an alternative of adult whole blood transfusion [4]. He transfused
 47 more than 400 units in multidisciplinary patients successfully without any
 48 adverse effects. Advantages of umbilical cord whole blood over adult whole
 49 blood are - it is free from infection, hypoantigenic with altered metabolic
 50 profile, filled with growth factor and cytokine-filled plasma, with the potential
 51 of higher oxygen-carrying capacity than adult blood, as an emergency source of
 52 blood for the management of disaster or crises anywhere in the world. It also
 53 may be safely used for the treatment of malignant and nonmalignant disorders
 54 [5]. Development of the blood substitutes such as stoma free hemoglobin
 55 solution (SFHS), the perfluorochemicals (PFCs) and hemoglobin encapsulated
 56 are still not approved for human use [6]. In the Present scenario the blood can
 57 only be procured from healthy human beings between the ages of 18 to 65 years
 58 and rest of the alternatives are concerned for further studies in future.

59 The safest donors are found among people who donate their blood voluntarily
 60 purely out of altruism and are self-aware of their unsuitability to serve as blood
 61 donors [7]. Voluntary, non-remunerated blood donation has been universally
 62 shown to be the cornerstone of safe blood [8]. According to World Health
 63 Organization (WHO), the estimated blood requirement for Southeast Asian
 64 region is about 16 million units per annum, but it collects just about 9.4 million
 65 units, leaving a gap of six million units [9, 10].

66 There's a wide range of voluntary blood donation and female gender
 67 participation from developed to developing and transitional countries
 68 worldwide. Globally, more than 70 countries had a blood donation rate of less
 69 than 1% (10 donations per 1000 population) in 2006 [11].

70 Dr. Samreen Siraj Bala et al from Srinagar, J&K, India (12) reported gender-
 71 wise proportion of male predominance in blood donation i.e males (95.56%)
 72 and female (4.44%) and quoted similar incidence from Western Ahmedabad
 73 where 95.48% were males and 4.52% were females and from Hyderabad where
 74 97.73% were males and 2.27% were females, which are comparable with
 75 countries like Bahrain, Kuwait, Yemen, Qatar etc. While, in countries like
 76 Australia and Finland males and females donate in almost same proportion [13].

77 Female blood donor participation is an important concern in this study. There is
 78 scarcity of facts on female gender participation in blood donation. Only minor
 79 percentage is contributed by the female donors. Cultural and religious issues
 80 such as women's dependence on men, the erroneous belief that men are

81 healthier than women, that women make monthly blood donations to nature
82 through their menstrual cycle besides other factors such as pregnancy and
83 breastfeeding further restrict many women from donating blood [14]. There is
84 need to develop an evidence-based educational, cultural and religious-focused
85 and friendly interventions that encourages females to donate blood. There is
86 need to educate the female population to address the negative perceptions
87 against blood donation and the importance of blood donation.

88

89 **Materials and Methods**

90 The study was conducted in blood bank, J.A hospital and G. R. medical College
91 Gwalior, India. This is a retrospective study. Donors visiting blood bank for
92 blood donation from January 2004- December 2014 were included in the study.
93 Donors were screened by trained personnel after satisfactory answering the
94 donor's questionnaire, their physical examination and hemoglobin (Hb %)
95 estimation. A total of 1, 37,767 blood units from the selected donors were
96 collected over a period of eleven years. These donors were Voluntary Donors
97 (VD) and Replacement Donors (RD). Replacement donors were those donors
98 who donated blood for ailing patients and were family members, close relatives
99 and friends of recipient. The Voluntary donations were obtained from walk in
100 donors and in voluntary blood donation camps organized by different
101 institutions, neighboring colleges, different social and political organizations.
102 Professional and paid donors were carefully eliminated. Written consent from
103 the donor was also taken prior to donation. 3 ml blood in plain vial and 2 ml
104 blood in EDTA (ethylene diamine tetra acetic acid) vial taken from the satellite
105 bag for testing of transfusion transmitted infections (TTI), blood grouping, cross
106 matching, etc.

107 Data was collected, compiled, summarized and was compared statistically by
108 frequency distribution and percentage proportion. Chi square (χ^2) test was
109 applied to know the significant (p value) ratio of difference statistically.

110

111 **Results-**

112 A total number of 1, 37,767 donors donated blood from January 2004-
113 December 2014, out of which 94,729 (68.8%) were voluntary and 43,038
114 (31.2%) were relative donors (table no.1). Also, significantly increasing pattern
115 in voluntary blood donation was reported from 2004 to 2014 i.e. from 15.2% to
116 95.0% ($p=0.00000$) (Figure no.1). Incidence of Male vs. Female blood donation
117 in the study came out to be 96.16% & 3.84% respectively and it was found
118 highly significant distribution statistically ($p= 0.00000$). No significant variation
119 of male vs. female ratio was reported among voluntary and relative blood
120 donors i.e. male: female-96.11%: 3.89% and 96.28%: 3.72% respectively in the
121 present study (Table no.1, figure no. 2). Incidence of female blood donation was
122 3.67% in the year 2004, 3.90% in 2005, 3.34% in 2006, 3.18% in 2007, 3.32%
123 in 2008, 3.71% in 2009, 3.66% in 2010, 3.96% in 2011, 4.57% in 2012, 4.50%

in 2013 and 4.18% in 2014. It shows that marginal improvement in the Female donation was reported in last two to three year of study but was not at all significant statistically regarding female gender donation from 2004-2014 i.e. $p=0.265$, $p=0.0013$ and $p=0.999$ in relative, voluntary and total donations respectively (Figure No. 3).

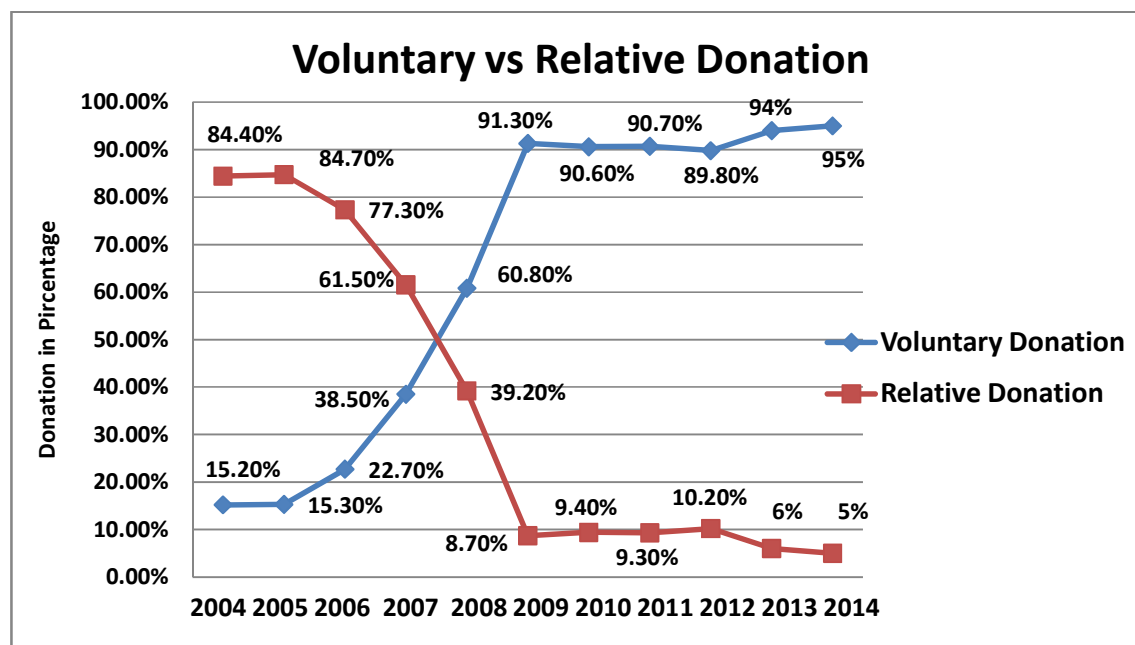


Figure No. 1- Increasing Pattern of Voluntary Blood Donation.

Table No. 1 Distribution Pattern of Blood Donation from 2004-2014

Year	Total Donation			Voluntary Donation			Relative Donation		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
2004	7900	7610 (96.33%)	290 (3.67%)	1201	1162 (96.74%)	39 (3.26%)	6699	6448 (96.26%)	251 (3.74%)
2005	8201	7881 (96.10%)	320 (3.90%)	1254	1220 (97.29%)	34 (2.71%)	6947	6661 (95.89%)	286 (4.11%)
2006	11366	10986 (96.66%)	380 (3.34%)	2528	2422 (95.81%)	106 (4.19%)	8838	8564 (96.90%)	274 (3.10%)
2007	14461	14001 (96.82%)	460 (3.18%)	5580	5360 (96.06%)	220 (3.94%)	8881	8601 (96.85%)	280 (3.15%)
2008	12946	12515 (96.68%)	431 (3.32%)	7878	7598 (96.45%)	280 (3.55%)	5068	4907 (96.83%)	161 (3.17%)

2009	12914	12434 (96.29%)	480 (3.71%)	11788	11377 (96.52%)	411 (3.48%)	1126	1087 (94.54%)	39 (3.46%)
2010	12638	12175 (96.34%)	463 (3.66%)	11449	11018 (96.24%)	431 (3.76%)	1189	1152 (96.89%)	37 (3.11%)
2011	13106	12586 (96.04%)	520 (3.96%)	11886	11405 (95.96%)	481 (4.04%)	1220	1171 (96.99%)	49 (4.01%)
2012	14001	13360 (95.43%)	641 (4.57%)	12573	12031 (95.69%)	542 (4.31%)	1428	1329 (93.07%)	99 (6.93%)
2013	14473	13821 (95.50%)	652 (4.50%)	13613	13025 (95.68%)	588 (4.32%)	860	796 (92.56%)	64 (7.44%)
2014	15761	15101 (95.82%)	660 (4.18%)	14979	14418 (94.26%)	561 (3.74%)	782	718 (91.82%)	64 (8.18%)
Total	137767	132470 (96.16%)	5297 (3.84%)	94729	91036 (96.1%)	3693 (3.89%)	43038	41434 (96.28%)	1604 (3.72%)

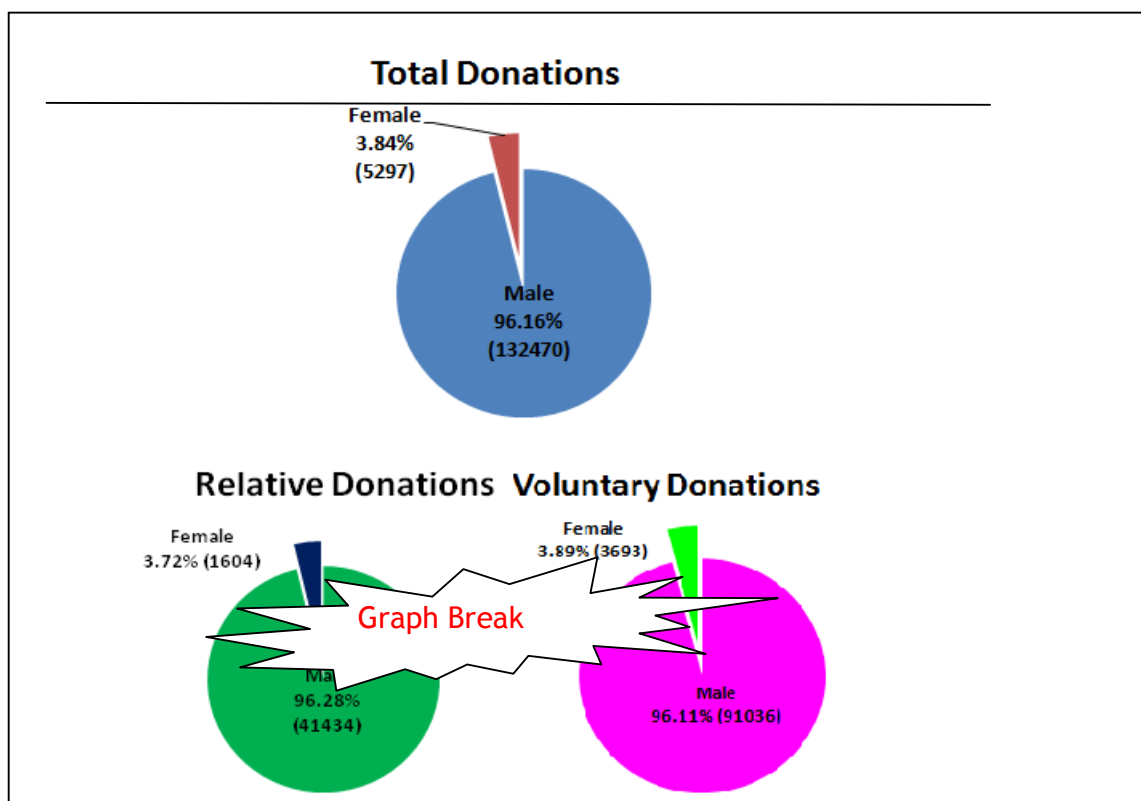
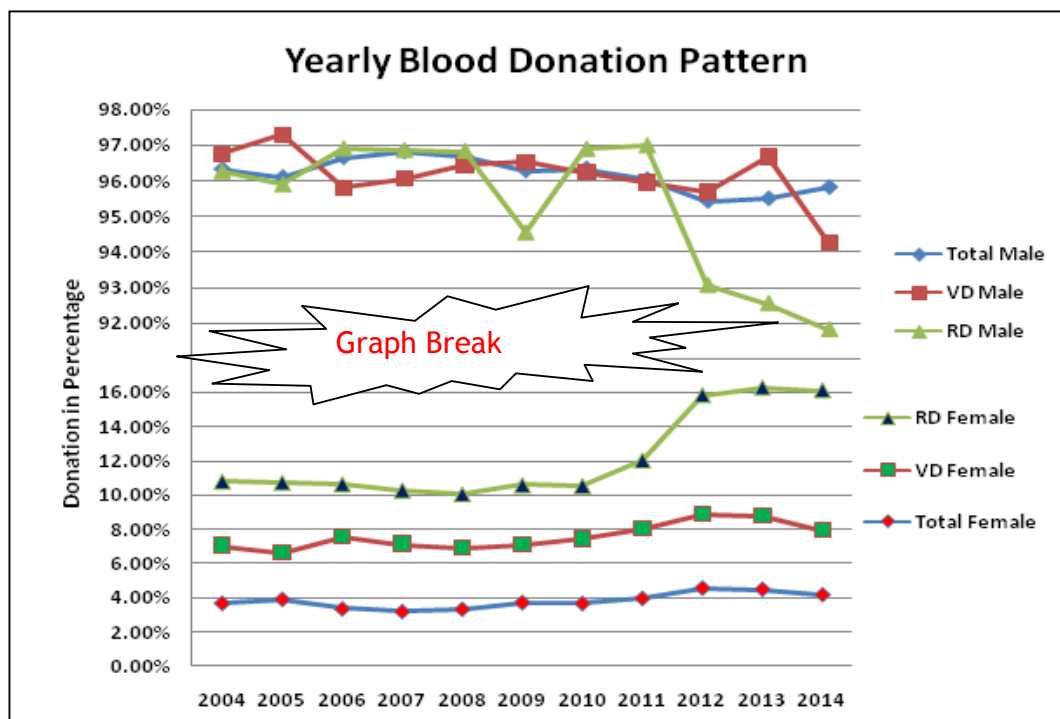


Fig no. 2- Gender Distribution among Voluntary, Relative and Total Blood Donation.



VD = Voluntary Donation, RD = Relative Donation

Fig No.3 Yearly Gender Wise Blood Donation Pattern.

Discussion-

According to 2012 World Health Organization (WHO) report, In India only nine million units are collected annually, while the need is for 12 million units [15]. As total population of India is 1.2 billion, there is 1% donation and a deficit of 3 million units per year. The gap between demand and supply can be bridged by carrying out a proper assessment so that the demand can be met through planned donor recruitment and planned production of blood components and plasma derivatives. The WHO recommends that 1% to 3% of a country's population should donate blood to meet the needs of that country [16]. The sex ratio for the entire world population is 101 males to 100 females [17]. In the United States, the sex ratios at birth over the period 1970–2002 were 1.05 for the white non-Hispanic population, 1.04 for Mexican Americans, 1.03 for African Americans and Indians, and 1.07 for mothers of Chinese or Filipino ethnicity [18]. Among Western European countries ca. 2001, the ratios ranged from 1.04 in Belgium to 1.07 in Switzerland [19], Italy [20] and Ireland [21]. In the aggregated results of 56 Demographic and Health Surveys [22] in African countries, the ratio is 1.03, though there is also considerable country-to-country variation [23]

The first step toward blood safety remains the recruitment of voluntary non-remunerated donations from low-risk repeat donors (24, 25). In a developing country like India the male to female ratio of blood donation is significantly low though the ratio of male to female population is almost equal. In the present study it can be seen that in the past decade the blood donations by male donors is way too high (96.16%) as compared to the female blood donors (3.84%). Previous research has revealed a higher rate of deferral in females, primarily because of anemia [26]. In 2003 female blood donors represented 40% of the blood donor population in Austria, 49.7% in France, 50% in Norway and 55% in Great Britain [27]. Greece and Italy are the only European countries in which the percentage of female donors is about 33% [28]. In Spain, 46% of the blood donors are women [29], in Portugal 43% [30], in Belgium 45.4%, [31] in the Netherlands 50% [32], in France 50%, [33] and in Finland 55% [34]. This is in affirmation of the WHO report that there are more male donors in Nigeria [35]. Factors such as their frequent menstrual cycles, pregnancy, and lactation may prevent them from donation.

About 234 million major operations are performed worldwide every year, with 63 million people undergoing surgery for traumatic injuries, 31 million more for treating cancers and another 10 million for pregnancy-related complications require blood transfusion. [36-37]. About 300 000 infants are born each year with Thalassemia and sickle-cell disease and need regular blood transfusion [38].

Developed countries with well-structured health systems and blood transfusion services based on voluntary blood donation are generally able to meet the demand for blood and blood products. In the WHO African region, blood requirements were estimated at about 8 million units in 2006, but only 3.2 million units were collected – about 41.5% of the demand [39].

South-East Asia accounts for about 25% of the world's population, but collects only 9% of the world's blood supply – 7 million units a year compared with an estimated requirement for total of 15 million units [40]. Globally, over 81 million donations of blood are collected annually, but only 45% of these are donated in developing and transitional countries, where 81% of the world's population lives [11].

In the view of Indian perspective, if blood donation is increased up to 2% by ensuring maximum participation of the female gender, extending component therapy to the remote areas of the country (which is presently restricted only in larger cities) and ensuring rational use of blood, the deficit between demand and

supply could be leveled. Presently, alternative of human whole blood and endorsement of the blood substitutes is still a question mark. Further, retrospective studies have some limitations such as selection bias, information bias and also certain key statistics which cannot be measured.

Conclusion

The present study shows that female gender participation in blood donation is extensively low, as reported from other parts of India and underdeveloped countries. While in developed countries it is almost equal or even higher. There's need to encourage females by various evidence based educational interventions about the importance of blood donation, so that there could be equal participation from them which may result in leveling the deficit of demand and supply of blood which currently resides in our country. Also, component therapy and rational use of blood should be taken into consideration throughout the country including the remote rural areas for a better tomorrow.

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