

Bridging the Knowledge–Practice Gap in Voluntary Blood Donation: A Cross-Sectional Study among Medical Students and Interns in Mumbai

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Abstract

Background & objectives: Voluntary blood donation is essential for maintaining an adequate blood supply. Medical students are an important potential donor population. This study assessed knowledge, attitude and practice regarding voluntary blood donation among medical students and interns at a tertiary care teaching hospital in Mumbai.

Methods: A cross-sectional questionnaire-based study was conducted among medical students and interns in July 2026. An anonymous electronic questionnaire assessed knowledge, attitude, previous donation, barriers and willingness to donate. Data were analyzed using descriptive statistics, chi-square test and independent-samples t-test.

Results: Among 231 participants, the mean age was 20.89 ± 1.74 years and 148 (64.1%) were male. The mean knowledge score was $11.33 \pm 1.40/14$. Awareness programmes had been attended by 111 (48.1%) participants. A favourable attitude was observed, with 220 (95.2%) considering blood donation a social responsibility and 193 (83.5%) willing to donate in future. However, only 76 (32.9%) had previously donated blood. Previous donation was significantly associated with gender, MBBS year and awareness-programme participation ($p < 0.001$). Participants exposed to awareness programmes had higher knowledge scores than those without such exposure (11.64 ± 1.13 vs. 11.05 ± 1.57 ; $p = 0.001$).

Interpretation & conclusions: Medical students demonstrated good knowledge and favourable attitudes, but actual donation practice was lower. Regular awareness programmes and accessible institutional blood donation camps may help bridge this knowledge–practice gap.

Keywords: Blood donation; Medical students; Voluntary donation

Introduction

Blood transfusion is an essential component of modern healthcare and plays a critical role in the management of trauma, major surgical procedures, obstetric haemorrhage, severe anaemia, malignancies

and several other life-threatening conditions. The availability of safe blood depends on a reliable donor population and an effective blood transfusion system. Voluntary, non-remunerated blood donation is considered the preferred source of blood because regular voluntary donors provide a sustainable donor pool and contribute to the safety of the blood supply.^{1,2}

India has made considerable progress in strengthening blood transfusion services and promoting voluntary blood donation. Nevertheless, maintaining an adequate pool of regular voluntary blood donors remains an important challenge. Recruitment of young adults is particularly important because they generally constitute a healthy population with the potential to become regular donors.

Medical students represent a unique potential donor group. They possess basic knowledge of human biology and disease, are generally aware of the importance of blood transfusion and are future healthcare professionals who can influence health-related behaviour among patients, relatives and the community. However, knowledge and positive attitudes do not necessarily translate into actual blood donation.

Several studies conducted among medical students have demonstrated a discrepancy between knowledge, attitude and practice. Chauhan et al. reported good knowledge and a favourable attitude among medical students in North India, but only 22.9% had previously donated blood.³ Kowsalya et al. reported an even lower previous donation rate of 13.2% among medical students in Puducherry despite increasing knowledge and awareness with progression through medical education.⁴ Raghuwanshi et al. similarly demonstrated that willingness to donate was considerably higher than actual donation practice among college students.⁵

The factors responsible for this gap may include inadequate knowledge of eligibility criteria, fear of weakness or needles, perceived medical ineligibility, lack of opportunity, inadequate awareness programmes and absence of convenient blood donation facilities.

The present study was therefore undertaken to assess the knowledge, attitude and practice regarding voluntary blood donation among medical students and interns at a tertiary care teaching hospital in Mumbai. The study also evaluated previous exposure to blood donation awareness programmes, barriers to donation and factors associated with actual blood donation practice.

Objectives

The primary objective was to assess knowledge, attitude and practice regarding voluntary blood donation among medical students and interns.

The secondary objectives were to assess previous exposure to blood donation awareness programmes, determine the proportion of participants who had previously donated blood, identify barriers to blood donation, assess future willingness to donate and evaluate factors associated with previous blood donation.

Materials and Methods

Study design and setting

A cross-sectional, questionnaire-based observational study was conducted among medical students and interns at a tertiary care teaching hospital in Mumbai, Maharashtra, India. Data collection was undertaken during July 2026.

Study population

The study population comprised undergraduate medical students from different MBBS years and interns. Participation was voluntary.

Data collection

Data were collected using an anonymous, self-administered electronic questionnaire. Participants were provided with information regarding the study and electronic informed consent was obtained before participation. No personally identifying information such as name, telephone number, email address or roll number was collected.

The questionnaire consisted of sections assessing demographic characteristics, exposure to blood donation awareness programmes, knowledge, attitude and practice regarding voluntary blood donation.

Assessment of knowledge

Knowledge was assessed using 14 questions addressing donor eligibility, safety of blood donation, volume of blood collected, replacement of blood volume, blood groups, blood safety and voluntary donation. One mark was assigned for each correct answer, giving a maximum possible score of 14.

Assessment of attitude

Attitude was assessed using statements concerning blood donation as a social responsibility, willingness to donate, encouraging others to donate, emergency donation and the importance of blood donation camps in medical colleges. Responses were recorded using a Likert-type scale.

Assessment of practice

Practice was assessed by asking participants whether they had previously donated blood, the number of previous donations, timing of their last donation and the reason for donation. Participants who had never donated were asked about reasons for non-donation and willingness to donate in future.

Statistical analysis

Data were compiled and analyzed using descriptive and inferential statistical methods. Continuous variables were expressed as mean $\pm$ standard deviation, while categorical variables were expressed as frequency and percentage. Associations between categorical variables were assessed using the chi-square test. Mean knowledge scores between groups were compared using an independent-samples t-test. A p-value <0.05 was considered statistically significant.

Results**Demographic characteristics (Table 1)**

A total of 231 participants responded to the questionnaire. The mean age was 20.89 ± 1.74 years. The majority of participants were males, with 148 (64.1%) males and 75 (32.5%) females; eight participants (3.5%) did not report their gender.

Second MBBS students formed the largest proportion of participants, accounting for 138 (59.7%) responses, followed by first MBBS students (39, 16.9%), third MBBS Part I students (38, 16.5%) and interns (16, 6.9%).

The most frequently reported blood group was O positive (94, 40.7%), followed by A positive (72, 31.2%) and B positive (31, 13.4%). Seven participants (3.0%) did not know their blood group.

Table 1. Demographic characteristics of participants

Variable	n (%)
Gender	
Male	148 (64.1)

Variable	n (%)
Female	75 (32.5)
Not reported	8 (3.5)
MBBS year	
First MBBS	39 (16.9)
Second MBBS	138 (59.7)
Third MBBS Part I	38 (16.5)
Internship	16 (6.9)
Blood group	
O positive	94 (40.7)
A positive	72 (31.2)
B positive	31 (13.4)
A negative	13 (5.6)
B negative	7 (3.0)
AB positive	7 (3.0)
Don't know	7 (3.0)

Exposure to awareness programmes

Of the 231 participants, 111 (48.1%) had previously attended a blood donation awareness programme, while 120 (51.9%) had not.

Participants who had attended an awareness programme demonstrated a significantly higher mean knowledge score compared with those who had not attended one (11.64 ± 1.13 vs. 11.05 ± 1.57 ; $p=0.001$).

Knowledge regarding blood donation (Table 2)

The mean knowledge score was 11.33 ± 1.40 out of 14, corresponding to approximately 80.9% of the maximum possible score.

Knowledge was particularly high regarding the safety of blood donation and basic blood-group compatibility. All participants recognized that blood donation does not cause permanent weakness and that healthy women can donate blood. Similarly, all participants recognized that blood donation using sterile disposable equipment is safe.

A total of 199 (86.1%) participants correctly identified 18 years as the minimum eligible age for blood donation. However, knowledge regarding the minimum body-weight requirement was considerably

lower, with only 93 (40.3%) correctly identifying 45 kg as the minimum weight requirement for a 350-mL whole blood donation.

Knowledge regarding blood groups was good. 210 (90.9%) correctly identified O negative as the universal donor group and 227 (98.3%) identified AB positive as the universal recipient group.

A potentially important misconception was observed regarding HIV transmission, with 61 (26.4%) participants incorrectly believing that a donor could acquire HIV through the process of blood donation.

Table 2. Selected knowledge parameters

Knowledge parameter	Correct response n (%)
Minimum age – 18 years	199 (86.1)
Minimum weight – 45 kg	93 (40.3)
Correct donation volume	170 (73.6)
One unit can help more than one patient	138 (59.7)
Blood volume is naturally replaced	212 (91.8)
Healthy women can donate	231 (100)
Blood donation is safe with sterile disposable equipment	231 (100)
Donor cannot acquire HIV through donation	170 (73.6)
O negative as universal donor	210 (90.9)
AB positive as universal recipient	227 (98.3)
Voluntary donors are not paid	188 (81.4)

Attitude towards blood donation (Table 3)

The overall attitude was strongly favourable, with a mean attitude score of 36.50 ± 3.44 out of 40.

A total of 220 (95.2%) participants considered blood donation a social responsibility. The same proportion stated that they would encourage others to donate blood and would donate during an emergency.

All participants agreed that blood donation saves lives. Furthermore, 220 (95.2%) supported regular blood donation camps in medical colleges.

A total of 193 (83.5%) participants expressed willingness to donate blood in the future.

Table 3. Attitude towards voluntary blood donation

Statement	Agree/strongly agree n (%)
Blood donation is a social responsibility	220 (95.2)

Statement	Agree/strongly agree n (%)
Every healthy adult should donate regularly	169 (73.2)
Willing to donate in future	193 (83.5)
Blood donation saves lives	231 (100)
Would encourage others to donate	220 (95.2)
Would donate during emergencies	220 (95.2)
Regular blood donation camps should be conducted in medical colleges	220 (95.2)
Voluntary donation should replace replacement donation	167 (72.3)

Blood donation practice (Table 4)

Despite the high knowledge and favourable attitude, only 76 (32.9%) participants had previously donated blood, while 155 (67.1%) had never donated.

Among previous donors, 34 (44.7%) had donated once, 30 (39.5%) had donated twice and 12 (15.8%) had donated three or more times.

The majority of previous donors had donated through blood donation camps. Among participants who had never donated, the major barriers included perceived ineligibility, lack of opportunity, fear of weakness and medical illness.

Table 4. Previous blood donation practice

Variable	n (%)
Ever donated blood	
Yes	76 (32.9)
No	155 (67.1)
Number of donations among donors	
Once	34 (44.7)
Twice	30 (39.5)
≥3 times	12 (15.8)

Factors associated with previous blood donation

Previous blood donation was significantly associated with gender ($p < 0.001$). Among males, 68/148 (45.9%) had previously donated compared with 8/75 (10.7%) females.

Donation practice also differed significantly according to MBBS year ($p < 0.001$). Previous donation was reported by 8/39 (20.5%) first-year students, 38/138 (27.5%) second-year students, 22/38 (57.9%) third-year students and 8/16 (50.0%) interns.

A strong association was observed between participation in awareness programmes and previous donation. Among the 111 participants who had attended an awareness programme, 56 (50.5%) had previously donated blood, compared with only 20 (16.7%) among the 120 participants who had not attended an awareness programme ($p < 0.001$).

Discussion

The present study demonstrated a clear knowledge–attitude–practice gap regarding voluntary blood donation among medical students and interns. Participants had good knowledge and a highly favourable attitude towards blood donation, but only one-third had actually donated blood. This finding is important because medical students represent a readily accessible population for recruitment of voluntary donors and can potentially influence donation practices within the wider community.

The mean knowledge score in our study was $11.33 \pm 1.40/14$ (80.9%), indicating good overall knowledge. This was higher than the level reported by Chauhan et al., who reported a mean knowledge score corresponding to 74.4% among 235 medical students in North India.³ In contrast, Kowsalya et al. reported an overall knowledge level of 44.8% among 371 medical students in Puducherry.⁴ The higher knowledge observed in the present study may be related to the study setting, increasing exposure to clinical subjects and blood transfusion-related situations in a tertiary care teaching hospital.

Knowledge regarding individual aspects of donation was variable. Although 86.1% correctly identified 18 years as the minimum age for donation, only 40.3% correctly identified 45 kg as the minimum body-weight requirement. This suggests that students may have good general awareness but incomplete knowledge of specific donor-selection criteria. Bharatwaj et al. similarly identified deficiencies in specific areas of blood donation knowledge among medical undergraduate students.⁶ Such gaps are relevant because students who incorrectly perceive themselves as ineligible may not approach a blood donation centre even when they are actually eligible.

Knowledge regarding blood-group compatibility was considerably better in our study. More than 90% correctly identified O negative as the universal donor group and 98.3% identified AB positive as the universal recipient group. This may reflect greater exposure to basic blood-group concepts during undergraduate medical education. However, blood-group knowledge alone does not necessarily translate into blood donation practice.

An important misconception was observed regarding donor safety. Although all participants recognized that donation using sterile disposable equipment is safe, 26.4% believed that HIV could be acquired through blood donation. This finding emphasizes the need for continued education regarding the safety of the donation process. Similar misconceptions regarding blood donation and transfusion-transmitted infections have been reported among student populations. Mishra et al., in a study of 1,000 college-going students in North India, reported significant differences in knowledge between donors and non-donors and emphasized the importance of correcting misconceptions regarding blood donation.⁷

The attitude towards voluntary blood donation in our study was highly favourable. 95.2% of participants considered blood donation a social responsibility, 95.2% would encourage others to donate and 95.2% would donate during emergencies. In addition, 83.5% expressed willingness to donate in future. These findings are consistent with previous studies demonstrating favourable attitudes among medical students.

Chauhan et al. reported that approximately 91% of medical students were willing to donate blood.³ Raghuwanshi et al. reported an even higher willingness, with 85% of college students expressing willingness to donate when approached.⁵

Despite this favourable attitude, only 32.9% of our participants had previously donated blood. This was higher than the 22.9% reported by Chauhan et al.³ and the 13.2% reported by Kowsalya et al.⁴ However, the donation rate remained substantially lower than the level of willingness observed in our study. This discrepancy highlights that favourable attitudes alone are insufficient to ensure actual donation.

The knowledge–practice gap has been described by several previous investigators. Raghuwanshi et al. observed that although a large proportion of students expressed willingness to donate, practical donation rates were considerably lower.⁵ Mishra et al. also demonstrated higher knowledge among donors than non-donors, suggesting that knowledge and previous donation may be interrelated.⁷ These findings support the need for interventions that address not only knowledge but also practical barriers to donation.

Donation practice in our study increased with increasing MBBS year. Previous donation was reported by 20.5% of first-year students, 27.5% of second-year students, 57.9% of third-year students and 50.0% of interns, with the difference being statistically significant ($p < 0.001$). This pattern is broadly consistent with Kowsalya et al., who reported better blood donation-related knowledge, attitude and practice among senior medical students compared with junior students.⁴ Increasing age, greater clinical exposure, better understanding of transfusion medicine and increased exposure to blood donation camps may contribute to this trend.

A significant association was also observed between gender and previous blood donation. 45.9% of male participants had previously donated compared with 10.7% of female participants ($p < 0.001$). Similar gender differences have been reported by Chauhan et al., who observed substantially lower donation practice among female medical students.³ Several factors may contribute to this difference, including concerns regarding weakness, menstruation-associated blood loss, haemoglobin status and perceived eligibility. Importantly, the present study found that all participants recognized that healthy women can donate blood, indicating that the lower donation practice among females may not necessarily reflect a negative attitude towards donation.

One of the most significant findings of the present study was the association between awareness-programme participation and actual blood donation. Among participants who had attended an awareness programme, 50.5% had previously donated blood, compared with only 16.7% among those who had not attended one ($p < 0.001$). Participants exposed to awareness programmes also had significantly higher knowledge scores (11.64 ± 1.13 vs. 11.05 ± 1.57 ; $p = 0.001$).

This finding is particularly relevant for planning interventions. Chauhan et al. reported improvement in willingness to donate following an interactive awareness session among medical students.³ Similarly, Bharatwaj et al. emphasized the importance of educational interventions and regular opportunities for blood donation among medical students.⁶ Although the cross-sectional design of our study does not establish causality, the strong association suggests that awareness programmes may play an important role in improving knowledge and potentially encouraging donation.

The reasons for non-donation provide further insight into the knowledge–practice gap. Perceived ineligibility and lack of opportunity were the most frequently reported barriers, followed by fear of weakness and medical illness. These findings suggest that many students may not be actively opposed to

donation but simply do not perceive themselves as eligible or do not have convenient access to donation facilities.

The importance of providing convenient opportunities was also evident from the practice pattern of previous donors. Most donors reported donating through blood donation camps. Furthermore, 95.2% of participants supported regular blood donation camps in medical colleges. This indicates strong institutional acceptability for campus-based donor recruitment. Raghuwanshi et al. similarly suggested that practical measures to facilitate donation, including convenient opportunities and institutional support, could improve donor participation.⁵

The present study therefore suggests that medical colleges could adopt a two-pronged strategy. First, students should receive structured education addressing donor eligibility, safety of donation, misconceptions regarding weakness and infection transmission, and the importance of voluntary non-remunerated donation. Second, this education should be linked directly to regular blood donation camps so that students who are willing to donate have an immediate and convenient opportunity to do so.

The high future willingness observed in our study provides an encouraging opportunity. Although only 32.9% had previously donated, 83.5% expressed willingness to donate in future. Thus, a large proportion of students represent potential first-time donors. Appropriate counselling and regular institutional donation drives could help convert this willingness into actual donation behaviour.

An important strength of the present study is that it evaluated knowledge, attitude and actual practice within the same population and additionally examined awareness-programme exposure and barriers to donation. The inclusion of students from different stages of medical education allowed assessment of the relationship between educational level and donation practice.

However, the study has limitations. It was a single-centre cross-sectional study with a relatively modest sample size and voluntary participation. Therefore, the findings may not be generalizable to all medical students. Blood donation history and reasons for non-donation were self-reported and may be subject to recall or social desirability bias. Furthermore, because of the cross-sectional design, the association between awareness-programme participation and donation cannot be interpreted as a causal relationship. Students who were already interested in blood donation may have been more likely to attend awareness programmes.

Despite these limitations, the study provides useful evidence of a substantial gap between willingness and actual donation among future healthcare professionals. The findings suggest that awareness alone is insufficient; awareness must be combined with accessibility and opportunity. Regular institutional blood donation camps, targeted educational interventions and follow-up mechanisms for repeat donation may help develop a sustainable culture of voluntary blood donation among medical students.

Conclusion

Medical students and interns demonstrated good knowledge and a strongly favourable attitude towards voluntary blood donation, but actual donation practice remained substantially lower. Only 32.9% had previously donated despite 83.5% expressing willingness to donate in future. Previous donation was significantly associated with gender, MBBS year and participation in blood donation awareness programmes.

The significant association between awareness-programme participation and both knowledge and donation practice highlights the potential value of structured educational interventions. However, the

major barriers of perceived ineligibility and lack of opportunity indicate that education should be accompanied by easily accessible blood donation facilities.

Regular blood donation camps within medical colleges, supported by focused education regarding donor eligibility and safety, may help bridge the knowledge–practice gap and convert medical students from potential donors into regular voluntary blood donors.

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References

1. World Health Organization. Towards 100% voluntary non-remunerated blood donation: a global framework for action. Geneva: WHO; 2010.
2. World Health Organization. Blood donor selection: guidelines on assessing donor suitability for blood donation. Geneva: WHO; 2012.
3. Chauhan R, Kumar R, Thakur S. A study to assess the knowledge, attitude, and practices about blood donation among medical students of a medical college in North India. *J Family Med Prim Care*. 2018;7(4):693-7. doi:10.4103/jfmpc.jfmpc_54_17.
4. Kowsalya V, Vijayakumar R, Chidambaram R, Srikumar R, Prabhakar Reddy E, Latha S, et al. A study on knowledge, attitude and practice regarding voluntary blood donation among medical students in Puducherry, India. *Pak J Biol Sci*. 2013;16(9):439-42. doi:10.3923/pjbs.2013.439.442.
5. Raghuwanshi B, Pehlajani NK, Sinha MK. Voluntary blood donation among students: a cross-sectional study on knowledge and practice vs. attitude. *J Clin Diagn Res*. 2016;10(10):EC18-22. doi:10.7860/JCDR/2016/21957.8733.
6. Bharatwaj RS, Vijaya K, Rajaram P. A descriptive study of knowledge, attitude and practice with regard to voluntary blood donation among medical undergraduate students in Pondicherry, India. *J Clin Diagn Res*. 2012;6(4):602-4.
7. Mishra SK, Sachdev S, Marwaha N, Avasthi A. Study of knowledge and attitude among college-going students toward voluntary blood donation from north India. *J Blood Med*. 2016;7:19-26. doi:10.2147/JBM.S91088.