

ORIGINAL RESEARCH

KNOWLEDGE, ATTITUDES, MOTIVATORS, BARRIERS, AND BLOOD DONATION PRACTICES AMONG MEDICAL AND ALLIED HEALTH SCIENCES STUDENTS IN NORTHERN INDIA: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Voluntary non-remunerated blood donation is essential for maintaining a safe and adequate blood supply. Students in medical and allied health programmes represent a potentially important donor population, but favourable attitudes do not necessarily translate into actual donation.

Objective: To assess knowledge, attitudes, donation practices, motivating factors, and barriers related to voluntary blood donation among undergraduate medical and allied health sciences students, and to examine variation in responses across academic institutes.

Methods: A cross-sectional questionnaire-based study was conducted from January to June 2024 at a tertiary-care centre within a private university in northern India. Using convenience sampling, 710 students aged >18 years from medical, dental, paramedical, physiotherapy, nursing, pharmacy and biomedical sciences programmes were included. A self-designed, pretested questionnaire assessed 20 knowledge items, seven motivating factors, one barrier item, two donation-practice items, and seven attitude/perception items. Categorical responses were summarized as frequencies and percentages. Associations between institute and questionnaire responses were examined using Pearson's chi-square test; $p < 0.05$ was considered statistically significant.

Results: Of 710 participants, 400 (56.3%) were women. Awareness of one's own blood group (90.9%) and the concept of voluntary blood donation (90.8%) was high, whereas knowledge of minimum donor weight (44.6%), time required for donation (47.6%), and the effect of high-risk behaviour on eligibility (43.7%) was lower. Only 29.9% rejected the misconception that infection can be acquired while donating blood under routine blood-centre practice. Altruism/social help (83.1%), social-media campaigns (79.9%), token recognition (80.3%), and provision of leave (76.2%) were commonly reported motivators. The leading barriers were fear of weakness or illness after donation (34%), time constraints (20%), and fear of needles (18%). Only 127 students (17.9%) reported having donated blood previously. Positive attitudes were common: 90.7% regarded donation as an honourable act and 83.4% would encourage others to donate, but only 41.1% agreed that they would donate repeatedly.

Conclusion: Medical and allied health sciences students demonstrated generally favourable attitudes toward blood donation, but important knowledge gaps and a substantial knowledge-to-practice gap persisted. Institution-specific education, correction of misconceptions, convenient donation opportunities, and donor-retention strategies may help translate willingness into regular voluntary donation.

Keywords: Blood donation; Voluntary non-remunerated blood donation; Medical students; Allied health sciences; Knowledge; Attitudes; Barriers; Donor motivation

INTRODUCTION

Blood transfusion is an indispensable component of modern health care, supporting emergency medicine, surgery, obstetric care, oncology, haematology and the management of severe anaemia. Globally, approximately 120 million blood donations are collected each year, yet marked inequities in donation rates and access persist between countries [1]. Voluntary, unpaid donation remains central to strategies for ensuring a safe and sustainable blood supply.

In India, the Directorate General of Health Services estimates an annual requirement of approximately 14.6 million units for the existing health-care system [2]. A population-needs modelling study suggested that the underlying requirement could be substantially higher if all people requiring transfusion had full access to care [3]. These estimates underscore the importance of maintaining a broad, regular and well-informed donor pool.

Young adults in universities are attractive candidates for donor recruitment because many are healthy, accessible through organised institutions and potentially able to become repeat donors. However, knowledge alone does not reliably predict donation behaviour. Reviews of knowledge-attitude-practice studies in developing settings have repeatedly identified misinformation, fear of adverse effects, procedural anxiety, limited opportunity to donate and a gap between favourable attitudes and actual donation [4]. A recent critical appraisal of Indian blood-donation KAP studies also highlighted weaknesses in questionnaire design and reporting, emphasizing the need for clearly described methods and locally relevant assessment tools [5].

Health-professions students are of particular interest because their training exposes them to transfusion medicine and the clinical consequences of blood shortages. Indian studies among medical and other college students have generally reported positive attitudes but variable knowledge and relatively modest rates of previous donation [6,7]. Understanding both facilitators and barriers within this population may therefore help universities and blood centres design more effective donor-recruitment and retention strategies.

The present study assessed awareness, attitudes, motivating factors, barriers and self-reported blood-donation practices among medical and allied health sciences students at a private university in northern India, and examined whether responses differed across academic institutes.

MATERIALS AND METHOD

Study design and setting

This observational cross-sectional study was conducted in the Department of Immunohematology and Blood Transfusion at a tertiary-care centre within a private university in northern India. Data were collected over six months, from 1 January to 30 June 2024. Reporting was structured with reference to the STROBE recommendations for cross-sectional studies [8].

Study population, sample size and sampling

The study population comprised undergraduate students enrolled in medical and allied health sciences institutes of the university. Students older than 18 years who provided consent were eligible. Incomplete questionnaires were excluded. The study protocol specified a minimum sample size of 440, based on an assumed prevalence of 50%, a 95% confidence level, 5% absolute precision and allowance for non-response. Because a larger number of eligible students were available during the study period, 710 completed questionnaires were included. Participants were recruited by non-probability convenience sampling.

Ethics

The study was initiated after approval by the institutional research and ethics committee. Participation was voluntary, and informed consent was obtained before questionnaire administration.

Questionnaire and study variables

A self-designed, prevalidated and pretested questionnaire was used to collect sociodemographic information and data on blood-donation knowledge, motivation, barriers, practice and perception. The questionnaire contained three sections. The first comprised 20 binary (yes/no) knowledge items covering awareness of one's blood group, voluntary donation, donor eligibility, donation interval, transfusion-transmitted infections, blood components and common misconceptions. Donor-eligibility items were interpreted in the context of national blood-centre standards applicable in India [9].

The second section contained seven yes/no items addressing potential motivating factors and one multiple-choice item on the principal barrier to blood donation. The third section included two yes/no questions on previous donation practice and seven attitude/perception items rated as agree, disagree or not sure. No composite knowledge, attitude or practice score was reported; therefore, analyses were retained at the item level.

Statistical analysis

Data were summarized using frequencies and percentages. Differences in response distributions across the six academic institutes were assessed using Pearson's chi-square test. Two-sided p values <0.05 were considered statistically significant. For consistency, chi-square p values were calculated from the contingency-table cell counts. Where sparse cells occurred, inferential results were interpreted cautiously because some tables may not fully satisfy expected-frequency assumptions for the chi-square approximation.

RESULTS

Participant characteristics

A total of 710 students participated. Medical students formed the largest group (423; 59.6%), followed by paramedical students (98; 13.8%), dental students (67; 9.4%), pharmacy/biomedical sciences students (48; 6.8%), nursing students (47; 6.6%) and physiotherapy students (27; 3.8%). Women constituted 56.3% of the sample (400/710).

Table 1. Participant distribution by institute

Characteristic	n	%
Medical	423	59.57
Paramedical sciences	98	13.80
Dental	67	9.43
Pharmacy and biomedical sciences	48	6.76
Nursing	47	6.62
Physiotherapy	27	3.80
Female	400	56.3
Male	310	43.7

Knowledge regarding blood donation

General awareness was high for several basic concepts, but knowledge was uneven across donor-selection and safety domains. Overall, 90.9% knew their blood group and 90.8% reported knowing the meaning of voluntary blood donation. Knowledge of the donation interval (63.4%), age criteria (61.3%), haemoglobin criteria (58.0%) and minimum donor weight (44.6%) was less consistent. Three quarters (75.4%) reported knowing common transfusion-transmitted infections, while only 46.3% reported knowing how many components can be prepared from one unit of blood. A notable misconception concerned infection during donation: 70.1% answered that a person could become infected while donating blood, meaning only 29.9% rejected this misconception. Conversely, 72.1% correctly rejected the statement that blood can be artificially synthesized. Several knowledge responses differed across institutes. (Table 2).

Table 2. Selected response frequencies for blood-donation knowledge items, by institute

Item / selected response	Medical(n=423)	Paramedic al(n=98)	Dental(n=67)	Pharmac y(n=48)	Nursing(n=47)	Physio therapy(n=2 7)	Overall(n=710)	p valu e
1. Do you know your blood group? [Yes]	418 (98.82)	56 (57.14)	67 (100)	39 (81.25)	40 (85.11)	25 (92.59)	645 (90.85)	<0.0 01
2. Do you know what is voluntary blood donation? [Yes]	400 (94.56)	78 (79.59)	62 (92.54)	40 (83.33)	38 (80.15)	27 (100)	645 (90.84)	<0.0 01
3. Do you know how frequently a person can donate blood? [Yes]	271 (64.07)	59 (60.20)	45 (67.16)	29 (60.42)	29 (61.70)	17 (62.96)	450 (63.38)	0.94 8
4. Do you know how much time is take for blood donation? [Yes]	182 (43.03)	54 (55.10)	37 (55.22)	26 (54.17)	25 (53.19)	14 (51.85)	338 (47.61)	0.11 2
5. Do you know which blood group is universal blood donor? [Yes]	418 (98.88)	78 (79.59)	31 (46.27)	43 (91.49)	36 (76.60)	25 (92.59)	631 (88.87)	<0.0 01
6. Do you know which blood group is a universal blood recipient? [Yes]	417 (98.58)	75 (76.53)	30 (44.78)	41 (85.42)	38 (80.85)	25 (92.59)	626 (88.17)	<0.0 01
7. Do know know about the age criteria for blood donation? [Yes]	240 (56.74)	67 (68.37)	39 (58.21)	37 (77.08)	32 (68.08)	20 (74.07)	435 (61.27)	0.01 7
8. Do you know about hemoglobin criteria for blood donation? [Yes]	238 (56.26)	53 (54.08)	48 (71.64)	31 (64.58)	28 (59.57)	14 (51.85)	412 (58.03)	0.18 1
9. Do you know about the minimum weight required for blood donation? [Yes]	148 (34.99)	57 (58.16)	40 (59.70)	30 (62.5)	25 (53.19)	17 (62.96)	317 (44.65)	<0.0 01
10. Do you understand what is high risk behaviour? [Yes]	243 (57.45)	57 (58.16)	52 (77.61)	25 (52.08)	30 (63.83)	16 (59.26)	423 (59.58)	0.04 4
11. Do you know about the effect of high-risk behaviour on blood donation? [Yes]	172 (40.66)	40 (40.82)	43 (64.18)	19 (39.58)	23 (48.94)	13 (48.15)	310 (43.66)	0.01 3
12. Do u think a donor with chronic illness can donate blood? [No]	399 (94.33)	91 (92.86)	65 (97.01)	41 (85.42)	35 (74.47)	26 (96.30)	657 (92.54)	<0.0 01
13. Do you think a pregnant/ lactating/ menstruating woman can donate blood? [No]	388 (91.73)	94 (95.92)	64 (95.52)	41 (85.42)	39 (82.98)	27 (100)	653 (91.97)	0.01 9
14. Do you think a person can be infected after receiving a blood transfusion? [Yes]	391 (92.43)	62 (63.27)	58 (86.57)	32 (66.67)	27 (57.45)	18 (66.67)	588 (82.82)	<0.0 01
15. Do you know the names common transfusion-transmitted infections? [Yes]	359 (84.87)	42 (42.86)	57 (85.07)	33 (68.75)	25 (53.19)	19 (70.37)	535 (75.35)	<0.0 01
16. Do you know how many components can be made from one unit of blood? [Yes]	198 (46.81)	48 (48.98)	35 (52.24)	21 (43.75)	21 (44.68)	6 (22.22)	329 (46.34)	0.17 1
17. Do you think one can get infected while donating blood? [No]	94 (22.22)	54 (55.10)	9 (13.43)	25 (52.08)	17 (36.17)	13 (48.15)	212 (29.86)	<0.0 01
18. Do you know how many lives can be saved by one unit of donated blood? [Yes]	165 (39.01)	43 (43.88)	34 (50.75)	28 (58.33)	24 (51.06)	16 (59.26)	310 (43.66)	0.02 3
19. Do you think that blood can be artificially synthesized? [No]	327 (77.30)	78 (79.59)	34 (50.75)	32 (66.67)	28 (59.57)	13 (48.15)	512 (72.11)	<0.0 01
20. Do u think a person who has embossed tattoo in last 3 months can donate blood? [No]	364 (86.05)	77 (78.57)	57 (85.07)	39 (81.25)	34 (72.34)	21 (77.78)	592 (83.38)	0.11 5

Note: The table displays one selected response per item to reduce duplication. For items 12, 13, 17, 19 and 20, “No” is displayed because that response was treated as favourable/ knowledge-consistent in the questionnaire. Formal donor eligibility should always be determined using current national standards. p values are Pearson chi-square tests calculated from the reported cell counts; $p < 0.05$ was considered statistically significant.

Motivating and deterring factors

Altruism and the feeling of helping society was the most frequently endorsed motivator (83.1%), followed by token recognition (80.3%), social-media/video campaigns (79.9%), and the availability of one day of leave from work or study (76.2%). Family/friend encouragement (67.8%) and encouragement from colleagues or seniors (70.7%) were also common. Just over half (54.8%) believed that donation could provide guaranteed blood availability for themselves or their family. The leading self-reported barriers were fear of weakness or illness after donation (34%), time constraints (20%), and fear of needles (18%) (Table 3 and Figure 1).

Table 3. Reported motivating factors for blood donation

Motivating factor	Yes, n	Yes, %
Have your family and friends ever motivated you to donate blood?	481	67.75
Have your colleagues and seniors at the workplace ever motivated you to donate blood?	502	70.70
Have social media videos and campaigns ever motivated you to donate blood	567	79.86
Will you donate blood if you are given leave from workplace for 1 day	541	76.20
Does altruism and feeling of social help motivate you to donate blood	590	83.10
Do you think blood donors need some token as a motivational factor for blood donation	570	80.28
Do you think donating blood will provide guaranteed blood storage for you and your family?	389	54.79

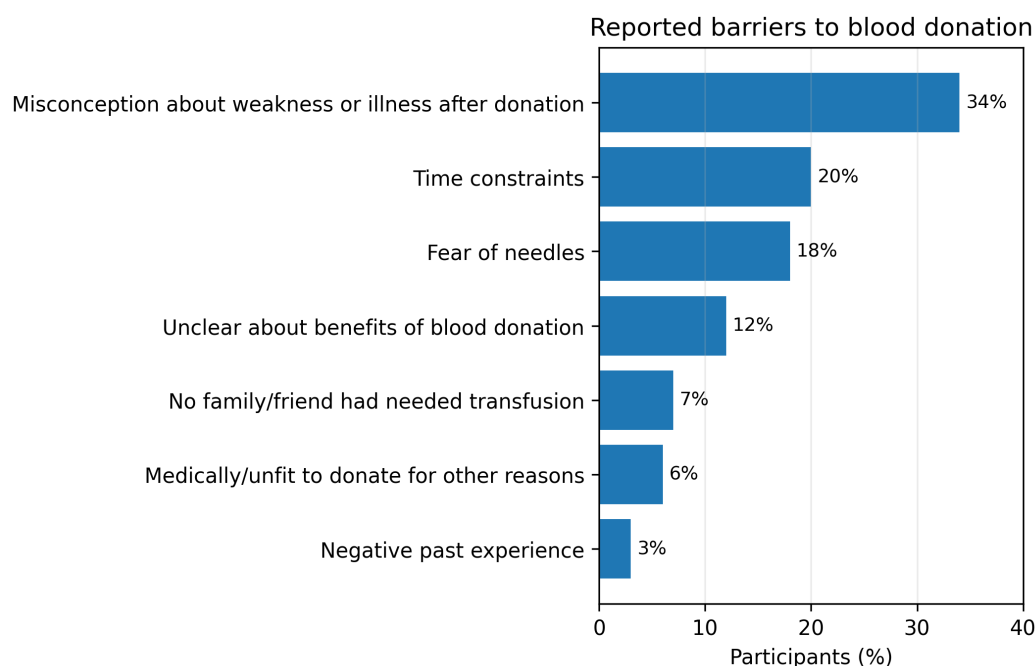


Figure 1. Reported barriers to blood donation. Percentages sum to 100% after rounding.

Donation practice, attitudes and perceptions

Only 127 participants (17.9%) reported having donated blood previously. In a separate item, 132 (18.6%) reported having donated at a blood-donation camp. Previous donation differed significantly across institutes ($p=0.003$). Positive attitudes were common: 90.7% considered blood donation an honourable and proud act, 89.7% agreed that they would donate if family or friends required blood, and 83.4% would motivate others. However, only 41.1% agreed that they would donate repeatedly; 44.7% were unsure. Responses to several attitude items varied across institutes (Table 4).

Table 4. Donation practice and selected positive attitude/perception responses, by institute

Item / selected response	Medical(n=423)	Paramedic al(n=98)	Dental(n=67)	Pharmac y(n=48)	Nursing (n=47)	Physiothera py(n=27)	Overall(n=710)	P valu e
1. Have you donated blood earlier? [Yes]	69 (16.31)	16 (16.33)	8 (11.94)	13 (27.08)	9 (19.15)	12 (44.44)	127 (17.89)	0.00 3
2. Have you ever donated blood at a blood donation camp? [Yes]	55 (13.00)	22 (22.45)	10 (14.93)	16 (33.33)	16 (34.04)	13 (48.15)	132 (18.59)	<0.0 01
3. Is blood donation a healthy and meaningful way of life? [Agree]	367 (86.76)	67 (68.37)	56 (83.58)	40 (83.33)	29 (61.70)	20 (74.07)	579 (81.55)	<0.0 01
4. Is blood donation an honourable and proud act? [Agree]	404 (95.51)	77 (78.57)	63 (94.03)	42 (87.5)	34 (72.34)	24 (88.89)	644 (90.70)	<0.0 01
5. Will you donate blood if your family or friends needs it? [Agree]	404 (95.51)	71 (72.45)	61 (91.04)	45 (93.75)	33 (70.21)	23 (85.18)	637 (89.72)	<0.0 01
6. Will you donate blood if you receive a phone call or message from someone in need? [Agree]	318 (75.17)	56 (57.14)	49 (73.13)	30 (62.50)	20 (42.55)	17 (62.96)	490 (69.01)	<0.0 01
7. Will you donate blood on your special events? [Agree]	211 (49.88)	25 (25.51)	39 (58.21)	25 (52.08)	24 (51.06)	15 (55.56)	339 (47.75)	<0.0 01
8. Will you motivate others to donate blood? [Agree]	359 (84.87)	73 (74.49)	63 (94.03)	43 (89.59)	29 (61.70)	25 (92.60)	592 (83.38)	<0.0 01
9. Will you donate blood repeatedly? [Agree]	184 (43.50)	29 (29.59)	36 (53.73)	18 (37.5)	16 (34.04)	9 (33.33)	292 (41.13)	0.02 1

Note: For the two practice items, the table displays “Yes”; for attitude/perception items, it displays “Agree”. p values are Pearson chi-square tests calculated from the reported cell counts. Sparse cells were present in some multi-category attitude comparisons and should be interpreted cautiously.

DISCUSSION

This study identified a clear mismatch between generally favourable views of blood donation and low levels of actual donation among medical and allied health sciences students. Most participants were aware of their blood group and the concept of voluntary donation, and attitudes toward the social value of donation were strongly positive. Nevertheless, only 17.9% reported a previous donation, and fewer than half expressed definite willingness to donate repeatedly. This knowledge-to-practice gap has been described consistently in blood-donation KAP studies from India and other developing settings [4-7].

Knowledge was not uniformly strong. Awareness of donor weight requirements, time required for donation, effects of high-risk behaviour, blood-component preparation and several safety-related concepts was incomplete. The most striking misconception was the belief, reported by 70.1% of participants, that a person could acquire an infection while donating blood. When standard sterile, single-use collection systems and appropriate blood-centre procedures are followed, blood donation itself does not expose the donor to blood-borne infection. Persistent fears of infection and post-donation weakness have been reported in earlier donor surveys and can directly discourage donation [4,10]. These findings support educational interventions that address procedural safety rather than relying only on general appeals to altruism.

The observed donation prevalence is comparable with the low-to-moderate rates reported in several student studies. Chauhan et al. found that 22.9% of medical students had donated previously despite favourable attitudes [6], while a multicountry study of 12,606 university students reported a previous-donation prevalence of 22.7% and similarly identified a substantial gap between attitude and practice [11]. Differences between studies may reflect age, sex distribution, eligibility, access to donation opportunities, local recruitment practices and the composition of academic programmes.

Altruism was the strongest motivating factor in the present study, but external facilitators were also prominent. Social-media campaigns, peer or family encouragement, token recognition and provision of leave were endorsed by substantial proportions of participants. Behavioural research among college students suggests that attitudes, perceived behavioural

control, external motivation and social influence all contribute to intention to donate repeatedly [12]. Likewise, studies in other settings have found that convenient access and time off can be important practical facilitators [13]. These findings suggest that donor recruitment should combine prosocial messaging with visible, convenient opportunities to act on that motivation.

The leading barriers—anticipated weakness or illness, limited time and fear of needles—are also well documented. Olaiya et al. reported fear of adverse effects and infection among donors in Nigeria [10], while studies in India have identified fear of pain and limited opportunity as important impediments [7,14]. Educational activities should therefore provide realistic information about expected post-donation effects, donor screening, sterile technique and recovery, while donation camps should minimize waiting time and provide supportive management for first-time donors and those with needle anxiety.

The finding that 83.4% of participants would encourage others to donate, but only 41.1% definitely intended to donate repeatedly, is particularly relevant for donor retention. A one-time willingness to participate in a socially valued act differs from the behavioural commitment required for regular donation. Repeat-donation programmes may benefit from reminders, peer networks, scheduled campus drives and positive donor experiences, rather than one-off awareness campaigns alone [12,15].

Responses varied across institutes for many knowledge and attitude items. Such differences may reflect curriculum exposure, demographic composition, year of study or local culture within programmes, but the convenience-sampled cross-sectional design does not permit causal attribution. Institute-specific needs assessment may nevertheless help target educational content more efficiently.

Strengths and limitations

A strength of the study is the inclusion of 710 students from six different medical and allied health sciences institutes, allowing comparison across a heterogeneous health-professions student population. The questionnaire covered knowledge, motivation, barriers, practice and perception rather than focusing on a single domain.

Several limitations should be considered. Convenience sampling from a single private university limits generalizability and may introduce selection bias. The questionnaire was self-designed; although described as prevalidated and pretested, details of the validation procedure, reliability statistics and pilot sample were not reported. Responses were self-reported and may be influenced by recall and social-desirability bias. No composite validated knowledge or attitude score was available, and multiple item-level comparisons increase the likelihood of chance statistical significance. Some contingency tables contained sparse cells, for which Pearson's chi-square approximation may be imperfect. The questionnaire also included simplified donor-eligibility statements; actual eligibility is determined by current national standards and individualized assessment [9].

An internal inconsistency was observed in the two practice items: 132 participants reported having donated at a blood-donation camp, whereas 127 reported any previous blood donation. Because camp donation would ordinarily be expected to form a subset of previous donation, this discrepancy may reflect differences in response interpretation by study participants and limits interpretation of these practice estimates.

CONCLUSION

Medical and allied health sciences students in this northern Indian university generally expressed positive attitudes toward voluntary blood donation, but actual donation was uncommon and several important knowledge gaps and misconceptions persisted. Fear of weakness or illness, time constraints and needle anxiety were prominent barriers, whereas altruism, social influence, media campaigns and institutional facilitation were common motivators. Programmes that combine accurate donor-safety education with convenient campus-based donation opportunities and structured repeat-donor engagement may be more effective than awareness activities alone in converting positive attitudes into sustained voluntary donation.

Declarations

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