Section: Physiology

Original Research Article

KNOWLEDGE, ATTITUDE AND PRACTICE TOWARDS VOLUNTARY BLOOD DONATION AMONG MEDICAL STUDENTS OF A TERTIARY CARE MEDICAL INSTITUTE OF AN EASTERN STATE OF INDIA

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Received : 30/09/2024
Received in revised form : 22/11/2024
Accepted : 06/12/2024

Keywords:
Blood Transfusion, Knowledge, Attitude, Awareness, Blood Group.

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DOI: 10.47009/jamp.2024.6.6.106

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2024; 6 (6); 554-560

Abstract

Background: Blood is a life-sustaining component essential for oxygen transport, nutrient delivery, and defence against pathogens. Blood transfusions are vital for managing acute conditions like trauma, surgeries and chronic illnesses such as thalassemia and other haematological conditions including leukemia, lymphoma and aplastic anemia. Blood scarcity remains a significant issue in India particularly in remote and rural areas due to limited awareness and infrastructure. Assessing the knowledge, attitude, and practices (KAP) of medical students can help address gaps and promote voluntary blood donation effectively. **Materials and Methods:** This cross-sectional study, conducted in a tertiary care medical institute in Eastern India, assessed the knowledge, attitudes, and practices (KAP) of 120 medical students toward voluntary blood donation using a structured, pretested questionnaire. The study assessed various aspects of medical students' knowledge, attitudes, and practices (KAP) toward voluntary blood donation. Attitudes were examined in terms of their willingness to donate, perceptions of its importance, and motivations or deterrents. Practices included previous donation history, frequency of donations, and reasons for donating or abstaining. Additionally, barriers such as fear, misconceptions, and lack of awareness were identified. Data analysis was performed using SPSS 23.0 with statistical significance set at $p<0.05$. **Result:** This study of 120 medical students revealed a male predominance (61.67%) with a mean age of 20.12 years. Awareness of blood groups was high, with 96.67% knowing their group, and B positive (32.50%) was the most common. Knowledge of universal donor blood type was high (85.00%) but awareness of donation intervals was lower (45.00%). Awareness of transfusion-transmissible infections was 100%, including HIV and Hepatitis B, while knowledge of malaria (68.33%) and syphilis (65.00%) was lower. Positive attitudes prevailed, with 91.67% seeing donation as beneficial and 90.83% interested in future donation. Key barriers included lack of encouragement (43.56%), inadequate awareness (15.84%), and fear of needles (11.88%). **Conclusion:** This study reveals that while medical students exhibit good knowledge and positive attitudes towards blood donation actual participation in blood donation was found to be limited. High awareness existed regarding blood types and transfusion-transmissible infections but knowledge gaps persist about donation intervals, recent vaccinations and menstruation-related eligibility. Despite willingness to donate to strangers and support for health programs low donation rates were found to be driven by barriers such as lack of encouragement, fear of needles, perceived physical unfitness and misconceptions about donation safety and health effects.

INTRODUCTION

Blood is an essential and life-sustaining component of the human body which is responsible for a range of important functions that support overall health and well-being. It serves as the primary means of transporting oxygen from the lungs to tissues and carbon dioxide from tissues back to the lungs for

expulsion. Blood also plays an important role in transporting essential nutrients, hormones, and waste products.[1] Red blood cells (RBCs) enable oxygen distribution throughout the body and platelets contribute to clotting to prevent excessive blood loss and white blood cells (WBCs) protect against infections. Plasma is responsible for transporting proteins, nutrients, hormones and waste products. Collectively, these components of blood make it indispensable for sustaining life. There is a critical need for readily available blood supply when health conditions arise that require transfusion support.[2]

In emergency and acute medical situations blood transfusions often become necessary to manage critical health needs and prevent further complications. Traumatic injuries such as those sustained in road traffic accidents often result in significant blood loss.[3] In this situation rapid transfusion is essential to stabilize the patient and prevent shock. Similarly, surgeries with high risk of bleeding, such as cardiac, orthopedic and certain abdominal surgeries rely on blood transfusions to ensure patient safety and support recovery. Patients with severe anemia may also require transfusions to stabilize their blood hemoglobin levels. Other acute situations, such as postpartum hemorrhage, acute gastrointestinal bleeding or bleeding disorders like haemophilia also necessitate urgent blood transfusions.[4]

While acute conditions require short-term blood transfusions, there are individuals with chronic illnesses who need regular blood transfusions throughout their lives. Thalassemia major is a hereditary condition where patients must undergo frequent transfusions to manage their symptoms and sustain a healthy quality of life. Patients with other inherited blood disorders such as sickle cell anemia may also require repeated blood transfusions to mitigate symptoms and prevent complications. Similarly, cancer patients undergoing chemotherapy, end stage renal disease patients undergoing haemodialysis may require repeated transfusions to maintain haemoglobin levels. For these individuals access to a stable blood supply is not only a matter of managing acute episodes but is crucial for their long-term health and well-being.[5]

Despite the critical need for a stable blood supply blood scarcity remains a pressing issue in many parts of India particularly in rural areas. India faces a blood shortage of hundreds of thousands of units annually with the deficit being especially pronounced in underserved rural regions.[6] This shortage often arises due to limited blood donation infrastructure, few blood donation drives and a lack of awareness among the rural population about voluntary blood donation. Rural healthcare facilities may have limited storage capacity for blood further exacerbating the issue by reducing the availability of timely transfusions. Transportation and logistical challenges also hinder blood supply to remote areas creating a considerable gap in healthcare services.[7]

Voluntary blood donation, a primary source of blood supply, depends significantly on the knowledge, attitude, and practice (KAP) of the general population. Knowledge about the importance of blood donation, its safety, and the eligibility criteria plays a pivotal role in encouraging more individuals to donate. However, misconceptions, lack of awareness and fear of adverse effects often deter people from donating blood voluntarily.[8] Positive attitudes towards blood donation such as recognizing its life-saving potential are essential in this situation. Healthcare workers, particularly undergraduate and postgraduate medical students can play an influential role in promoting voluntary blood donation due to their proximity to healthcare environments and firsthand awareness of the need for blood transfusions. Medical students are often at the forefront of community health initiatives and can serve as ambassadors of health education making their KAP towards blood donation critically important. Studies indicate that healthcare workers generally have higher awareness levels regarding the benefits and processes of blood donation.[9] Assessing KAP among this group not only provides insights into their potential as advocates for blood donation but also helps in identifying specific gaps in awareness or attitude that could be improved through targeted education and training programs. We therefor undertook this questionnaire based study to assess Knowledge, Attitude And Practice Towards Voluntary Blood Donation Among medical students Of An Eastern State Of India.

MATERIALS AND METHODS

This was a questionnaire based cross sectional study which was conducted in the department of physiology of a tertiary care medical institute of an eastern state of India. A questionnaire was prepared for the purpose of assessing Knowledge, Attitude And Practice Towards Voluntary Blood Donation Among medical students. The questionnaire consisted of questions to collect data about demographic details such as age and gender of the respondents as well as other questions which were used to assess Knowledge, Attitude And Practice Towards Voluntary Blood Donation. The sample size for this study was determined based on pilot research assessing the knowledge, attitudes, and practices regarding voluntary blood donation among medical students. To achieve a statistical power of 80% (1-Beta error) and a confidence level of 95% (1-Alpha error), a minimum of 112 participants were required. Therefore, a total of 120 students were included in this study.

The study's objectives and procedures were explained to all students in detail. They were told to repeat what they understood to make sure they fully understood the study's purpose. Written informed consent was obtained from each student who voluntarily agreed to participate. To collect data, a carefully pretested, structured questionnaire was distributed to

ISSN (O): 2687-5365; ISSN (P): 2753-6556

participants. This questionnaire gathered students' knowledge, attitudes, and practices (KAP) related to blood donation. Following the initial data collection participants were given information about the importance and benefits of voluntary blood donation. SPSS version 23.0 software was used for statistical analysis. Quantitative data, such as scores from knowledge assessments and attitude scales was reported as mean and standard deviation values. Qualitative data, including the proportion of students who have donated blood, their reasons for donation or non-donation, and self-reported barriers to blood donation were presented as frequency and percentage tables. For the analysis of qualitative data, such as differences in attitudes and practices based on demographic variables, the Chi-square test was applied. A p-value of less than 0.05 was considered statistically significant.

Inclusion Criteria

Medical students willing to participate in the study and answer the questionnaire.

Exclusion Criteria

Except unwillingness to answer the questionnaire there was no other specific exclusion criteria.

RESULTS

Analysis of demographic details of participants showed that out of 120 medical students who agreed to answer the questionnaire there were 74 (61.67%) males and 46 (38.33%) females. There was a male preponderance with M:F ratio of 1:0.62. The age of the respondent students ranged from 18-24 with mean age of 20.12 +/- 1.96 [Figure 1].

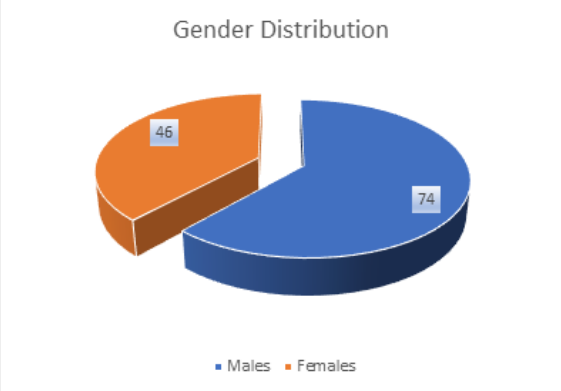

Figure 1: Gender Distribution of the studied cases.

The responses of the respondents to the questionnaire were analysed. The analysis of awareness of the respondents about their own blood group showed that out of 120 students 116 (96.67%) knew about their blood group. 2 (1.67%) were knowing but were not sure about blood group and 2 (1.67%) were totally unaware about their respective blood group [Figure 2].

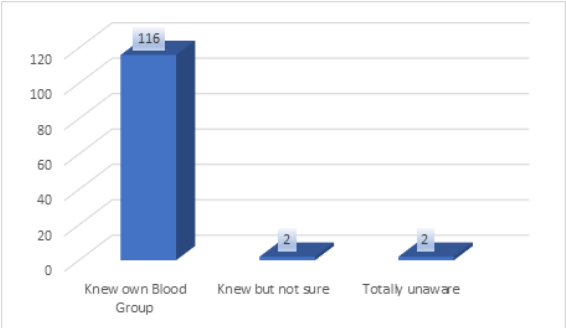

Figure 2: Knowledge about own blood group among the participants.

The analysis of respondent students' knowledge about their own blood group showed that the most commonly reported blood group was B positive (32.50%), followed by O positive (26.67%) and A positive (25.00%). Less frequently reported were AB positive (9.17%), and other blood types, such as AB negative (1.67%), O negative (1.67%) and "Don't know," each making up 2 cases (1.67%) of the total. Blood groups A negative and B negative were the least common blood groups each recorded in only 1 case (0.83%). 2 medical students didn't know their blood group [Table 1].

The analysis of respondents' general knowledge about blood donation demonstrated varying levels of awareness across different aspects. The majority (98.33%) were aware of their own blood type, and a high percentage (85.00%) could correctly identify the universal donor blood type. In comparison, 59.17% of respondents were able to identify the universal recipient blood type and 65.00% knew the minimum age required for blood donation. Awareness of the typical duration of a blood donation process and the amount of blood taken per session was present in 53.33% and 50.83% of respondents respectively. Knowledge of the ideal interval between consecutive blood donations was lower with only 45.00% aware and 56.67% of respondents recognized the health benefits associated with blood donation [Table 2].

The analysis of respondents' knowledge regarding the criteria for blood donation showed a range of awareness levels across different eligibility requirements. The majority (70.00%) were aware of the minimum hemoglobin level required for donation (≥12.5 g/dL), and 66.67% recognized pregnancy or breastfeeding status in women as an exclusion criterion. Awareness of the eligible age range (18-60 years) was relatively high with 65.00% of respondents familiar with this guideline. 63.33% understood that donors must be free from significant systemic diseases. Knowledge of the requirement to be having no history of sexual contact with individuals with hepatitis B in last 3months was noted by 58.33% of respondents while 51.67% were aware of the minimum body weight requirement (over 45 kg). Lower awareness was observed in areas such as the exclusion of donors who had malaria or donated blood in the past 3 months (45.00%) and the avoidance of blood donation during menstruation

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(45.00%). Similarly, only 46.67% knew that recent vaccinations within the past 2 months could exclude someone from donating, and 43.33% understood that no antibiotics should be taken within the last week. All respondents (100%) knew that the donor must be free from Transfusion-transmissible infections such as HIV, Hepatitis B and syphilis etc [Table 3].

The analysis of respondents' knowledge regarding transfusion-transmissible infections indicated high awareness that infections can spread via blood transfusion, with all respondents (100%) acknowledging this risk. Specific awareness of HIV and Hepatitis B as transfusion-transmissible infections was notably high with all respondent recognizing HIV and Hepatitis B to be transfusion transmissible infections. Knowledge of other infections varied, with 68.33% aware that malaria can be transmitted through blood transfusion while 65.00% recognized syphilis as a risk. Awareness was lower for Hepatitis E and dengue with only 40.00% and 46.67% of respondents identifying them as transfusion-transmissible [Table 4].

The analysis of attitudes toward blood donation among participants revealed generally positive perceptions. A high percentage (91.67%) believed that blood donation is a good practice with only 3.33% disagreeing. Interest in future blood donation was expressed by 90.83% while 4.17% were not interested and 5.00% were unsure. Concerns about infection were present as 64.17% acknowledged potential risk of infection while donating blood. Most participants (70.00%) indicated they would not restrict donations solely to family and friends. 71.67% were open to donating to strangers while 15.00 % were unwilling and 13.33% were unsure. The idea of integrating blood donation into health awareness programs was supported by 73.33 %/ A significant majority (78.33%) would recommend blood donation to others. Finally 43.33% believed in potential health benefits from donating blood [Table 5].

The analysis of reasons for not donating blood among current non-donors (n=101) revealed that the most common reason was a lack of personal invitation or encouragement (43.56%). This was followed by a perceived physical unsuitability for donation (12.87%) and fear or anxiety related to needles (11.88%). 16 individuals (15.84%) reported inadequate information or awareness about the blood donation process. Other less common reasons included concerns about the safety of the donation process (7.92%) and a belief that donating might lead to weakness or health issues (3.96%). A small number of respondents wanted to reserve their eligibility for family or friends requiring transfusions because of having conditions that may require blood transfusion (2.97%). 1 respondent (0.99%) feared discovering unknown health conditions during screening [Table 6].

Table 1: Blood group of the studied cases.

Blood Group	No of cases	Percentage
A -ve	1	0.83%
A +ve	30	25.00%
B -ve	1	0.83%
B +ve	39	32.50%
AB -ve	2	1.67%
AB +ve	11	9.17%
O -ve	2	1.67%
O +ve	32	26.67%
Don't know	2	1.67%
Total	120	100 %

Table 2: General knowledge of participants about blood donation.

General knowledge about blood donation	Number of respondents	Percentage
1. Awareness of one's own blood type	118	98.33%
2. Ideal interval between consecutive blood donations	54	45.00%
3. Amount of blood taken per donation session	61	50.83%
4. Typical duration for a blood donation process	64	53.33%
5. Identification of universal donor blood type	102	85.00%
6. Identification of universal recipient blood type	71	59.17%
7. Minimum age required for blood donation	78	65.00%
8. Health benefits associated with blood donation	68	56.67%

Table 3: Knowledge of participants regarding criteria for a blood donor

Knowledge regarding criteria for a blood donor	Numbers	Percentage
1. Eligible age range for blood donation (18-60 years)	78	65.00 %
2. Minimum hemoglobin level required (≥12.5 g/dL)	84	70.00 %
3. Minimum body weight requirement (over 45 kg)	62	51.67 %
4. No recent sexual contact with person with hepatitis B within last 3 months.	70	58.33 %
5. Free from malaria or blood donation in the past 3 months	54	45.00 %
6. Exclusion criteria: Pregnancy or breastfeeding status in women	80	66.67 %
7. Avoidance of blood donation during menstruation	54	45.00 %
8. Donors must be free from significant systemic diseases	76	63.33 %
9. No recent intake of antibiotics within the last week	52	43.33 %

ISSN (O): 2687-5365; ISSN (P): 2753-6556

10. Must not have received any vaccines in the past 2 months	56	46.67 %
11. Must be free from Transfusion-transmissible infections	120	100 %

Table 4: Participants' Knowledge regarding transfusion-transmissible infections

Knowledge regarding transfusion-transmissible infections		
1. Awareness that infections can spread via blood transfusion	120	100 %
2. Transfusion-transmissible infections include:		
a. HIV infection	120	100.0 %
b. Hepatitis B	120	100.0 %
c. Hepatitis E	48	40.00%
d. Malaria	82	68.33%
e. Syphilis	78	65.00%
f. Dengue	56	46.67%

Table 5: Participants' Attitude towards blood donation

Attitude towards blood donation	Yes		No		Not Sure	
	Numbers	Percentage	Numbers	Percentage	Numbers	Percentage
Do you believe it is a good practice for individuals to donate blood?	110	91.67%	4	3.33%	6	5.00%
Are you interested in donating blood in the future?	109	90.83%	5	4.17%	6	5.00%
Do you think there is a risk of infection from donating blood?	77	64.17%	28	23.33%	15	12.50%
Would you prefer to donate blood only to family and close friends?	18	15.00%	84	70.00%	18	15.00%
Are you open to donating blood to strangers who require it?	86	71.67%	18	15.00%	16	13.33%
Do you think blood donation should be made a part of health awareness programs?	88	73.33%	12	10.00%	20	16.67%
Would you recommend blood donation to your family and friends?	94	78.33%	8	6.67%	18	15.00%
Do you believe donating blood can have positive effects on your health?	52	43.33%	43	35.83%	25	20.83%

Table 6: Reason for not donating blood among non-donor participants.

Reason for not donating blood among current non-donors (n=101)	Numbers	Percentage (%)
I was never personally invited or encouraged to donate blood	44	43.56%
I believe I was physically unfit or unsuitable to donate	13	12.87%
I have a strong fear or anxiety related to needles	12	11.88%
I want to save my donation eligibility for family or friends who are diagnosed with conditions requiring regular blood transfusions	3	2.97%
Fear of discovering unknown health issues during blood screening	1	0.99%
I am unsure about the safety of the blood donation process	8	7.92%
I think donating blood might make me weak or cause health problems	4	3.96%
Lack of adequate information or awareness about the blood donation process	16	15.84%

DISCUSSION

Medical students represent an essential population for cultivating knowledge and positive attitudes toward voluntary blood donation. Their role is crucial in shaping future healthcare practices and community health awareness. Ensuring comprehensive understanding of blood donation criteria, such as eligibility guidelines, transfusion-transmissible infections and donation intervals is fundamental in creating a reliable pool of educated donors who can advocate for safe donation practices. While general awareness among students tends to be high in certain critical areas specific knowledge gaps still remain.10 The students' attitudes toward blood donation were predominantly positive, indicating a willingness to participate in donation programs and an openness to donate beyond close familial circles. This openness reflects a potential to foster a more extensive donor base and reduce reliance on replacement donations from family and friends. Many respondents indicated support for incorporating blood donation awareness into health programs which could be instrumental in reinforcing positive attitudes and practices around donation among future healthcare providers.[11]

Out of 120 medical students who participated, 74 (61.67%) were males and 46 (38.33%) were females, with a mean age of 20.12 years. Most students (96.67%) were aware of their blood group, while 1.67% were unsure and another 1.67% were unaware. Olga Ciepiela et al. conducted a cross-sectional study to assess the awareness of blood groups and blood

ISSN (O): 2687-5365; ISSN (P): 2753-6556

donation among medical students.[12] For this purpose, the authors undertook a study comprising 200 medical students from the Medical University of Warsaw, who completed a structured questionnaire evaluating their knowledge of blood groups, Rh factor, and attitudes toward blood donation. The study found that 98% of students knew their blood group, 95% were aware of the Rh factor, and 75% had donated blood at least once. On the basis of these findings, the authors concluded that medical students possess a high level of awareness regarding blood groups and blood donation, reflecting the effectiveness of their medical education. The findings of this study were similar to our study. Similar high level of awareness about their own blood amongst medical students has also been reported by the authors such as Saleh D et al,[13] and Wu LT et al.[14] The analysis of respondents' knowledge about blood donation criteria revealed varied awareness levels. While most were familiar with key eligibility factors like the minimum hemoglobin level (70.00%), pregnancy/breastfeeding exclusions (66.67%), and the eligible age range (65.00%), awareness of specific exclusions such as recent malaria, menstruation, or vaccination history was lower (around 45.00%). All respondents (100%) knew that donors must be free from transfusion-transmissible infections like HIV and Hepatitis B, reflecting strong awareness in critical safety areas. Chauhan R et al conducted a cross-sectional study to assess the knowledge, attitude, and practices regarding blood donation among medical students.[15] For this purpose, the authors undertook a study comprising 300 medical students from a medical college in India. Data were collected using a pretested, structured questionnaire covering demographic details, knowledge, attitude, and practices related to blood donation. The study found that 98% of participants were aware of the importance of blood donation, yet only 17% had donated blood themselves. Additionally, 80% of students recognized the need for regular blood donation, but misconceptions about eligibility criteria and fear of adverse effects were prevalent. On the basis of these findings, the authors concluded that despite high awareness levels, actual blood donation practices among medical students were low, indicating a need for targeted educational interventions to bridge this gap. Similar level of knowledge about eligibility and contraindications for blood donations had also been reported by the authors such as Javaeed A et al,[16] and Beyene GA et al.[17] In this study 91.67% believed that blood donation is a good practice with only 3.33% disagreed. Interest in future blood donation was expressed by 90.83% while 4.17% were not interested and 5.00% were unsure. Concerns about infection were present as 64.17% acknowledged potential risk of infection while donating blood. Most participants (70.00%) indicated they would not restrict donations solely to family and friends. G M Hosain et al conducted a cross-sectional study to assess the knowledge and attitudes towards voluntary blood donation among Dhaka University students in Bangladesh.[18] For this purpose, the authors undertook a study comprising 200 students, selected through stratified random sampling, who completed a structured questionnaire. The study found that 52% of participants were aware of the minimum age requirement for blood donation, and 68% knew the appropriate interval between donations. However, only 39% had ever donated blood, with the primary deterrents being fear of needles (45%) and misconceptions about health risks (30%). On the basis of these findings, the authors concluded that while there is a moderate level of awareness regarding blood donation among university students, actual donation rates are low, indicating a need for targeted educational programs to address fears and misconceptions. Similar attitudes towards blood donation were also reported by the authors such as Alfouzan N et al,[19] and Gomes MJ et al.[20]

CONCLUSION

This study reveals that while medical students exhibit good knowledge and positive attitudes towards blood donation actual participation in blood donation was found to be limited. High awareness existed regarding blood types and transfusion-transmissible infections but knowledge gaps persist about donation intervals, recent vaccinations and menstruation-related eligibility. Despite willingness to donate to strangers and support for health programs low donation rates were found to be driven by barriers such as lack of encouragement, fear of needles, perceived physical unfitness and misconceptions about donation safety and health effects.

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ISSN (O): 2687-5365; ISSN (P): 2753-6556