Original Article

Access this article online

Quick Response Code:

Website: https://journals.lww.com/ijhm

DOI: 10.4103/ijh.ijh_21_24

Assessment of knowledge, attitude, and practice of blood donation among paramedical students of a medical college in Chennai, Tamil Nadu

V. Kalpana Devi[1], E. Thirumurugan[1,2], R. Karthick[1], E. Abisheak Indian[1], G. Abinaya[1], R. Hemalatha[1], P. Sunil[1]

Abstract:

BACKGROUND: Blood donation is an essential global need far outweighs the available supply, rendering it a scarce and valuable resource. Within India, blood transfusion services hold significant importance and constitute a crucial aspect of the national health-care framework. Voluntary Non-Remunerated Blood Donation (VNRBD) is deemed the safest among the various ways of donating blood. The student population of educational institutions across the country, particularly those who are young and physically fit, represents one of the most promising sources of blood donations. The aim of the study was to evaluate the knowledge, attitudes, and donation practices of medical college students and motivate them to embrace voluntary blood donation as a regular habit.

MATERIAL AND METHODS: The Department of Allied Health Science at Dr MGR Educational and Research Institute in Chennai, Tamil Nadu, India, conducted a questionnaire survey from March 2023 to October 2023. Two thousand and two hundred forty students were invited to participate, with 2331 ultimately willing to partake. The gathered data underwent analysis using the SPSS Statistics software, version 20, with a significance level fixed at a $P = 5\%$.

RESULTS: The study included 2331 participants, comprising 840 males (36%) and 1491 females (64%). The age range of the participants was between 17 and 25 years, with a mean age of 18.9 ± 1.3 years. Out of 2331 participants, the majority (66.7%) showed sufficient knowledge with 9 or more correct answers, while the rest (33.2%) showed below-average knowledge.

CONCLUSION: The Tamil Nadu Health Professions Colleges possess the potential to make a noteworthy impact on the promotion of blood donation. According to a recent survey, students express a keen interest in donating blood if a camp is organized on the campus. By organizing awareness campaigns and conducting informative sessions, the colleges can inspire and motivate more students to donate blood, thereby playing a vital role in saving lives.

Keywords:

Blood donation, medical students, voluntary, attitude, blood donation knowledge, perception of blood donation, practice, Tamil Nadu

[1]Department of Allied Health Science, Dr. MGR Educational and Research Institute, Chennai, Tamil Nadu, [2]Department of Allied Health Science, Srinivas University, Mangalore, Karnataka, India

Address for correspondence:
Mr. E. Thirumurugan, Assistant Professor, Department of Allied Health Science, ACS Medical College and Hospital, Dr. MGR Educational and Research Institute, Chennai, Tamil Nadu, India.
E-mail: thiruahs1002@gmail.com

Submission: 07-03-2024
Revised: 27-03-2024
Accepted: 29-03-2024
Published: 10-05-2024

Introduction

The role of blood in healthcare is of utmost importance, as it represents a valuable resource that can be lifesaving in various medical scenarios. Blood transfusion is commonly employed in the treatment of emergencies, surgical procedures, bleeding disorders, obstetrical complications, hematological diseases, and cancer.[1] Despite the global collection of

How to cite this article: Devi VK, Thirumurugan E, Karthick R, Indian EA, Abinaya G, Hemalatha R, *et al*. Assessment of knowledge, attitude, and practice of blood donation among paramedical students of a medical college in Chennai, Tamil Nadu. Iraqi J Hematol 2024;13:71-8.

approximately 118.5 million blood units every year, the demand for blood still surpasses the existing capacity, making it a scarce and valuable commodity in the health-care industry.[2] As per the 2012 report published by the World Health Organization (WHO), the current annual collection of blood units in India stands at nine million, while the demand is for 12 million units. The shortage is particularly severe in the Delhi National Capital Region, where a yearly deficit of 100,000 units is observed.[3]

The need for a constant supply of donated blood is a pressing issue due to the fact that blood cannot be stored indefinitely. Blood banks must continually replenish their supplies due to the short lifespan of donated blood, which lasts only 35–42 days.[4] In order to ensure the availability of safe blood and blood products, the WHO recommends implementing a nationwide organized blood transfusion program. This program prioritizes voluntary non-remunerated blood donation (VNRBD) as the most sustainable solution. The WHO recognizes the importance of VNRBDs in ensuring an adequate supply of blood and blood products and has emphasized the need to establish and maintain a sufficient pool of these donors. By doing so, the safety and adequacy of the blood supply can be ensured, and patients in need of transfusions can receive the life-saving treatment they require. Such a program would offer a reliable and stable supply of blood, while also promoting the voluntary donation of blood without any monetary compensation.[5,6]

Donating blood is an essential aspect of medical care and medical college students can make a significant contribution by serving as voluntary blood donors. However, research has revealed a concerning lack of awareness and insufficient participation in voluntary blood donation practices among these students.[7] To address this issue, it is essential to investigate the factors that may be hindering their willingness to donate blood. By identifying and overcoming these obstacles, we can foster a culture of giving and encourage more students to become regular blood donors. The main objective of our survey-based study was to evaluate the knowledge, attitudes, and donation practices of medical college students and motivate them to embrace voluntary blood donation as a regular habit.

Materials and Methods

A survey questionnaire was administered at the Department of Allied Health Science, Dr. MGR Educational and Research Institute in Chennai, Tamil Nadu, India. The survey was conducted for 7 months, starting from March 2023 and ending in October 2023. The Institutional Ethics Committee approved the study plan under reference number 895/2023/IEC/ACSMCH. Both online and offline versions of the questionnaire were distributed. The offline version was dispensed by the designated principal investigator at the paramedical colleges in and around Chennai, Tamil Nadu, India. The investigator obtained informed consent from the subjects before data collection and collected the filled-out questionnaire forms on-site. The online survey was distributed to paramedical students through Whatsapp, Facebook, and E-mail using a telecommunications platform that merged the internet and telephone. The researchers recruited respondents by sending survey invitations that included general information about the survey, along with the questionnaire and consent statement, to eligible participants. Ethical considerations were met by obtaining written consent and maintaining confidentiality [Figure 1].

The present study utilized the research paper by Alsalmi *et al*.[8] to construct a comprehensive questionnaire consisting of 40 items. The first section of the questionnaire is a meticulously designed component that aims to capture the participants' sociodemographic characteristics with utmost precision. It includes parameters such as age, gender, educational status, and blood groups, which are paramount for comprehensively analyzing the collected data. The second section was dedicated to assessing the knowledge and attitude of the participants toward blood donation, while the third section explored the practices, barriers, and universities' role in promoting blood donation.

Study design

From March 2023 to October 2023, a descriptive cross-sectional study was conducted on undergraduate Health Science graduating students from Paramedical colleges at the Chennai, Tamilnadu, India.

Statistical analysis

The data collected were effectively sorted and analyzed using Microsoft Office Excel and Statistical Package for the Social Sciences (SPSS) version 20 (IBM, Chicago, IL). Descriptive statistical methods were applied to present the frequencies with corresponding percentages for the categorical variables and mean with standard deviations for the continuous variables. The Chi-square test was employed to ascertain the noteworthy correlations between blood donation practices, knowledge levels, and demographic characteristics. $P < 0.05$ was deemed statistically significant.

Results

The study involved 2331 participants, including 840 males, representing 36% of the sample, and 1491 females, constituting 64% of the sample. The age

Table 1: Demographic characteristics of participants (*n*=2331)

Demographic variables	*n* (%)
Age (mean±SD)	18.98±1.340
Gender	
Male	840 (36)
Female	1491 (64)
Speciality	
Cardiac care technology	566 (24.2)
Cardio perfusion technology	314 (13.5)
Optometry	152 (6.5)
Clinical nutrition	2 (0.1)
Medical laboratory technology	83 (3.6)
Operation theater and anesthesia technology	569 (24.4)
Physician assistant	370 (15.9)
Radiology and imag technology	199 (8.5)
Renal dialysis technology	76 (3.3)
Current academic level	
1st year	753 (32.3)
2nd year	462 (19.8)
3rd year	606 (26)
4th year	510 (21.8)
Blood group	
A+ve	398 (17.07)
A−ve	27 (1.15)
B+ve	756 (32.43)
B−ve	37 (1.58)
Ab+ve	123 (5.27)
Ab−ve	11 (0.47)
O+ve	867 (37.19)
O−ve	59 (2.53)
A1+ve	26 (1.11)
A1−ve	1 (0.04)
AB+	124 (5.31)
A1b+ve	17 (0.72)
A2+ve	2 (0.08)
A2−ve	1 (0.04)
A2b+ve	3 (0.12)
Ab1+ve	1 (0.04)
Don't know	1 (0.04)

SD=Standard deviation

range of the participants was between 17 and 25 years, with a mean age of 18.9 ± 1.3 years [Table 1].

Knowledge and attitude toward blood donation

The study conducted a comprehensive evaluation of the knowledge and attitude of participants toward blood donation. Out of 2331 participants, the majority (66.7%) showed sufficient knowledge with 9 or more right answers, while the rest (33.2%) showed below-average knowledge. The mean number of correct answers was 9 out of 12, indicating a good level of understanding regarding blood donation.

A substantial number of respondents (79.4%) held a favorable opinion regarding blood donation, recognizing its significance for the community. Furthermore, a considerable proportion (62.6%) expressed contentment toward the blood donation process as carried out in blood banks. In addition, most participants (88%) conveyed their readiness to donate blood when requested by family members or others in need (71.8%) [Tables 2 and 3].

Table 2: Knowledge on blood donation among the participants (*n*=2331)

Questions	*n* (%)
Do you know the common blood groups?	
Yes	2252 (96.6)
No	79 (3.4)
Can a donor be infected by donating blood?	
Yes	608 (26)
No*	1723 (74)
How often can an individual donate?	
Weekly	39 (1.7)
Monthly	838 (36)
Three times monthly*	324 (13.8)
Six times monthly	377 (16.2)
Yearly	753 (32.3)
Who is able to donate blood?	
Men (all ages)	101 (4.3)
Women (all ages)	22 (0.9)
Young males/females	256 (11.0)
Old males/females	11 (0.5)
Any healthy adult*	1893 (81.2)
Anyone who is diseases	48 (2.1)
What volume of blood is collected during each donation? (mL)	
150-200	948 (40.7)
400-450*	1091 (46.8)
700-750	214 (9.2)
1000	78 (3.3)
What is the duration of a donation process? (min)	
<20	715 (30.6)
20–40*	1356 (58.2)
>60	260 (11.2)
Is blood required in emergencies?	
Yes*	2211 (94.8)
No	120 (5.1)
Can blood be stored?	
Yes*	2125 (91.1)
No	206 (8.9)
Can blood be donated while keeping a fast?	
Yes	664 (28.4)
No*	1667 (71.5)
Is there any age limitation on blood donation?	
Yes*	1861 (79.8)
No	470 (20.2)
Can women donate blood if she is pregnant?	
Yes	156 (6.7)
No*	2175 (93.3)
Can people with any blood group donate blood?	
Yes*	1478 (63.4)
No	853 (36.6)

Table 3: Attitude towards blood donation among the participants (*n*=2331)

Questions	*n* (%)
Will you donate blood when a patient relative needs?	
Yes	2052 (88)
No	279 (12)
Will you donate blood to anonymous patients?	
Yes	1673 (71.8)
No	658 (28.2)
Should donors be giving a gift/money for donation?	
Yes	550 (23.6)
No	1781 (76.4)
Do you feel that blood donation is important for community?	
Yes	1851 (79.4)
No	480 (20.6)
What is your feeling about the procedure in blood banks\hospitals?	
Positive	1460 (62.6)
Negative	64 (2.7)
Neutral	807 (34.6)
Do you agree with blood importation from abroad?	
Yes	1374 (58.9)
No	957 (41.1)
Do you think blood donation is a religious duty?	
Yes	369 (15.8)
No	1962 (84.2)
Do you think being a health profession student, encourages you to donate blood?	
Yes	2133 (91.5)
No	198 (8.5)

Practice of blood donation and universities role in promotion

Table 4 illustrates the blood donation practices and the challenges that hinder regular blood donation. Fifteen percent of the respondents (350 individuals) have donated blood in the past, with male respondents constituting 70% (245 donors). Among the male donors, 30% (105 individuals) donated blood only once. However, 15.8% of participants claimed that blood donation is a religious obligation. Public media campaigns have played a vital role in promoting blood donation, as 69.7% (1625 individuals) of the participants received calls for blood donations through the public media.

According to a recent survey on the role of universities in promoting blood donation, a significant proportion of students reported that their colleges did not offer any courses or lectures on the subject (47.9%, 1116 participants). However, a sizeable minority reported that their colleges had organized blood donation campaigns (37.1%, 865 participants). Of note, a substantial majority of respondents expressed willingness to donate blood if their colleges were to organize a blood donation camp on campus (63.8%, 1488 participants) [Figure 2].

Barriers and motivations for blood donation

According to the recent research, the fear of donating blood is the most frequently cited obstacle to donation, accounting for 11% of cases, while health-related reasons represent only 2.4% of cases, as reported by nondonors. Among the surveyed student population, 59.6% expressed that appreciation certificates are the most effective incentive for blood donation, while 27.1% preferred academic support in the form of bonus marks in their courses [Table 5].

Association between demographics, knowledge level, and practice of blood donation

The study yielded noteworthy findings on the relationship between blood donation behavior and three crucial factors, namely knowledge, academic level, and gender. The research revealed a statistically significant association between the aforementioned factors and blood donation behavior among students. Specifically, the results demonstrated that higher levels of knowledge about blood donation were linked to a greater likelihood of engaging in blood donation ($\chi^2[1] = 55.9$, $P < 0.001$). In addition, academic level was found to be a significant factor in blood donation behavior among students ($\chi^2[1] = 6.11$, $P < 0.001$). Finally, the study identified a significant association between gender and blood donation behavior ($\chi^2[1] = 202.6$, $P < 0.001$). These findings indicate that knowledge, academic level, and gender play critical roles in shaping the blood donation behavior of students [Table 6].

Discussion

Ensuring an adequate blood supply is of utmost significance for health-care organizations.[9] To accomplish this goal, it is essential to assess the knowledge, attitude, and practices regarding blood donation among Health Sciences undergraduate students graduating from Chennai, Tamil Nadu. The present study's findings indicated that the study participants demonstrated satisfactory knowledge (66.7%) concerning blood donation. A related study conducted in South India shows a comparable percentage of blood donation among the population (62%).[10] However, the findings are lower compared to studies conducted in Nigeria (85%),[11] Thailand (80%),[12] Addis Ababa, Ethiopia (83.6%),[13] and Adama, Ethiopia (79.4%).[14] On the other hand, the findings are higher than those of studies conducted in Nepal (32.4%),[15] Central India (52.5%),[16] Manipur (9%),[17] and Kollam, Kerala (35%).[18] The observed variations in the percentage of blood donation could be attributed to differences in sociodemographic characteristics and accessibility to information on the significance of blood donation.

Table 4: Practice towards blood donation among the participants (*n*=2331)

Questions	*n* (%)
Have you ever donated blood before?	
Yes	350 (15)
No	1981 (85)
If donated blood before … how many times?	
Once	137 (5.9)
Twice	52 (2.2)
Three to four times	41 (1.8)
More than five times	120 (5.1)
I have not donated blood	1981 (85)
When was the last time you donated blood	
In the current year	112 (4.8)
Before 1 year or more	238 (10.2)
I have not donated blood	1981 (85)
If you are a donor, where was the last time you donate your blood?	
In the hospitals or blood banks of the ministry of health	89 (3.8)
In the hospitals or blood banks of the military institutions	37 (1.6)
In private hospitals or blood banks	224 (9.6)
I have not donated blood	1981 (85)
If you donated blood before, will your last experience motivate you to donate again?	
Yes	195 (8.4)
No	155 (6.6)
I have not donated blood	1981 (85)
If you are a donor, did you donate blood regarding someone asking for in social media websites (Twitter, Facebook, What's app … etc.)	
Yes	140 (6.0)
No	210 (9.0)
I have not donated blood	1981 (85)
Did you feel any side effects after donating blood?	
Yes	51 (2.2)
No	299 (12.8)
I have not donated blood	1981 (85)
If you donated blood … why did you donate blood in your last donation?	
A friend or relative needed blood	225 (9.6)
Voluntary	93 (4.1)
Rewarding	22 (0.9)
To get the car license	10 (0.4)
I have not donated blood	1981 (85)
Have you ever seen any public media that calls people to donate blood?	
Yes	1625 (69.7)
No	706 (30.3)
Do you encourage relatives/friends to donate their blood voluntarily?	
Yes	2044 (87.7)
No	287 (12.3)
Does your family encourage you to donate blood?	
Yes	1723 (73.9)
No	608 (26.1)
What is your parent's attitude regarding blood donation?	
Supportive	1304 (55.9)
Against blood donation	175 (7.5)
Neutral	852 (36.6)
Have you ever received blood before?	
Yes	243 (10.4)
No	2088 (89.6)
Have you had lectures/courses regarding the importance of blood donation in your college?	
Yes	1215 (52.1)
No	1116 (47.9)
Has your college organized a blood donation camp, or regular ones, since you attended it?	
Yes	865 (37.1)
No	1466 (62.9)
If your college organizes a blood donation camp within the campus, would you participate and donate your blood?	
Yes	1488 (63.8)
No	843 (36.2)

Table 5: Barriers and motivators to donate blood among the study sample (*n*=2331)

Questions	*n* (%)
If you are a nondonor, why have not you donated blood yet?	
Fears	258 (11.0)
Health reason	490 (21.0)
No time	94 (4.0)
Common stereotype	27 (1.2)
No specific reason	558 (24)
No one asked me to donate	554 (23.8)
I donated blood before	350 (15)
If you are a donor, why do you think nondonors do not donate their blood?	
Fears	45 (2.0)
Health reason	58 (2.4)
No time	31 (1.3)
Common stereotype	12 (0.5)
No specific reason	162 (7.0)
No one asked them to donate	42 (1.8)
I have not donated blood	1981 (85)
As a student, what is the best motivation to donate blood?	
Money/gift for each donation	309 (13.3)
Approved certificates	1389 (59.6)
Academic support and extra marks	633 (27.1)

A related study conducted in Pondicherry by Bharatwaj *et al*. among undergraduate medical students revealed incomplete knowledge about blood donation. Nonetheless, 85% of participants expressed their willingness to donate blood in future. The authors of these studies recommended organizing regular continuing medical education and seminars for medical students on voluntary blood donation.[19]

According to the findings of our study, the predominant blood group was "B" comprising 32.4% of the participants, followed by "O" at 37.1%, "A" at 17%, and "AB" at 5.2%. These results are consistent with the findings of prior research conducted by Giri *et al*.[20]

Table 6: Association between blood donation practice and multiple predictive variables (*n*=2331)

Independent variables	Previous blood donation (s)		*P*
	No (*n*=1981), *n* (%)	Yes (*n*=350), *n* (%)	
Knowledge level			
Sufficient knowledge	1280 (64.6)	277 (79.1)	0.00
Below average knowledge	701 (35.4)	73 (20.9)	
Current academic year			
1st year	647 (32.7)	106 (30.3)	0.00
2ndyear	404 (20.4)	58 (16.6)	
3rd year	511 (25.8)	95 (27.1)	
4th year	419 (21.2)	91 (26.0)	
Gender			
Male	596 (30.1)	244 (69.7)	0.00
Female	1385 (69.9)	106 (30.3)	
Age (years)			
17–18	784 (39.6)	102 (29.1)	0.10
19–20	968 (48.9)	184 (52.6)	
21–22	220 (11.1)	58 (16.6)	
>23	9 (0.5)	6 (1.7)	
Speciality (%)			
Cardiac care technology	488	78	0.07
Cardio perfusion technology	280	34	
Optometry	129	23	
Clinical nutrition	1	1	
Medical laboratory technology	70	13	
Operation theater and anesthesia technology	488	81	
Physician assistant	312	58	
Radiology and imaging technology	151	48	
Renal dialysis technology	62	14	

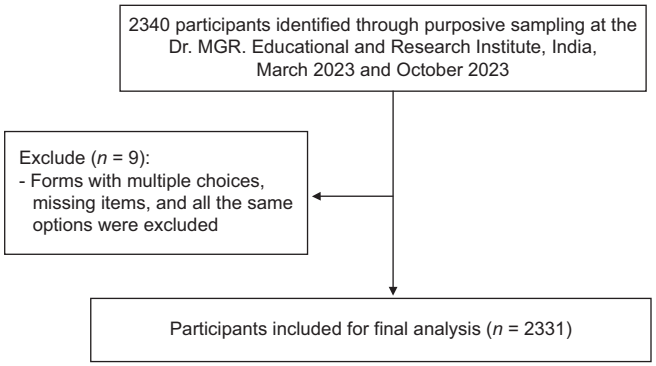

Figure 1: Illustration of the study design

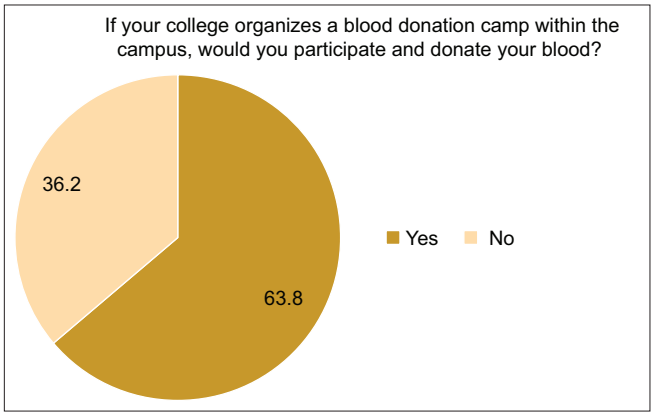

Figure 2: Willigness to donate blood

in Maharashtra and Chandra and Gupta[21] in North India. The study sample included individuals with both common and rare blood groups, underscoring the significance of encouraging students to participate in voluntary blood donation programs and register with local blood banks.

According to a recent study, 15% of undergraduate Health Science students graduating had donated blood at some point. This figure is consistent with similar studies conducted in Thailand (11%),[12] Tamil Nadu, South India (10.75%),[17] South India (12.76%),[22] and Nigeria (15%).[11] However, the rate is lower than those found in Central India (47.5%),[23] the University of South India (38%),[10] and Larissa, Greece (23.9%).[24] These variations could be attributed to the promotional efforts of blood banks and other social institutions to promote the importance of donating blood.

Our study revealed a significant proportion of participants, accounting for 24%, did not donate blood due to the lack of being approached. This observation is consistent with a prior study of 500 Saudi individuals,

where 42.6% of nondonors cited the same reason for not donating blood.[25] The results of our study and prior research underscore the importance of promoting the concept of "voluntary blood donation" through targeted marketing efforts, similar to those undertaken by the National AIDS Control Organization (NACO) in recent times. We recommend implementing proactive measures to increase the awareness and encourage blood donation among individuals who may not have been approached in the past.

Conclusion

The Tamil Nadu Health Professions Colleges possesses the potential to significantly contribute to the promotion of blood donation. The Health Professions Colleges of Tamil Nadu hold immense potential in furthering the noble cause of blood donation. Based on a recent survey, it has been observed that students are willing to donate blood if a camp is organized on campus. The college can inspire and motivate more students to donate blood and contribute to saving lives by implementing encouragement campaigns and educational sessions within the campus. Similar studies should be conducted at the district level across Tamil Nadu to promote 100% voluntary blood donation in the state and eventually expand to other states in India.

Acknowledgement

We extend our heartfelt gratitude to the first, second, and third-year students who participated in our study, as well as several esteemed faculty members including Dr. Senthil Kumar T, Annie Caroline P, Vaishnavi P, Gomathi K, Tamizharasi P, Swathy P, Syed Ali Afrin, Sangeetha C, Nirmala S, Gnana Nisha Juliet A, Seethalakshmi N, Janani Gunasekaran, Dinesh M, Sakthi Abirami R, Marjorie Miraclin K, Surendhar A, Jayaishwarya A P, Vayshak K V, Tharun Kumar R, Sheba Yesu Priya S, Jayabharathy M, Annie Anbarasi S, Ponmozhi N, Sudesan J, Mageshwaran E, Aarthi, Bhaviya B, Geethanjali K, Mubeena K F, Malini N, Sivaranjani M, Chamundeswari Y, Lekaa C, Suganya, Indhumathi K S, Janani N, Sandhiya D, Ravivarman, Amala Deepa V, Bhavani A, and Kaviya Sri S, who generously assisted us in gathering data from our student participants. We would also like to express our gratitude to external faculties from various other institutions who helped us gather data from their students, as well as Dr. Kalavathy Victor, Director of Allied Health Science of Dr. M.G.R. Educational and Research Institute, for her unwavering guidance throughout the study.

Limitation of the study

Our study faced several limitations that are common to research on knowledge, attitudes, and practices. Firstly, we acknowledge that responses may have been influenced by socially desirable attributes, and we cannot rule out the potential for both recall bias and interviewer bias. Secondly, considering the multicultural nature of Chennai and the diverse backgrounds of the students from multiple medical colleges, caution must be taken when extrapolating our results to the general population of Tamil Nadu. Lastly, we were not able to collect and analyze data from those who declined to participate in the study, which could have introduced sampling bias.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Hossain MS, Siam MH, Hasan MN, Jahan R, Siddiqee MH. Knowledge, attitude, and practice towards blood donation among residential students and teachers of religious institutions in Bangladesh – A cross-sectional study. Heliyon 2022;8:e10792.
2. World Health Organization-Blood Safety and Availability. Available from: https://www.who.int/news-room/fact-sheets/detail/blood-safety-andavailability#::text=About%20118.54%20million%20blood%20donations,vary%20according%20to%20income%20group. [Last accessed on 2023 Apr 04].
3. Why Donate Blood- e-RaktKosh. Available from: https://www.eraktkosh.in/BLDAHIMS/bloodbank/donateblood.cnt. [Last accessed on 2023 Apr 04].
4. Mammen JJ, Asirvatham ES, Lakshmanan J, Sarman CJ, Pandey A, Ranjan V, *et al*. The clinical demand and supply of blood in India: A National level estimation study. PLoS One 2022;17:e0265951.
5. World Health Organization (WHO). The Melbourne Declaration on 100% Voluntary Non-remunerated Donation of Blood and Blood Components. Geneva: World Health Organization; 2009.
6. World Health Organization. Towards 100% Voluntary Blood Donation: A Global Framework for Action. Voluntary blood Donation: Foundation of a Safe and Sufficient Blood Supply. Geneva: World Health Organization; 2010. p. 2. Available from: https://www.ncbi.nlm.nih.gov/books/NBK305666/. [Last accessed on 2024 Mar 27].
7. 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;7:693-7.
8. Alsalmi MA, Almalki HM, Alghamdi AA, Aljasir BA. Knowledge, attitude and practice of blood donation among health professions students in Saudi Arabia; a cross-sectional study. J Family Med Prim Care 2019;8:2322-7.
9. Melku M, Asrie F, Shiferaw E, Woldu B, Yihunew Y, Asmelash D, *et al*. Knowledge, attitude and practice regarding blood donation among graduating undergraduate health science students at the university of Gondar, Northwest Ethiopia. Ethiop J Health Sci 2018;28:571-82.
10. Saba KM, Remy A, Binue VS, Vive R. Knowledge, attitude and practice on blood donation among health science students in a university campus, South India. Health Allied Sacs J 2011;10:6.
11. Salaudeen AG, Odeh E. Knowledge and behavior towards voluntary blood donation among students of a tertiary institution

in Nigeria. Niger J Clin Pract 2011;14:303-7.
12. Wiwanitkit V. Knowledge about blood donation among a sample of Thai university students. Vox Sang 2002;83:97-9.
13. Misganaw C, Tenkir M, Deresa A, Tesfaye M, Tessema TT, Taye H. The level and associated factors of knowledge, attitude and practice of blood donation among health science students of Addis Ababa University. IJMHSR 2014;1:105-18.
14. Gebresilase HW, Fite RO, Abeya SG. Knowledge, attitude and practice of students towards blood donation in Arsi University and Adama Science and Technology University: A comparative cross sectional study. BMC Hematol 2017;17:20.
15. Mrigendral A. Study on knowledge, attitude and practice of blood donation among students of different colleges of Kathmandu, Nepal. Int J Pharm Biol Arch 2013;4:424-8.
16. Geri PA, Pale DB. Knowledge and attitude about blood donation amongst undergraduate students of Gravari institute of medical sciences deemed university of central India. Ann Troop Med Public Health 2012;5:569-73.
17. Syiemlieh AJ, Akoijam BS, Kumar S. Assessment of knowledge, perception and practice of voluntary blood donation among health professional students in RIMS, Imphal, Manipur. IOSR JDMS 2016;15:26-30.
18. Aslami AN, Jobby A, Simon S, Nazarudeen N, Raj P, Ramees M, *et al*. Assessment of knowledge, attitude and practice (kap) of blood donation among MBBS students of a medical college in Kollam, Kerala. JEMDS 2015;4:6086-95. [doi: 10.14260/jemds/2015/887].
19. 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 Suppl 2:602-4.
20. Giri PA, Yadav S, Parhar GS, Phalke DB. Frequency of ABO and rhesus blood groups: A study from a rural tertiary care teaching hospital in India. Int J Biol Med Res 2011;2:988-90.
21. Chandra T, Gupta A. Prevalence of ABO and rhesus blood groups in Northern India. J Blood Disord Transf 2012;3:132.
22. Yerpude PN, Jordan KS. A cross-section study on KAP on blood donation among medical students South India. Int J Med Health Sci 2013;2:382-5.
23. Ben Natan M, Gorkov L. Investigating the factors affecting blood donation among Israelis. Int Emerg Nurs 2011;19:37-43.
24. Papagiannis D, Rachiotis G, Symvoulakis EK, Anyfantakis D, Douvlataniotis K, Zilidis C, *et al*. Blood donation knowledge and attitudes among undergraduate health science students: A cross-sectional study. Transfus Apher Sci 2016;54:303-8.
25. Alam M, Masalmeh Bel D. Knowledge, attitudes and practices regarding blood donation among the Saudi population. Saudi Med J 2004;25:318-21.