Origional Article

KNOWLEDGE, ATTITUDE AND PRACTICES REGARDING BLOOD DONATION AMONG MEDICAL STUDENTS OF A PRIVATE MEDICAL COLLEGE, LAHORE

Sara Amin[1] , Seema Hasnain[2] , Zainab Batool[3] , Ashir Mughal[4]

ABSTRACT

Background: Blood donation helps save the lives of millions. Voluntary blood donation is necessary for a sustainable blood supply. To determine the knowledge, attitude and practices of 1st to 5th year medical students about blood donation and their association with the sociodemographic factors in a private medical college.

Materials and Methods: A cross-sectional study was conducted among medical students from the first to final year from April to September 2022 after approval from the Ethical Review Board. Data was collected on a pretested self-administered questionnaire from all the students who were present on the day of data collection after obtaining verbal consent from them. The data was analyzed by SPSS-22. Chi-square/Fisher's exact was applied to find out the association of sociodemographic factors with knowledge, attitude and practices of blood donation. A p-value of ≤0.05 was considered as significant

Results: Out of 631 students, 601 who filled out the questionnaire had 0.5% good, 14.6% satisfactory and 84.9% poor knowledge. A positive attitude was reported by 80% of students. However, only 28.1% had ever donated blood. There is a statistically significant association of overall knowledge (p-value=0.01) and overall attitude (0.013) with the year of class. The practice of donating blood has a significant relationship with age (p-value=0.043), gender (0.000) and year of study (p-value=0.009).

Conclusion: The overall knowledge of medical students about blood donation was poor. The majority of the students had a positive attitude about blood donation and only more than one quarter had donated blood. There is a significant association of the academic year with knowledge regarding blood donation.

Key Words: Blood donation, Medical students, Knowledge, Attitude, Practices

doi: https://doi.org/10.51127/JAMDC5I4OA06

How to cite this:
Amin S, Hasnain S, Batool Z, Mughal A. Knowledge, attitude and practice regarding blood donation among medical students of a private medical college, Lahore.
JAMDC. 2023;5(4): 232-242
doi: https://doi.org/10.51127/JAMDC5I4OA06

INTRODUCTION

Blood donation is one of the most important components of health care. Blood donation helps save the lives of millions of patients who are in dire need of blood. That is why voluntary blood donation is essential for sustainable blood supply.[1] It should be the responsibility of every country to have a proper national health strategy and network for the provision of safe and sufficient blood.[2] Globally around 118.5 million blood donations are made, out of which 40% of blood is donated by developed countries where only 16% of the population lives. The percentage of people who donate

[1,3,4]Student, Final Year MBBS, FMH College of Medicine & Dentistry
[2]Professor of Community Medicine, FMH College of Medicine & Dentistry, Lahore
Date of submission 07-09-2023
Date of review 22-11-2023
Date of acceptance 03-01-2024

whole blood serves as a gauge for the country's overall blood supply. Blood donors can be classified as voluntary, paid and family or substitution donors which are also known as replacement donors. Over fifty percent of the world's blood donation is still obtained from paid blood donors and relatives in 54 different countries.[2] Less than 10 blood donations per 1,000 people are made every year in 66 nations, which is the rate usually considered indispensable to meet a country's minimal blood needs.[3] Only 10% of the blood collected in Pakistan comes from willing donors, even though 70% of the population is under the age of 29, and 90% comes from replacement donations made by families.[4] The World Health Organization (WHO) launched World Blood Donor Day in 2004 to raise awareness of the continued need for blood donations to save lives. Blood donations are essential to global health systems but can only be provided by voluntary blood donors.[5]

One of the reasons for blood scarcity is to inability to arrange regular blood supply as a result of misconceptions, hazards that donors perceive and lack of enthusiasm among them.[6] College students in Pakistan are a key source of voluntary blood donation if they are motivated and willing to do so.[7]

The purpose of the current study was to determine the existing knowledge, attitude and practice of medical students about blood donation and its association with sociodemographic factors.

MATERIAL AND METHODS

A descriptive cross-sectional study was conducted among the medical students of a private medical college from the first to final year from April to September 2022. All the students were included except those who refused to fill out the form and were absent on the day of data collection. The total number of students in the college was 630. A non-probability purposive sampling technique was applied. Age, sex and academic year constituted the independent factors, whereas knowledge, attitude, and practice served as the dependent variables. The data was collected by the students of Batch A1 of the fourth year on a self-administered pre-structured questionnaire comprising four sections after approval by the Institutional Review Board and by obtaining verbal consent from the students. Scoring of questions regarding knowledge and attitude was done. If the answer was correct then one mark was given and if it was wrong, then zero mark was given. There were 19 questions related to knowledge and 08 questions to attitude. The scores were categorized as Good, Satisfactory and Poor depending on the calculated percentage >75%, 60-75% and <60% respectively. Data was analyzed after cleaning the data by SPSS-22. Descriptive statistics were determined as mean and standard deviation for the age of participants. Categorical data was presented in terms of frequency and percentage of participants. The Chi-square /Fisher exact test was applied to demonstrate the relation of age, sex and year of education with knowledge, attitude and practice about blood donation. A P-value of ≤ 0.05 was taken as significant for this study.

RESULTS

Out of 630 medical students, 601 filled the questionnaire from whom 290 (48.2%) students were of 17-21 years of age with a mean age of 21.56 ±1.99 years. Two hundred and five (34.1%) were males and 283 (39.5%) healthcare workers were the primary source of information for blood donation. Out of 601 respondents, 3(0.5%) had good, 88 (14.6%) satisfactory and 510 (84.9%) had poor overall knowledge regarding blood donation. Whereas overall attitude was good in 362 (60.2%), satisfactory in 148 (24.6%) and poor in 91(15.1%) students (Figure-1).

Regarding knowledge related to blood donation, 516 (85.9%) out of 601 students knew the types of blood groups, 525 (87.4%) answered correctly about the

universal donor and the correct minimum age for blood donation (18 years) was mentioned by 460 (76.5%). However, 521 (86.7%) and 514 (85.5%) respondents did not know about the screening tests for blood donation and duration of preservation of donated blood respectively (Table- 1).

The majority of the students (80%) had a positive attitude about blood donation and almost 469 (78%) were willing to donate blood. Out of 601 students, 376 (80.2%) showed their willingness to donate blood to anyone (Table 1).

Regarding the practice of blood donation only 169 (28.1%) had ever donated blood and the frequency of blood donation once a year was reported by 128 (75.8%) students (Table-2).

Out of 432 students who had never donated blood,178 (41.2%) reported that one of the main reasons for not donating blood was that no one had ever approached them for this purpose, 156 (36.1%) perceived that they were unfit for blood donation, and 63 (14.5%) had fear of needles (Table -3).

There was a statistically significant association of the year of study with overall knowledge (Fisher exact test=16.48 & p-value=0.01) and attitude (Chi-square test=19.34 & p-value=0.013) (Table-4).

Whereas a significant relationship regarding blood donation practice was observed with age (p-value=0.043), gender (p-value=0.000) and year of study (p-value=0.009) (Table-5).

Figure No.1: Overall knowledge and attitude of medical students regarding blood donation (N=601).

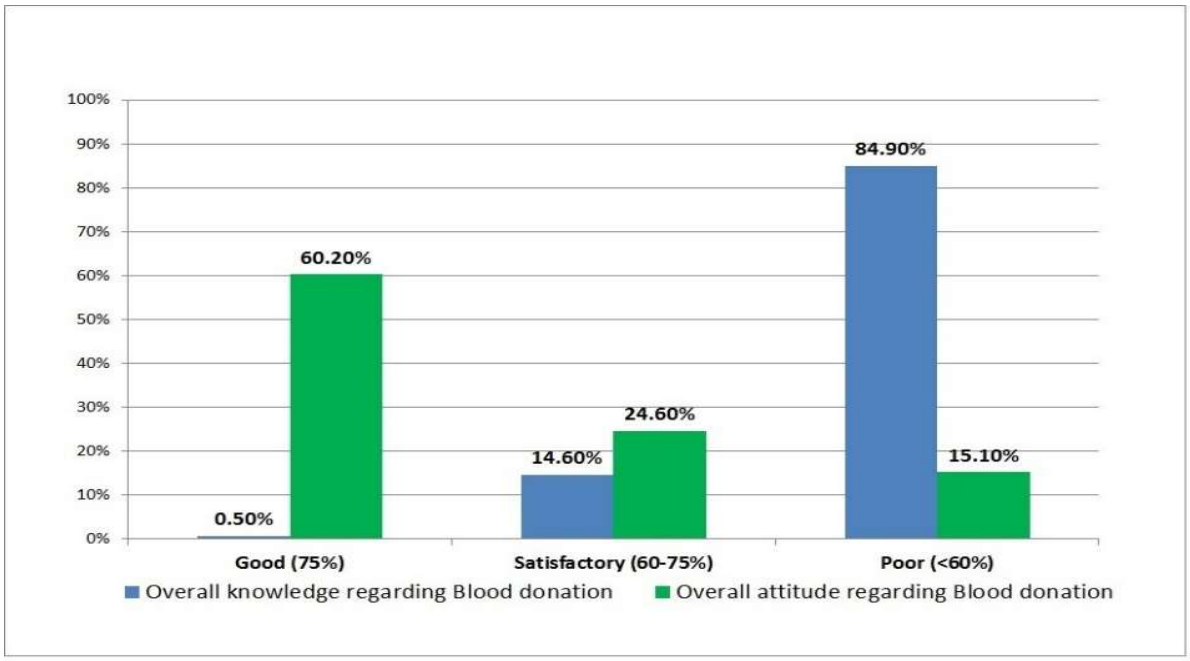

Table No. 1 Responses related to knowledge and attitutes about blood donation (N=601)

Knowledge questions	**Correct Answer**	**Incorrect answer**
1. Knowledge about different types of blood groups **(Yes)**	516 (85.9%)	85 (14.1%)
2. Universal recipient **(AB+ve)**	526 (87.5%)	75 (12.5%)
3. Universal donor **(O-ve)**	525 (87.4%)	76 (12.6%)
4. Minimum age for blood donation **(18 years)**	460 (76.5%)	141 (23.5%)
5. Maximum age for blood donation **(60years)**	155 (25.8%)	446 (74.8%)
6. Minimum weight for blood donation **(45kg)**	374 (62.2%)	227 (37.8%)
7. Hemoglobin for blood donation for females **(12.5mg/dl)**	469 (78%)	132 (22%)
8 Hemoglobin for blood donation for males **(13.5mg/dl).**	409 (68.1%)	192 (31.9%)
9. Blood donation by patients with chronic disease **(No)**	542 (90.2%)	59(9.8%)
10. Interval between blood donation **(3 months)**	391 (65.1%)	210 (34.9%)
11. Amount of blood donated at one time **(450 ml)**	248 (41.3%)	353 (58.7%)
12 No. of patients benefited by one unit of blood **(3)**	179 (29.8%)	422 (70.2%)
13. Transmission of infectious diseases due to unscreened blood **(All)**	17(2.8%)	584 (97.2%)
14. Screening tests for blood donation (**All)**	80 (13.3%)	521 (86.7%)
15. How many types of blood donors **(03)**	190 (31.6%)	411 (68.4%)
16. Duration of preservation of donated blood **(35 days)**	87 (14.5%)	514 (85.5%)
17. Donation time for one pint of blood **(6-8minutes)**	158 (26.3%)	443 (73.7%)
18. What are the types of blood donors (**Voluntary, paid & replacement)**	78 (13%)	523 (87%)
19. When can non-lactating women can donate blood **(after 6 months of delivery)**	314(52.2%)	7 (7.8%)
Questions related to attitude	**Correct answer**	**Incorrect answer**
1. People should donate blood **(Yes)**	569 (94.7%)	32 (5.3%)
2. Your attitude about blood donation (**Positive)**	481 (80%)	120 (20%)
3. Willing to donate blood **(Yes)**	469 (78%)	132 (22%)
4. If yes to whom like to donate blood **(Anyone)** (N=469)	376 (80.2%)	93(19.8%)

5. One can get infected while donating blood **(Yes)**	447 (74.4%)	154 (25.6%)
6. Best source of blood donors (**Voluntary)**	503 (83.7%)	98 (16.3%)
7. Any reward for blood donors **(No)**	454 (75.5%)	147 (24.5%)
8. Motivate other people for blood donation **(Yes)**	548 (91.2%)	(8.8%)

*Correct answers in bold letters

Table No.2: Practice of students about Blood donation (N=601)

Questions related to practices regarding blood donation	**Frequency**
1. Number of students who donated blood	
i) Yes	169 (28.1%)
ii) No	432 (71.9%)
2. Frequency of blood donation by students (N=169)	
i) Once a year	128 (75.8%)
ii) 2-3 times per year	41(24.2%)
3. When did the students last time donate blood (N=169)	
i) This year	94 (55.6%)
ii) Last year	54 (32%)
iii) More than one year	21 (12.4%)
4. To whom blood was donated: (N=169)	
i) Relatives	44 (26%)
ii) Friends	32 19%)
iii) Strangers (correct)	93 (55%)
5. Problems faced by students after blood donation: (N=169)	
i) Yes	26 (15.4%)
ii) No	143 (84.6%)
6. Feeling of satisfaction after blood donation: (N=169)	
i) Yes	141(83.5%)
ii) No	28 (16.5%)
7. Any reward for blood donors required (N=601)	
i) Yes	147 (24.5)
ii) No	454 (75.5%)

Table No. 3: Reasons recorded by students for not donating blood (432)

Reasons for not donating blood	**Frequency**
i) Never approached to donate blood	178 (41.2%)
ii)Unfit to donate blood	156 (36.1%)
iii) Fear of needles	63 (14.5%)
iv) Fear of knowing disease status on screening	29 (6.7%)
v) Risk of developing disease due to donation	44 (10.1%)
vi) Any other cause	14 (3.2%)

*Multiple responses allowed

Table No. 4: Association of knowledge and attitude with sociodemographic factors

Variables	**Knowledge**			**Attitude**		
	Good	**Average**	**Poor**	**Good**	**Average**	**Poor**
Age category						
17-24 years	2 (66.7%)	86(97.7%)	481(94.3%)	342 (60.1%)	138 (24.3%)	89 (15.5%)
25-33 years	1(33.3%)	2 (2.3%)	29 (5.7%)	20 (62.5%)	10 (31.3%)	2 (6.3%)
Fisher exact test:5.445 & p-value=0.064				**Fisher exact test:2.33 &p-value=0.31**		
Gender						
Male	1 (33.3%)	27 (30.7%	177(34.7%)	117 (57.1%)	49 (23.9%)	39 (19%)
Female	2 (66.7%)	61 (69.3%)	333 (65.3%)	245(61.9%)	99 (25%)	52 (13.1%)
Fisher exact test=0.688 & p-value=0.764				**Chi-square value:3.68 & p-value=0.162**		
Year of Study						
First-year	1 (0.7%)	34 (23.6%)	109 (75.7%)	78 (54.2%)	44 (30.6%)	22 (15.3%)
Second year	0 (0%)	08 (8.4%)	87 (91.6%)	66 (69.5%)	13 (13.7%)	16 (16.8%)
Third year	1 (1%)	17 (16.8%)	83 (88.2%)	64 (63.4%)	20 (19.8%)	17 (16.8%)
Fourth-year	0 (0%)	13 (11.6%)	99 (88.4%)	77 (68.8%)	23 (20.5%)	12 (10.7%)
Final year	1 (0.7%)	16 (10.7%)	132(88.6%)	77 (51.7%)	48 (32.2%)	24 (16.1%)
Fisher Exact test=16.48 & p-value=0.01				**Chi-square=19.34 & p-value=0.013**		

Table No. 5: Association of sociodemographic factors with donation of blood by medical students

Variables	**Yes**	**No**
Age categories		
17-24 years	155 (91.7%)	414 (95.8%
25-33 years	14 (8.3%)	18 (4.2%)
Chi-square= 4.085 & p-value=0.043		
Gender	**Yes**	**No**
Male	97 (57.4)	108(25%)
Female	72 (42.6%	324 (75%)
Chi-square=56.72 & p-value=0.000		
Year of Study	**Yes**	**No**
First year	42 (24.9%)	102 (23.6%)
Second year	16 (9,5%)	79 (18.3%)
Third year	25 (14.8%)	76 (17.6%)
Fourth year	44 (26.0%)	68 (15.7%)
Final year	42 (24.9%	107 (24.8%)
Chi-square=13.53 & p-value=0.009		

DISCUSSION

As blood donation is a resource that may save lives in a variety of emergency scenarios and other circumstances connected to it, this study is being undertaken in a private medical college to evaluate knowledge, attitude and practice in this area. Building a pool of enthusiastic young people is therefore vital to encourage them to give their blood freely and without payment.

In the current study, 84.9% of students had poor, 14.6% satisfactory and only 0.5% good overall knowledge regarding blood donation which was very disappointing as being medical students, they should have much better knowledge. Whereas studies conducted in Karachi [7], Lahore [8], Saudi Arabia [9] and Tamil Nadu [10] reported that 92.2%, 33.1%, 60.2% and 53.3% of medical students had adequate knowledge about blood donation respectively which is contrary to our study. The variation in overall knowledge in different studies may be due to whether the topic of blood donation is part of the curriculum or not, the number of blood donation campaigns held, the level of awareness and different criteria used for assessing knowledge regarding blood donation in these institutions.

A recent study reported that 80% of students had a positive attitude about blood donation. Other studies however stated 42%, 62.6% [6], 79.2 % [11] and 94.1% [12] positive attitude. The diversity of variation may be due to differences in motivation, level of awareness through social media, misconceptions and also due to holding of blood donation campaigns in these countries. In the present study, 78% of students said they would be willing to give

blood, and of those, 80.2% stated they would be willing to give blood to anybody. This shows that altruism has a key role in blood donation as confirmed by research studies done in Saudi Arabia [9], Lahore[13] and India[6] in which 83.9%, 77.7% and 91% respectively had reported their willingness to donate blood.

Out of 601 students, 75.8% had donated blood once and 24.2% had donated blood more than once whereas other studies depicted that 55.6 % [6] and 58.4%[14] had donated blood once whereas 44.4% [6] and 41.6%[14] had donated blood more than once. This variation in different studies indicates that necessary steps must be taken to motivate and inspire the students by creating awareness among them and by holding regular blood donation campaigns to provide opportunities for non-remunerated blood donation.

In the current study, a significant relationship between the academic year with knowledge (p-value=0.01) and attitude (p-value=0.013) respectively was reported. A study of Azad Kashmir reported that female respondents had greater overall knowledge (p-value=0.019) which is contrary to our study. Whereas a study of Lahore depicted that gender and age had a significant relationship with knowledge and only gender had a significant relationship with attitude which is contrary to our result[15].

A statistically significant association of practice of donating blood with age (p-value=0.043), gender (p-value= 0.000), and year of study(p-value=0.009) was depicted in the current study.

These results are in concordance with a study where a significant difference was observed in the history of blood donations for age (p=0.087), gender (p=0.0001), and educational level (p=0.0001).[15] Variables that were significantly associated with blood donation were age above 30 (p<0.001) and male sex (p=0.001).[16] The current study showed that third-year MBBS students donated the most blood, whereas first-year MBBS students donated the least. Whereas a study in Nepal reported that final year students (35.71%) donated blood more as compared to first year (8.57%) students.[14] Whereas a study in India reported that 16%, 32.7% and 44% of students who had donated blood belonged to the first year, the second year, and final year respectively.[17]

Reasons given in the current study for not donating blood were that 36.85% had never approached for blood donation, 32% perceived that they were unfit for blood donation as their knowledge about the criteria for donating blood was poor along with myths and misconceptions related to blood donation, fear of needles 13%, fear of knowing disease status on screening (6%) and risk of developing disease due to donation (9%). Similar reasons were also observed in other studies. [11 ,18] Thus, these findings are in concordance with our study. Thus there are two main challenges for improving non-remunerated voluntary blood donation which can be achieved by encouraging the youth population for blood donation and converting them to regular donors. According to a Saudi Arabia study, 70% of respondents stated that their college had never offered lectures regarding blood donation and never organized blood donation campaigns.[9] Thus role of medical colleges is very important for improving awareness and motivating the students for blood donation by holding seminars, and lectures related to blood donation and arranging blood donation campaigns.

A study conducted in Turkey among third and final year medical students reported that students who had taken part in blood donation training had much greater rates of blood donation and encouraged others to donate blood than those students who had not attended these trainings.[19] An international program called Club 25 was started in response to a WHO demand. It's a fresh idea that emphasizes the importance of saving lives by donating blood. Through Club 25, young people are inspired to visit a blood center, learn about healthy lifestyles, and routinely donate blood for 20

blood donations by the time they are 25. In 1989, Zimbabwe founded its first club. Over 60 nations have either started Club 25 programs or are attempting to find other ways to increase the number of young blood donors.[20] Such club 25 should also be established in Pakistan for the promotion of voluntary blood donation by young people.
A randomized control trial was conducted in Denmark to assess the impact of text messaging blood donors to let them be informed that their donation had helped a patient. It was found that text messaging increased the subsequent donation by 3.6% (p-value=0.023) who received the message as compared to those who did not.[21] Text messaging after post-donation among first time donors was an efficient intervention to increase the retention rate for subsequent donations as reported by another randomized control study. [22]
In a study conducted in Karachi, 69.7% of medical students answered positively that Short Message Service (SMS) reminded and motivated them to blood donation voluntarily more often. Thus SMS messaging can encourage persons to blood donation voluntarily by removing their fears and by increasing their awareness.[23]
Despite of thorough study, there are a few limitations in this study. Since the study is conducted on medical students only, the knowledge about blood donations among a common population cannot be assessed. Moreover, this study includes medical students from only one medical college so results cannot be generalized.

CONCLUSION

The medical students had poor knowledge about blood donation. Most of the medical students had a positive attitude towards blood donation and showed willingness to donate blood. One quarter of the students had donated blood.

ACKNOWLEDGMENT

The authors are grateful to the Heads of the Department of Basic and Clinical Subjects of Fatima Memorial College of Medicine and Dentistry, Lahore, Pakistan for helping us in the collection of data from medical students. We are also thankful for the cooperation of first to final year medical students who are actively participated in this study.

Financial disclosure: None
Conflict of Interest: None

AUTHOR CONTRIBUTIONS

SA: Acquisition and analysis of data, drafting the manuscript
SH: Conception of idea & design of study, critically revised the article with intellectual input
ZB: Data collection and data entry and analysis of data.
AM: Data collection, record keeping, statistical analysis and drafting of manuscript

REFERENCES

1. What countries Record the Highest blood donors? (Internet) (cited2022 May26). Available from: https://www.mapsofworld.com/answers/health/countries-record-highest-blooddonors/#
2. World Health Organization. Blood Safety and availability. Fact sheet(internet).Geneva: WHO ;20(cited 2022May 22) Available from: https://www.who.int/news-room/fact-sheets/detail/blood-safety-and-availability.
3. In WHO Expert Committee on Biological Standardization: sixty-seventh report. WHO Technical Report Series No. 1004. Geneva: WHO; 2017. (cited 2022 May24). Available from: http://apps.who.int/medicinedocs/documents/s23322en/ s23322en.pdf,
4. Wazir HK. Only 10% Pakistanis donate blood voluntarily. Pakistan Today (Internet). (cited 2022 April,5) Available from: http://archive.pakistantoday.com.pk/20

17/06/10/only-10-pakistani-donate-blood-voluntarily/
5. Georgoudiou H.The History Of World Blood Donor Day.June08,2021. Available from: doi: https://www.oneblood.org/media/blog/the-history-of-world-blood-donor-day.stml
6. 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 Jul;7(4):693. doi: 10.4103/jfmpc.jfmpc_54_17. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6132011/
7. Ahmed Z, Zafar M, Khan AA, Anjum MU, Siddiqui MA. Knowledge, attitude and practices about blood donation among undergraduate medical students in Karachi. Journal of Infectious Diseases and Therapy. 2014 Mar 29. https://doi.org/10.4172/2332-0877.1000134
8. Mirza H, Khan F, Naeem FJ, Ashraf B. Blood safety and donation knowledge, attitude and practice (KAP) among 1st year medical students at LMDC, Lahore. Pak J Med Health Sci. 2015 Jul 1;9(3):992-4. Available from: https://www.pjmhsonline.com/2015/july_sep/pdf/
9. 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 Jul;8(7):2322. doi: 10.4103/jfmpc.jfmpc_415_19
10. Govindasamy V, Sivasankaran D, Purushothaman V. Knowledge, attitude and practice regarding blood donation among medical students of Tamil Nadu-a cross sectional study. ICJMPH. 2019 Oct;6(10):4583. doi: http://dx.doi.org/10.18203/2394-6040.
11. Melku M, Asrie F, Shiferaw E, Woldu B, Yihunew Y, Asmelash D, Enawgaw B. 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(5).doi 10.4314/ejhs.v28i5.8
12. Nandan, S., Veena, S., Devadas, V.M. Knowledge, Attitude and Practice of blood donation among undergraduate medical students in Shimoga Institute of Medical Sciences. IJHCR. 2021;4(6):182-185.
13. Islam T, Aslam M, Shabir M, Changazi SH, Bhatti S, Ahmad QA. Attitude and Trends of Undergraduate Medical Students towards Blood Donations in Services Institute of Medical Sciences, Lahore. Esculapio Journal of SIMS. 2019;15(3):217-20.
14. Dawadi P, Khadka S, Khanal MC, Thapa RK. Blood donation practice among undergraduate students in a tertiary care hospital: a descriptive cross-sectional study. JNMA: 2020 Dec;58(232):998. doi: 10.31729/jnma.5288
15. Rasool AG, Saud N, Kamal A, Amjad NA, Sha-hid NO, NIZAM M. Socio-Demographic Factors Affecting Knowledge, Attitude and Practice towards Blood Donation among University Students in Lahore, Pakistan. Pak. J. Med. Health Sci. 2021;15(3):638-41.
16. Shabani MM, Zimbwe KB, Sobhy S. Saving lives through voluntary blood donation: learning from medical students in ruvuma, southern Tanzania. Hematol Transfus Int J. 2020;8(3):62-9. doi: 10.15406/htij.2020.08.00226
17. Samanta M, Kumar DL, Patel M, Mangal N, Varghese KA. Perception and Practice of Blood Donation Among Medical Students in Southern Rajasthan, India. Nepal Med. J. 2021 Dec 31;4(2):489-94.

18. Kanwal A, Raza AA, Saif S, Ashfaq U. Knowledge, Attitude and Practices of Voluntary Blood Donation among Students of Rawalpindi Medical University. JRMC. 2019 Feb 18;23(S-1):50-2.
19. Taş A, Kiraz ED. Are future doctors ready to donate blood and encourage blood donation?. Transfus Apher Sci2018 Aug 1;57(4):569-72. https://doi.org/10.1016/j.transci.2018.06.004
20. Club 25. (Internet) (cited 2022 May 20) Available from: http://blodan.org/club-25
21. Fosgaard T, Hansen L, Jacobsen C, Sørensen E, Romose M, Ullum H. Can text messages save lives? A field experiment on blood donor motivation. Transfusion. 2020 Mar;60(3):460-5. https://doi.org/10.1111/trf.15633
22. Pongsananurak C, Norasetthada L, Tantiworawit A, Rattarittamrong E, Rattanathammethee T, Hantrakool S, Piriyakhuntorn P, Sriwichai M, Leetrakool N, Chai-Adisaksopha C. The effects of text messaging for promoting the retention of the first-time blood donors, a randomized controlled study (TEXT study). Transfusion. 2020 Oct;60(10):2319-26.. https://doi.org/10.1111/trf.15984
23. Saleem S, Wasim A, Sabih S, Khan AF, Rizvi MH, Jillani UA, Syed MJ, Mumtaz M, Mumtaz Y, Shehzad AM, Dawani O. Assessing Acceptability of Short Message Service Based Interventions towards Becoming Future Voluntary Blood Donors: J. Blood Transfus. 2014;2014:567697. doi: 10.1155/2014/567697.