Original Paper

Blood Donation Attitudes and Knowledge of Medical School Students at the University of Crete, Greece: An Intra-Institutional Exploration

MARIA-TZENI ATHANASAKI[1], PANAGIOTIS VOLKOS[2], MANOLIS LINARDAKIS[1], EMMANOUIL K. SYMVOULAKIS[2]

[1]Department of Social Medicine, School of Medicine, University of Crete, Voutes 71003 Heraklion, Greece

[2]Clinic of Social and Family Medicine, School of Medicine, University of Crete, Voutes 71003 Heraklion, Greece

ABSTRACT: In the last decade, demand for blood has been increased internationally, while there is a consistent shortage of regular blood donors. Medical students are a potential pool of regular blood donors. The present study investigated the attitudes and knowledge of undergraduate medical students, regarding blood donation. During the May of 2023 data from 320 medical students of the University of Crete, Greece who were studying from the first to the sixth year were analyzed. It was a cross-sectional observational study and data collection was performed by completing an anonymous questionnaire with socio-demographic items and the Blood Donation Attitudes and Knowledge Scale. Three hundred twenty undergraduate students participated in this study. Sophomores accounted for 20.3% (n=65). Only 25.9% of the participants donated blood repeatedly. Most students (99.4%; p<0.001) believed that donating blood was a good act and 87.5% reported that religious beliefs should not influence blood donation (both p<0.001). The frequency of students in the 4th-6th year who achieved a high score in Attitudes and Knowledge scale was higher compared to the 1st-3rd year students (23.6% vs. 10.6%, p=0.002). Higher score on Attitudes and Knowledge about Donation was significantly associated with increased year of study (r=0.196, p<0.001). Moderate levels of Attitudes and Knowledge Scale about Blood Donation were reported with a significant tendency to increase along the years of study. Perhaps, medical students may mature their perception towards blood donation alongside with their training advancement in Medicine.

KEYWORDS: *Blood donation, donor, attitude, knowledge, medical students.*

Introduction

Blood donation is characterized as a humanitarian act and endorse core meanings of the concept of volunteering [1].

The need for blood is assessed to be increased worldwide, as it is a major issue of the health system supply capacity, since blood transfusion is used in demanding conditions of the everyday care [2].

Blood transfusion is considered to be of critical importance in several cases, such as in victims of road accidents, as well as in patients undergoing surgery, chemotherapy, bone marrow transplantation, and many other clinical conditions [3,4].

Around the world, there are reported hundreds of people who need to receive blood at regular intervals to survive, such as people with chronic blood disorders [5].

Primarily, in the recent years it was estimated that the complexity of surgical procedures and the increase in life expectancy intensified the demand for blood transfusions [4,6,7].

Furthermore, it was observed through studies that 30-50% of patients hospitalized in an intensive care unit (ICU) needed blood, with anemia reaching 75% as a reason for transfusion [8].

The World Health Organization (WHO) argues that the need for blood in countries with more developed healthcare systems is greater than in other countries [1].

Nevertheless, according to WHO, at least 1% of the population has to become blood donor, in order to cover the basic needs of a country [1].

However, in many countries, demand remains higher than supply, with blood management services struggling to ensure both quality and safety [1,9].

According to Greek legislation, the national organization of blood donation system is based on the voluntary and unpaid offering of blood, prohibiting financial transactions in exchange for blood donation [10].

According to WHO, there were recorded 13,300 blood donation centers in 2023 and blood was obtained by three modalities of donorship (unpaid volunteers, replacement donors, and paid donors), while World Health Assembly convincingly supports voluntary unpaid blood donation [11].

Regarding the domestic demand for blood, research showed that Greece is in a great need for

10.12865/CHSJ.51.01.05

blood and there is an insufficient collection of blood units [4].

As a result, the impetus is given to strengthen the effort to collect blood from regular volunteer blood donors [4].

The expectation is to become, as country, self-sufficient in the blood units needed and to manage the blood supply by recruiting more volunteers to donate blood [4,12].

This is challenging as Greece welcomes every summer a number of tourists [13] crudely comparable to its native inhabitants.

In Greece, young people and women represent the smallest proportion of the blood supply [14].

However, medical and health science students are a group of healthy individuals with altruistic attitudes.

Besides, health students are a pool of young, promising, potential blood donors because they are considered healthy, active, and well-informed future blood donors [2,15-17].

However, the most important issue is that students may early develop a blood donor 'identity', an aspect which can also trigger empathy, compassion, and altruistic trust beyond their duty behaving.

Therefore, it is essential to identify dimensions of knowledge, attitudes, and beliefs among medical students, in order to be able to design customized interventions for enhancing blood donations rates in local social networks, through early message propagation in the context of student groups.

As for the beliefs of future doctors, they tend to consider blood donation as a moral and social responsibility of human beings, in other words, as an altruistic act [18,19].

The positive attitude of medical students, apart from the regular blood donation attitude, was further illustrated by their willingness to be engaged in forthcoming blood donations if requested [20,21].

Studies suggested educational interventions for health science students [22] and campaigns targeting young people to promote voluntary blood donation [23].

Health science students were actively involved in promoting blood donation and this was due to the training they received to inspire a sense of confidence across potential donors [2].

Thus, it could be argued that health science students may be more influential compared to their peers (meaning students from different academic fields), in regards to the concept of voluntary blood donation promotion in comparison with other forms of promotion initiatives.

That, could classify any evidence driven information on attitudes and knowledge of health science students as a priority.

Therefore, the primary aim of the study was to analyze and record blood donation attitudes and knowledge of the undergraduate medical students, while they acquire academic and lived experience regarding blood donation, overtime.

In addition, it aimed to offer responses for two hypotheses: the first examined whether the attitudes and knowledge of 4th-6th year students differs from those of 1st-3rd year students.

The second searched if students' attitudes and knowledge were correlated with socio-demographic variables.

Methods

A cross-sectional observational survey was conducted during seven teaching activity days on May 2023, at the Medical School of the University of Crete.

The sample of study targeted undergraduate medical students, from the 1st to the 6th year. Physical attendance to courses was a requirement for recruitment.

A minimum participation rate of 30% of all, courses, registered students (n=747) was set.

In fact, 327 students were initially invited.

The sampling was convenient, and the survey was conducted in the entertainment and dining facility of the Medical School.

Instruments

A questionnaire sheet was created for this survey, which was distributed to the participants and consisted of the following two sections: (1) the first section comprised 12 questions about the students' demographic information (gender, year of birth, height, weight), features of attendance (year of study), health habits (smoking, exercising, sleeping hours), and some questions related to blood donation (promotion calls for blood donation via social media, health problems that potentially limit blood donation).

The second section included an 11-item scale labeled as Blood Donation Attitudes and Knowledge.

The Scale is similar in format and use to Organ Donation Awareness Scale [24], Blood and Organ Donation scale [25], and also meanings of blood donation, as content, were based on previously published material [7].

Questions explored knowledge and attitudes towards blood donation, where answers were

10.12865/CHSJ.51.01.05

dichotomous (yes or no), with affirmative (yes) answers receiving a value of 1 and negative (no) answers receiving a value of 0.

Items five and seven were reversed.

The score with a range of 0-11 was linearly converted to 0-100 to better understand its use, with the overall high scores, receiving values ≥75.0 (as equivalent to those in the fourth quartile of the 0-100 scale).

Higher score indicated higher attitude and knowledge about blood donation.

Ethics

The present study was approved by the Ethics and Deontology Committee of the University of Crete with protocol number 78/09.05.23, in accordance with the 1964 Helsinki Declaration and its later amendments.

Written informed consent was signed separately.

Questionnaire sheets were marked with a pseudo-password (letters and numbers), freely chosen from each participant.

No any personal data or identification traces were retrievable.

Statistical analysis

Statistical analysis of the responses given to the questions in this study was implemented using SPSS software (IBM Corp. Released 2021, IBM SPSS Statistics for Windows, v.25.0, Armonk, NY: IBM Corp.).

The absolute and relative frequency distributions of the characteristics of the 320 students who participated in the study were estimated, with corresponding confidence intervals presented for comparison purposes.

The relative frequency of responses to the questions of the Attitudes and Knowledge Scale for Blood Donation was tested using the binomial test (at a frequency level of 50.0%), while the consistency of responses was tested using the Kuder-Richardson coefficient (KR-20).

The Scale score was assessed for symmetry, using the Blom method (QQ plot) and was found to have very slight asymmetry.

Subsequently, the scale was correlated with the students' characteristics through the Pearson's parametric method.

While the χ^2 and Student t-test were used to compare the frequency distributions of the characteristics with the low and high scores of the Scale.

Finally, based on analysis of covariance (ANCOVA), the polynomial trend of the score was checked during the years of study using age and body mass index as covariates.

Heterogeneity was tested using the Levene's method.

The acceptable significance level was set at 0.05.

Results

A total of 320 from 327 medical students finally participated, most of them were females (56.9%) and the mean age of the total sample was 22.5 years (±2.9) (Table 1).

The majority of the students were in the 2nd year of their studies (20.3%), followed by 3rd year students (19.6%).

Regarding the health features of the participants (results no shown in table/figure), most of them had normal weight (n=214, 66.7%), they were non-smokers (n=262, 81.9%), the average sleep during the night was 6.7 hours, while most of them followed a structured sport activity (n=168, 52.5%).

The 23.4% of the respondents answered positively to the question concerning the existence of a serious chronic disease or several hospitalizations of a familiar person.

When asked if they had a family member who had suffered a serious injury or had undergone a surgery that required a blood transfusion, 35.6% of the students offered positive responses.

Additionally, 66.9% of the participating students had been invited to donate blood in the past through social media.

Lastly, only 28.8% of them answered that they have a health problem that does not potentially allow a blood donation act.

Table 1. Main characteristics of 320 participating medical students.

		n	%
Gender	*male*	138	43.1
	female	182	56.9
Age, *years*	*mean ± stand. dev. (min., max..)*	22.5±2.9 (19, 43)	
Year of study	*1st*	52	16.3
	2nd	65	20.3
	3rd	63	19.6
	4th	45	14.1
	5th	45	14.1
	6th	50	15.6

Almost half of the participating students had previously donated blood at least once (47.5%) or had donated blood voluntarily (46.3%) (Table 2).

In addition, significantly less than half or 26.9% of the participants declared themselves volunteers with a blood donor card, 25.9% had donated blood repeatedly, and 26.6% had a negative view on monetary motivation in order to donate blood (p<0.001).

On the other hand, most respondents or 94.7% would donate blood for a relative, 87.5% believed that blood donation is not unacceptable because of religious beliefs, and 99.4% agreed that donating blood is a good act (p<0.001).

Most students (94.4%) had reported awareness about rare blood groups and their importance.

However, only 38.8% (p<0.001) of the participating students were familiar with the legal framework for organ, tissue, and bone marrow donation.

Nevertheless, 32.2% (p<0.001) of the future doctors have been already listed as bone marrow donors.

Table 2. Frequency of responses to 11 questions of the Attitudes and Knowledge Scale on Blood Donation of the 320 participating students.

Questions	Responses		p-value
	no	yes	
Have you donated blood at least once?	52.5	**47.5**	0.402
Have you donated blood repeatedly?	74.1	**25.9**	<0.001
Have you donated blood voluntarily?	53.7	**46.3**	0.198
Are you a volunteer with a blood donor card?	73.1	**26.9**	<0.001
Would you donate blood if you were offered a monetary motivation?	**26.6**	73.4	<0.001
Would you donate blood for a relative?	5.3	**94.7**	<0.001
Do you find blood donation unacceptable because of religious beliefs?	**87.5**	12.5	<0.001
Do you agree that donating blood is a good act?	0.6	**99.4**	<0.001
Are you aware of rare blood groups and their importance?	5.6	**94.4**	<0.001
Have you already registered as a bone marrow donor?	67.8	**32.2**	<0.001
Are you aware of the legislative framework of organ, tissue and bone marrow donation?	61.2	**38.8**	<0.001

Note: Binomial test (50.0%)
Bold indicates the positive Scale responses.

The mean score levels of *Attitudes and Knowledge about Blood Donation* were found as moderate (56.4±18.3) in a range 0 to 100 (Table 3).

It was observed that the highest percentage of students (83.7%) belong to the low-middle level on a percentile scale, regarding attitude and knowledge concerning blood donation.

The frequency of students in the 4th-6th year of study with a high score of *Attitudes and Knowledge about Blood Donation* was two-fold greater compared to the frequency of 1st-3rd year students (23.6% vs. 10.6%, p=0.002**)** (results no shown in table/figure).

Table 3. Scores and consistency of responses on the Attitudes and Knowledge Scale for Blood Donation among the 320 participating students.

	mean	stand. dev.	Median	min	max	Consistency of responses KR
Blood Donation Attitudes & Knowledge Scale	56.4	18.3	54.5	18.2	100.0	0.701
low – middle level (<75%)	n=268 or 83.7%					
High level (≥75%)	n=52 or 16.3%					

Note: KR, Kuder-Richardson.
Higher score indicates high score of attitudes & knowledge about blood donation.

Moreover, as shown in Table 4, the higher score on *Attitudes and Knowledge about Donation* was significantly associated with increased age (r=0.195, p<0.001), year of study (r=0.196, p<0.001), and increased body mass index (BMI) (r=0.152, p=0.006).

10.12865/CHSJ.51.01.05

Table 4. Correlation of Attitudes and Knowledge Scale scores about Blood Donation of the 320 medical students, according to their characteristics.

	Attitudes and Knowledge Scale score about Blood Donation (higher values → high level of attitudes & knowledge about blood donation)	
	r-Pearson	p-value
Gender (1: male, 2: female)	0.039	0.482
Age (years)	**0.195**	<0.001
Year of study	**0.196**	<0.001
Body Mass Index (kg/m^2)	**0.152**	0.006
Smoking (1:no, 2:yes)	0.074	0.187
Night time sleep (hours)	0.009	0.874
Structured sport activity (1:no, 2:yes)	-0.064	0.255

According to Figure 1, the mean score of the respondents' *Attitudes and Knowledge about Blood Donation* appeared to increase significantly along the years of study from the 1st to the 5th year (p-trend=0.034).

However, the students of the 6th year achieved a slightly decreased score.

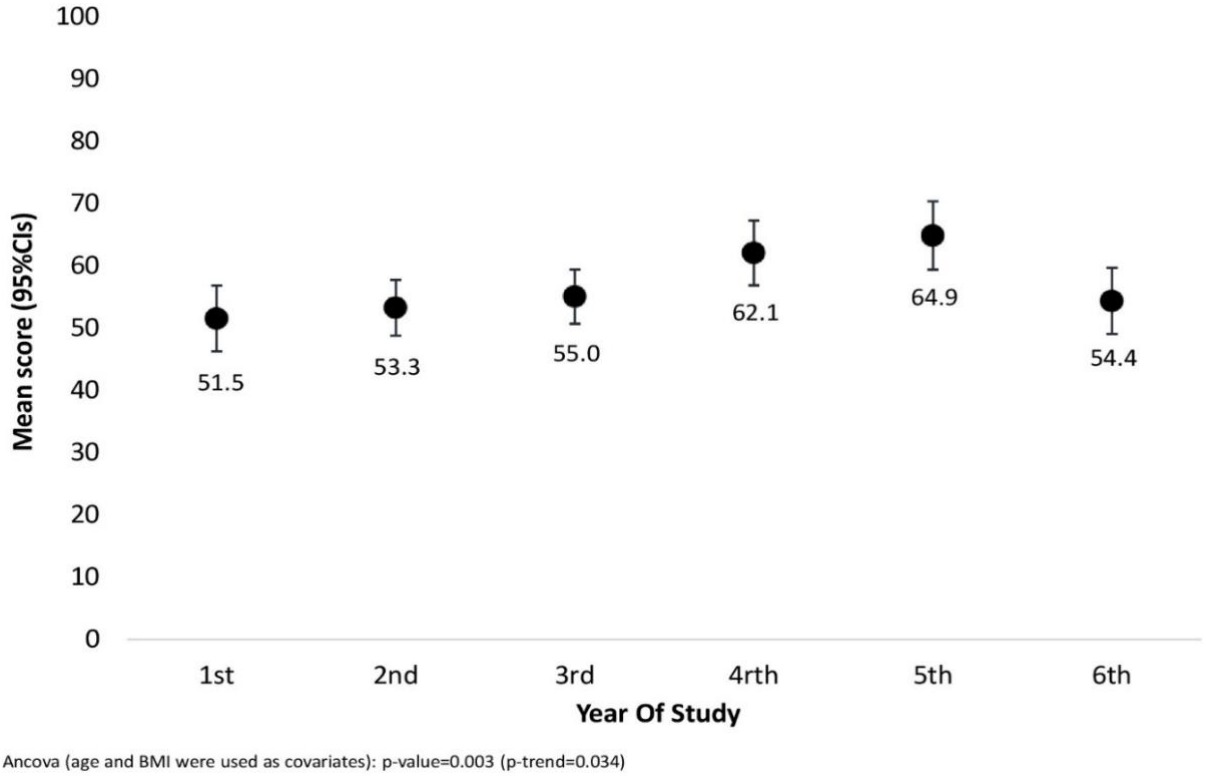

Figure 1. Scoring of the Attitudes and Knowledge Scale about Blood Donation of the 320 medical students according to their year of study.

Discussion

Our study showed moderate average levels of scores in regards to attitudes and knowledge of the undergraduate medical students towards blood donation, with 52/320 students to be stratified as highly scorers.

The frequency of students between the 4th and 6th year who reported high levels of attitudes and knowledge about blood donation was double in comparison to that of students between the 1st and 3rd year.

Moreover, there was a significant association of increased scores on the attitudes and knowledge scale with the socio-demographic features of the participants, such as increased age and year of study.

Several studies, which have been published in the international literature, have reported that both attitude and knowledge, among medical

students, towards blood donation showed aligned trends [15,19,20].

Additionally, significant positive associations between attitudes for blood donation and age or years of study have been described [20], a finding that was also confirmed in the current study.

However, in a study with participants from several academic fields, there is some evidence showing that the level of knowledge although moderate did not influence students' attitudes to be positive [26].

It is worth mentioning, in contrast, that almost one fourth of students in Iran showed a unfavorable point of view regarding blood donation due to a lack of relevant knowledge [27].

The re-emerged finding from our analysis that there is a correlation between attitude and knowledge is very encouraging for re-activating initiatives towards blood donation.

As future doctors will potentially use their knowledge to become regular donors themselves and to motivate people from their social background.

There is some useful information through studies that compared perception variation outcomes before and after an intervention.

The results were very encouraging after the intervention, in regards to students' intention to become future blood donors [15].

Similarly, Chauhan and colleagues, showed that after an intervention, there was a 6.5% increase in the intention of medical students to become blood donors [19].

Therefore, students' attitudes towards blood donation could be positively altered by an intervention targeting to boost regular blood donation concept in the healthcare context.

Consequently, fostering campaign initiatives to inform medical students about blood donation, raising awareness and encouraging them to become regular blood donors is sufficiently plausible [16,21].

Furthermore, it has been reported that blood, organ, and bone marrow donation were negatively associated with emotional discomfort [25], while organ donation was positively associated with general self-efficacy [24], demonstrating that emotional and behavioral features could be used to deal with unfavorable or contradictory attitudes [25].

Given that both organ and blood donation may be considered “altruistic” acts, emotional and behavioral aspects should be taken into account when trying to enhance blood donation rates.

In the present survey, the results showed that 47.5% of students have given blood at least once, with almost 5 out of 10 students declaring that it was a voluntary act (both $p>0.05$).

Most students answered that they would donate blood in case of a relative's care need.

In a community survey in Greece, 53.3% had offered blood because of a family member or friend [14].

In particular, a study with a similar sample design showed that students became blood donors for a familiar person [2].

Local determinants may influence such expressed willingness to donate blood for a familiar person oscillating between 18.6%-in a study carried out in Tanzania- [21] and 94.7% for the present study.

Young adults often behave as having a feeling of “invulnerability”.

The view that younger people often feel that their health is somehow sheltered may be supported by the fact that they are also susceptible to behavioral health risk factors [28].

Literature has shown that only 12.3% of medical students did not reported risk factors including smoking, alcohol binge drinking, lack of physical exercise, and absence of fruit and vegetable consumption [28].

Therefore, action to raise awareness among young adults in order to mediate this feeling of “invulnerability”, by promoting simultaneously blood donation in its human needful aspect with a thoughtful choice of a more healthy living.

Moreover, in our study, it seems that there was a significant variation in scores over the curriculum years, showing an emerging relationship between attitude and knowledge with academic experience gain.

Besides, there was a significant rise in the average Attitude and Knowledge scores of the participating students from the 1st to the 5th year, with the 6th year showing a slight decrease.

A similar study, conducted in the 3rd and 5th year of study, showed significantly higher knowledge and attitude scores for 5th year students compared to 3rd year students [3].

Therefore, both surveys show that over the fellowship years, the relationship between knowledge and attitude among medical students gradually increased, while similar results were reported in health professions students as well [29].

This may be associated with the exposure of students to a clinical environment [16].

10.12865/CHSJ.51.01.05

However, it is noteworthy that, in our study, a score drop was observed among the 6th year students.

Last but not least, participants were asked about organ, tissue, and bone marrow donation legislation, of whom 38.8% were aware and 32.2% had registered as a bone marrow donor.

In a similar related survey among medical students, 32% of the participants were registered as bone marrow donors [30].

This contrasts with a study on nursing student donorship, in which only 15.1% of participants were aware of the legislation, 6.4% had registered as bone marrow donors and 1.4% had donated blood in the past [25].

Therefore, it could be assumed that medical students are likely to be more involved within the mentioned cluster of donation acts.

Strengths

In Greece, several surveys have been conducted on blood donation.

However, limited information is lately available on medical students.

Nevertheless, studies have been conducted in Greece among health professionals and health science students, as well as, among Greek medical laboratory students and nursing students, on their attitude towards blood donation [7,14,25].

In addition, the study sample may reflect the current trend within the Medical School of the University of Crete.

One out of three registered students were involved in the study.

The density sample was considered sufficient, taking into account the seven-day period the survey lasted to collect the necessary data, avoiding phenomena of opinion saturation or domino response content.

Besides the above, another strong point of the survey was the collection process and venue selected, at a moment of rest and relax in their academic environment, students had the necessary time and space, they needed, to eagerly offer their responses.

Finally, the survey was seen as motivational since it was enthusiastically accepted by many of students who wished researchers to expand such initiatives.

Some of them murmured that felt more motivated towards donation after the survey participation.

Current results could be taken into account by curriculum designers for integrating some teaching on issues of blood or tissue donation, with a systematic manner.

Limitations

In this study, the main limitation was due to the design of the study, as it was a cross-sectional survey, and the results were obtained from a specific time period from a single academic setting, do not allow causal conclusions or generalization.

There are not available data, previously collected from the same academic setting, so as longitudinal comparisons are not possible.

We are not able to assess possible local determinants that influence students' views towards blood donation.

However, current information can be used as baseline for future monitoring and worthy reason to design joined research projects with other academic settings of the country.

Conclusions

The need for blood, in Greece and globally, requires the strengthening of attractive programs on literacy and culture towards blood donation.

Young people represent a pool of suitable volunteers who are informed, healthy, and open minded towards life matters.

In particular, medical students, according to the survey, have some knowledge about blood donation which can be further improved with friendly and smart initiatives.

Educational and research purposes may help towards this direction.

By improving the knowledge of current students and future doctors through relevant interventions and motivational meanings, they may assist to raise awareness as ambassadors of a community message.

In addition, it is encouraging that in the present survey, students in the 4th-6th year of study show an overall higher score towards blood donation than the students in the 1st-3rd year.

The above results show that over the years of study, students have the opportunity to deepen their knowledge and improve their attitudes towards blood donation.

The academic exposure, within a Medical School, alone appears to be sufficient to positively affect views towards blood donation, during the last three years of courses.

Perhaps, this interval is crucial to optimize professional culture towards donorship, with structured teaching and motivational courses.

Acknowledgements

We would like to thank all the participants, undergraduate students at the Medicine School of

the University of Crete and the Deanship of the School of Medicine.

We also thank the Dean, Professor G. Kochiadakis, for assisting this research effort.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of interests

None to declare.

References

1. WHO, World Health Organization & International Federation of Red Cross and Red Crescent Societies, 2010, Towards 100% voluntary blood donation: a global framework for action [online]. Available at: https://iris.who.int/handle/10665/44359 [Accessed 27.03.2024].
2. Martínez-Santos AE, Fernández-De-La-Iglesia J del C, Casal-Otero L, Pazos-Couselo M, Rodríguez-González R. Blood donation attitudes and knowledge in Spanish undergraduates with roles in health-education. Transfus Apher Sci, 2022, 61(4):103416.
3. Taș A, Evci Kiraz ED. Are future doctors ready to donate blood and encourage blood donation? Transfus Apher Sci, 2018, 57(4):569-572.
4. Marantidou O, Loukopoulou L, Zervou E, Martinis G, Egglezou A, Fountouli P, Dimoxenous P, Parara M, Gavalaki M, Maniatis A. Factors that motivate and hinder blood donation in Greece. Transfus Med, 2007, 17(6):443-450.
5. Parker CS, Tsai J, Siddiqi AEA, Atrash HK, Richardson LC. Meeting the Emerging Public Health Needs of Persons With Blood Disorders. Am J Prev Med, 2014, 47(5):658-663.
6. Mahfouz MS, Ryani M, Nawar Hamzi AS, Zaeri DA, Dahdoh AA, Almalki AJ, Ali Hakami JA, Aqeeli AAA, Tawashi IH. Blood donation among university students: practices, motivations, and barriers in Saudi Arabia. Avicenna J Med, 2021, 11(2):70–76.
7. Papagiannis D, Rachiotis G, Symvoulakis EK, Anyfantakis D, Douvlataniotis K, Zilidis C, Markaki A, Hadjichristodoulou C. Blood donation knowledge and attitudes among undergraduate health science students: A cross-sectional study. Transfus Apher Sci, 2016, 54(2):303–308.
8. Cable CA, Razavi SA, Roback JD, Murphy DJ. RBC Transfusion Strategies in the ICU: A Concise Review. Crit Care Med, 2019, 47(11):1637–1644.
9. WHO, 2016, Voluntary unpaid blood donations must increase rapidly to meet 2020 goal [online]. Available at: https://www.who.int/news/item/13-06-2016-voluntary-unpaid-blood-donations-must-increase-rapidly-to-meet-2020-goal [Accessed 27.03.2024].
10. Greek Government Gazette, 20025, Law No 3402/2005: Reorganization of the blood donation system and other provisions [online]. Available at: https://www.e-nomothesia.gr/kat-ygeia/n-3402-2005.html [Accessed 27.03.2024].
11. WHO, 2023, Blood safety and availability [online]. Available at: https://www.who.int/news-room/fact-sheets/detail/blood-safety-and-availability [Accessed 27.03.2024].
12. Kalargirou AA, Beloukas AI, Kosma AG, Nanou CI, Saridi MI, Kriebardis AG. Attitudes and behaviours of Greeks concerning blood donation: recruitment and retention campaigns should be focused on need rather than altruism. Blood Transfus, 2014, 12(3):320–329.
13. Symvoulakis EK, Vardavas CI, Fountouli P. Adverse reactions to blood donation among adolescents. JAMA, 2008, 300(15):1759-1760.
14. Apostolidou K, Rekleiti M, Saridi M, Toska A, Souliotis K, Zilidis C. Investigating attitudes and motives of volunteer blood donors. Interscientific Heal Care, 2013, 5(4):176–89.
15. Ugwu N, Uneke C, Ugwu C, Otu Oti W, Agbo U, Akamike I. Effect of Blood Donor Educational intervention on the knowledge and Attitude towards Voluntary Blood Donation among Medical Students at a Nigerian University. Niger Med J, 2020, 61(3):163-168.
16. 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 J Nepal Med Assoc, 2020, 58(232):998-1004.
17. Martínez-Santos AE, Fernández-de-la-Iglesia J del C, Pazos-Couselo M, Marques E, Veríssimo C, Rodríguez-González R. Attitudes and knowledge in blood donation among nursing students: A cross-sectional study in Spain and Portugal. Nurse Educ Today, 2021, 106:105100.
18. Fauzia M, Tabinda A, Kashmira N, Qudsia A, Mohammad L. Knowledge and Attitudes towards Voluntary Blood Donation among Students of a Private Medical College. Clin Infect Dis, 2011, 20(1):74066367.
19. 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 Fam Med Prim care, 2018, 7(4):693-697.
20. Javaeed A, Kousar R, Farooq A, Hina S, Ghauri SK, Tabbasum T. Knowledge, Attitude, and Practice of Blood Donation Among Undergraduate Medical Students in Azad Kashmir. Cureus, 2020, 12(4):e7733.
21. Shaaban MM, Zimbwe KB, Mbwele B. Saving Lives through Voluntary Blood Donation: Learning from Medical Students in Ruvuma, Southern Tanzania. Tanzania Med J, 2020, 31(4):1–20.
22. Alaskar S, Alsadhan J, Alanazi R, Alnashi L, Almutairi R, Chachar Y, Damlaj M. Voluntary blood donation among female health care university students in Saudi Arabia, knowledge and status. J Fam Med Prim care, 2021, 10(6):2353-2357.
23. Padilla-Garrido N, Fernández-Herrera MD, Aguado-Correa F, Rabadán-Martín I. Motivators, barriers and communication channels for blood donation in relation to students at a university in Spain. Transfus Apher Sci, 2021, 60(6):103270.
24. Symvoulakis E, Markaki A, Rachiotis G, Linardakis M, Klinis S, Morgan M. Organ donation attitudes and general self-efficacy: Exploratory views from a rural primary care setting. Rural Remote Health, 2019, 19(4):5241.

25. Symvoulakis EK, Papagiannis D, Volkos P, Mantadaki AE, Linardakis M, Rachiotis G. Blood, organ and bone marrow donation: Reporting on the attitudes, related to socio-emotional determinants, among nursing students in Greece. Transfus Apher Sci, 2022, 61(6):103471.
26. Obregón-Jiménez K, Velástegui-Muñoz G, Melo-López M, Iñiguez-Macas P, Calero-Tipantuña A, Betancourt-Fonseca L, Avilés-Erazo E, Loachamin-Andrango A, Alvarez-Sánchez N, Torres P. Knowledge, attitudes and predisposition towards blood donation in medical students at the Central University of Ecuador. Cienc e Investig Med Estud Latinoam, 2020, 27(2):16–23.
27. Askari Majdabadi H, Kahouei M, Taslimi S, Langari M. Awareness of and attitude towards blood donation in students at the Semnan University of Medical Sciences. Electron physician, 2018, 10(5):6821–6828.
28. Linardakis M, Papadaki A, Smpokos E, Kafatos A, Lionis C. Prevalence of multiple behavioral risk factors for chronic diseases in medical students and associations with their academic performance. J Public Heal, 2020, 28(4):383–392.
29. Alsalmi M, Almalki H, Alghamdi A, Aljasir B. Knowledge, attitude and practice of blood donation among health professions students in Saudi Arabia; A cross-sectional study. J Fam Med Prim care, 2019, 8(7):2322-2327.
30. Khatun R, Otaibi BW, Ssentongo A, Hazelton JP, Cooper AB. Medical Student Attitudes Toward Blood Donation in Times of Increased Need. Am Surg, 2022, 88(9):2338–2344.

Corresponding Author: Panagiotis Volkos, Clinic of Social and Family Medicine, School of Medicine, University of Crete, Voutes 71003 Heraklion, Greece, e-mail: volkospan@hotmail.com