Knowledge and predisposition to donate blood: a study of brazilian postgraduate health science students

Conhecimento e predisposição para doar sangue: um estudo com estudantes brasileiros de pós-graduação em ciências da saúde

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ABSTRACT

Objective: to assess the knowledge and willingness to donate blood among postgraduate students in health sciences in Brazil. **Methods:** An online self-administered questionnaire was conducted to collect sociodemographic data, knowledge about blood donation (stages and requirements), and students' predisposition to donate. **Results:** out of 110 participating students, 56% had donated blood previously and 90% expressed willingness to donate. Professional experience in hemotherapy and self-perceived adequate knowledge were independent factors associated with satisfactory knowledge. **Conclusion:** most postgraduate students in health sciences in Brazil demonstrated predisposition to donate blood, with 56% having donated previously and 90% expressing interest. Professional experience in hemotherapy and perceived knowledge of donation requirements were associated with better understanding. These findings underscore the importance of hemotherapy education in encouraging blood donation among students, contributing to strategies aimed at increasing the number of donors and ensuring a safe blood supply.

Keywords: Blood Donation; Students, Health Occupations; Blood Bank.

RESUMO

Objetivo: avaliar o conhecimento e a disposição para doar sangue entre estudantes de pós-graduação em ciências da saúde no Brasil. **Métodos:** foi conduzido um questionário online para coletar dados sociodemográficos, conhecimento sobre doação de sangue (etapas e requisitos) e disposição dos estudantes em realizar a doação. **Resultados:** dos 110 estudantes participantes, 56% já haviam doado sangue e 90% manifestaram disposição para doar. A experiência em hemoterapia e a autopercepção de conhecimento adequado foram fatores independentes associados ao conhecimento satisfatório. **Conclusão:** a maioria dos estudantes de pós-graduação demonstrou disposição para doar sangue, com 56% tendo doado anteriormente e 90% expressando interesse. A experiência em hemoterapia e o conhecimento percebido dos requisitos de doação foram associados a uma melhor compreensão. Esses resultados ressaltam a importância da educação em hemoterapia para incentivar a doação de sangue entre os estudantes, contribuindo para estratégias que visam aumentar o número de doadores e garantir um suprimento seguro de sangue.

Palavras-chave: Doação de Sangue; Estudantes de Ciências da Saúde; Banco de Sangue.

INTRODUCTION

Currently, no substance is capable of replacing the blood[1]. Access to safe blood is essential in healthcare, facilitating medical interventions and significantly enhancing the quality of life and life expectancy for patients with various acute and chronic conditions. This is crucial in both scheduled treatments and emergency situations[2].

In Brazil, blood donation is a voluntary practice. It can be categorized into three types, the first being autologous donation, where patients donated blood for their own future potential use, replacement donation, in which donors give blood to replenish supplies used by a specific recipient, often a relative or friend, and voluntary or spontaneous donation, aimed at maintaining blood bank stocks, primarily motivated by altruism[1-3]. The latter type is associated with higher blood safety standards, as donors are motivated solely or primarily by the well-being of recipients. However, recruitment of donors remains a global challenge[3]. To ensure a safe, high-quality, and readily available blood supply that meet healthcare needs, the World Health Organization (WHO) recommends that all blood donations be voluntary and unpaid[2]. In Brazil, there are legally established incentives to encourage blood donation. These include the right to a day off work every twelve months, without penalty to employment, and half-price tickets to cultural and sporting events[4-5].

According to the Pan American Health Organization (PAHO), until 2017 only 46.5% of blood transfusions in Latin America and the Caribbean were sourced from voluntary donations. The majority of donations consisted of replacement donations, followed by autologous and remunerated donations[2]. In contrast, in 2019, 60.6% of potential donors in Brazil were motivated by voluntary donation, while 39.0% were motivated by the replacement donation[6].

Despite reaching the minimum suggested level of 1% blood donor participation in 2019, with an estimated 1.7% of the population donating, Brazil still falls short of the World Health Organization's ideal target of 3% donor prevalence. This higher percentage is necessary to ensure the country's blood supply adequately meets healthcare demands[6-7]. These data reinforce the necessity of developing strategies to promote and raise awareness among the population about blood donation, ensuring the voluntary, responsible, and regular practice of this action[1,3,6,8].

Several factors influence adherence to blood donation, including altruism, social pressure, incentives, ~~and~~ social responsibility, the presence of myths and prejudices, and access to accurate information about donation. Understanding the blood donation

process is crucial for individuals considering donation, particularly when it is voluntary[9,11]. Enhanced knowledge plays a significant role in dispelling myths and uncertainties, thereby promoting greater adherence, safety, and service quality. This fosters motivation among new donors and increases the return rates of those already recruited[3,9,11].

By understanding specific contexts, such as knowledge levels regarding hemotherapy services, and individual characteristics, such as beliefs and values, new and focused strategies and recruitment campaigns to attract and retain regular volunteer blood donors can be developed. In this context, students and healthcare professionals play crucial roles as disseminators of knowledge about blood donation and as influential agents encouraging potential donors[12-14].

This study aimed to assess the knowledge profile and predisposition to donate blood among health sciences postgraduate students at a Brazilian university.

METHODS

A prospective cross-sectional study was conducted between April and June 2021. The study involved postgraduate students, aged 18 years and over, who were regularly enrolled at the Federal University of Health Sciences of Porto Alegre (UFCSPA), and volunteered to participate. Free and Informed Consent was obtained electronically from all participants. The study excluded students who were underage, had difficulty understanding the questions, or were enrolled in postgraduate programs but not actively registered at UFCSPA. The study was conducted in accordance with national and international ethical guidelines and received approval from the Research Ethics Committee of the Federal University of Health Sciences of Porto Alegre (approval number 4.777.003).

A self-administered online questionnaire was created using Google Forms® to gather sociodemographic data, assess knowledge regarding blood donation including its stages and requirements, and evaluate students' predisposition towards blood donation (tendency to, willingness to donate). The questionnaire was distributed via social networks (Instagram® and Facebook®), sent by e-mail to postgraduate programs, and disseminated among peers. Due to the lack of a validated instrument to assess knowledge in the area, the authors developed a questionnaire based on scientific literature, focused on important issues to encourage blood donation among students[11,15-16]. The final questionnaire consisted of twenty questions about blood donation. Nine of

these questions addressed knowledge about the steps and requirements for blood donation, as well as aspects related to blood supply. Two questions focused on the academics' self-assessment of their knowledge on the subject. The remaining eleven questions aimed to identify the demographic characteristics of the sample. The academics' self-assessment level of knowledge was categorized as "satisfactory" (>70%), "fair" (50% to 70%), and "unsatisfactory" (<50%). The answers were evaluated based on the information and eligibility criteria for blood donors, mandatory testing, and quality control as outlined by the Technical Regulation of Hemotherapy Procedures[17].

The education level was categorized as "master degree", "doctoral degree" and "other", which included postdoctoral students, medical or multiprofessional residency participants, and specialization program students. Professional training respondents were classified in two groups: Group 1 consisted of professions closely related to work in blood banks (biomedical sciences, biology, nursing, pharmacy and medicine); Group 2 included other professions such as healthcare management, biotechnology, nutrition, speech-language pathology, physiotherapy, psychology, mathematics, analytical toxicology, physical education, gastronomy, biomedical informatics, bioprocess engineering and biotechnology, and systems analysis and development.

Statistical analysis: Data were presented as frequency and percentage, using the Chi-Square or Fisher Exact Test when appropriate, while age as mean and standard deviation. For the association with intention to donate it was used Student's t-test and the Analysis of Variance (ANOVA) for the level of knowledge. For variables associated with the level of knowledge, a *p* value <0.20 was used as a filter to select the most relevant variables for the multivariate analysis. Relative risk (RR) was calculated with a 95% confidence interval for the outcome of satisfactory knowledge (compared to fair/unsatisfactory) in univariate and multivariate analysis, using Poisson regression analysis with robust variance. Data analysis was performed using SPSS software (IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.), considering the results with p-value <0.05 statistically significant.

RESULTS

The study included 110 health sciences postgraduate students, whose sociodemographic characteristics are detailed in Table 1. The majority of the participants were female (84.5%), and there was a diverse representation of religious beliefs and economic statuses. Participants' ages ranged from 19 to 58 years, with a mean age of 30.9 years.

Table 1 - Demographic characteristics of the participants. Porto Alegre-RS, 2021.

Variable	Category	Frequency - n (%)
Gender	Female	93 (84.5)
	Male	17 (15.5)
Religion	Agnostic and Atheist	31 (28.2)
	Catholic	42 (38.2)
	Buddhist, Evangelic, Spiritist, Jewish, Muslim and Umbanda	34 (30.9)
	Others ("none defined", "non-practitioner", "Seventh-day Adventist")	3 (2.7)
Family income (minimum wages) *	Until < 3	26 (23.6)
	3-5	31 (28.2)
	Over >5	53 (48.2)
Educational level	Master degree	69 (62.7)
	PhD degree	24 (21.8)
	Other	17 (15.5)
Profession	Group 1	72 (65.5)
	Group 2	38 (34.5)

Group 1: biomedical sciences, biology, nursing, pharmacy, and medicine; Group 2: other professions. * The minimum wage in Brazil stood at 1,212 Brazilian reais per month in 2021 (213,17 dollars).

When evaluating the practice of blood donation, most postgraduate students (56.4%) reported that they had donated blood at least once, and were aware of their blood group (93.6%). The intention to donate was observed in 90% of the participants, while 8.2% did not express this intention, and 1.8% indicated they had never thought about it (Table 2). If a family member or friend needed blood, 99.1% of the participants stated they would donate. Among those who had no intention of donating blood or had never thought about it, 88.9% and 100%, respectively, said they would donate if it was for an acquaintance. The intention to donate did not show a statistically significant association with the level of education or professional training of the participants.

Table 2 - Age, education level and profession according to the level of knowledge and intention to donate blood. Porto Alegre-RS, 2021.

		Intention to donate (%)			Level of knowledge (%)		
		Yes	**No**	**Never thought about it**	**Satisfactory**	**Fair**	**Unsatisfactory**
Frequency n (%)		99 (90.0)	9 (8.2)	2 (1.8)	47 (42.7)	42 (38.2)	21 (19.1)
Age (years)	**Mean ±SD**	30.5±7.2	34.0±11.2	41.0±5.7	29.4±7.0	31.8±7.4	32.6±9.2
Educational level	**Master´s program**	62.6	66.7	50.0	72.3	57.1	52.4
	PhD program	21.2	33.3	0.0	19.1	23.8	23.8
	Other	16.2	0.0	50.0	8.5	19.0	23.8
Profession	**Group 1**	65.7	66.7	50.0	78.7*	66.7	33.3
	Group 2	34.3	33.3	50.0	21.3	33.3	66.7*

SD, standard deviation; Group 1: biomedical sciences, biology, nursing, pharmacy, and medicine; Group 2: other professions. *p-value <0.05.

The satisfactory level of knowledge prevailed over the others, corresponding to 42.7% of the participants. Among people who had fair and insufficient knowledge, 90.5% and 100.0%, respectively, never had professional experience in blood banks.

Among individuals with experience in blood donation, 78.9% had satisfactory knowledge, while 21.1% had fair knowledge. Furthermore, of those with satisfactory knowledge, 72.3% had taken classes or attended sessions on blood donation, while most individuals with knowledge classified as "unsatisfactory" never had this content in any curricular component (71.4%). Professional training (bachelor's degree), when linked to professions with greater practice in blood banks (Group 1), showed a positive association (p-value <0.001) with the level of knowledge, while the level of education was not statistically associated (Table 2).

Most respondents with satisfactory knowledge (70.2%) had previously donated blood, while most individuals with unsatisfactory knowledge (90.5%) had never donated blood (Figure 1). Indeed, a higher proportion of students who intended to donate blood (46.5%) had satisfactory knowledge and most students without the intention to donate (88.9%) demonstrated a fair level of knowledge (Figure 2). Two participants responded that they had never thought about blood donation, and they exhibited fair and unsatisfactory levels of knowledge.

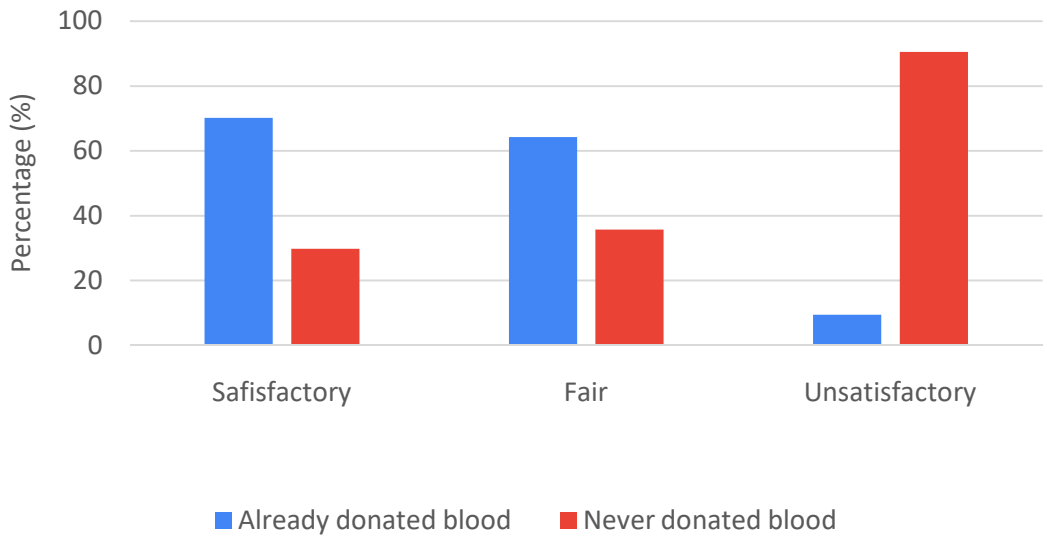

Figure 1. Association between blood donation and level of knowledge among graduate students in the health area.

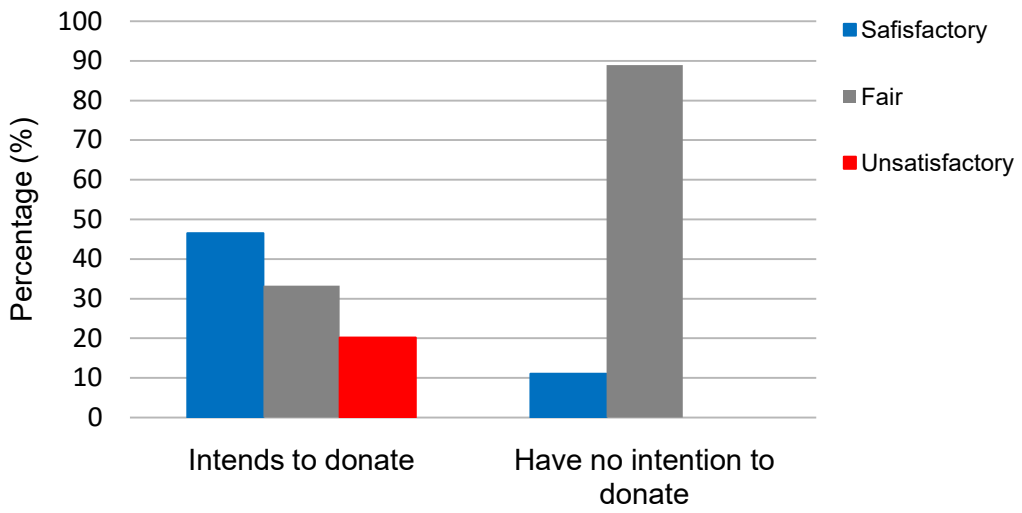

Figure 2. Intention to blood donation blood in health graduate students according to the level of blood donation knowledge.

Regarding the participants' self-assessment of their knowledge about blood donation, 56.4% stated that they knew most of the blood donation requirements and 50.9% reported having a superficial understanding of the donation steps. Among students with a satisfactory level of knowledge, 80.9% indicated that they knew most requirements and 55.3% reported being well-versed in the stages of donation. Conversely, among students with an unsatisfactory level of knowledge, 61.9% responded that they knew some requirements and 47.6% admitted not knowing the steps of blood donation.

Univariate analysis revealed that factors associated with a satisfactory level of knowledge included profession Group 1, having previously donated blood, having professional experience in a blood bank, participating in a class or course on blood donation, and being well-versed in the stages of donation (Table 3).

Furthermore, multivariate analysis indicated that professional experience in a blood bank and self-assessment of adequate knowledge about requirements are independent factors, with individuals with these characteristics being 1.47 times and 2.1 times more likely to have satisfactory knowledge, respectively. In univariate analysis, these values increase to 2.25 and 3.27, respectively.

Table 3 - Univariate and multivariate analysis for the level of knowledge among graduate health students. Porto Alegre-RS, 2021.

Variable	Category	Univariate			Multivariate		
		p-value	RR	CI95%	p-value	RR	CI95%
Age		0.093	0.97	0.94-1.01	0.629	0.99	0.95-1.03
Profession	Group 1 x Group 2	0.023*	1.95	1.10-3.48	0.746	1.11	0.59-2.11
Blood type	Know x Don't know	0.221	3.13	0.50-19.44	0.391	2.17	0.37-12.69
Already blood donation	Yes x No	0.018*	1.82	1.11-3.01	0.232	1.29	0.85-1.96
Professional experience in blood bank	Yes x No	0.000*	2.25	1.56-3.23	0.038*	1.47	1.02-2.10
Discipline/class about blood donation	Yes x No	0.011*	1.95	1.17-3.27	0.931	0.98	0.56-1.69
Self-assessment of knowledge about requirements	Know most x Know some	0.000*	3.27	1.76-6.08	0.026*	2.10	1.09-4.01
Self-assessment of knowledge about donation stages	Know well x Don't know	0.006*	4.33	1.51-12.42	0.285	1.91	0.59-6.20
	Know superficially x Don't know	0.242	1.93	0.64-5.80	0.566	1.39	0.45-4.26
Intention to blood donation	Yes x No	0.132	4.18	0.65-26.86	0.090	4.22	0.80-22.39

RR: relative risk; CI95%: confidence interval of 95%; Group 1: biomedical sciences, biology, nursing, pharmacy, and medicine; Group 2: other professions. *p-value <0.05.

DISCUSSION

The assessment of intention and knowledge about blood donation regarding the Brazilians remains insufficient. In the health field, there are few studies conducted with undergraduates and even fewer with postgraduate students. These individuals represent a group of young people, which is the target audience recommended for attracting donors[14]. Students in this area, who are or will become health professionals, must understand the aspects of blood donation to serve as motivators and advocates of this practice[12,14]. Moreover, there are few studies linking knowledge about blood donation

with influencing factors. This study found no significant association between age and other sociodemographic characteristics (gender, religion, family income and level of education) with the level of knowledge and intention to donate blood. These findings are consistent with those of similar studies[18-21].

Unlike prior surveys with undergraduates and health students, this study showed a higher proportion of participants who had previously donated blood (56.4%). A study among nursing students in Ceará (northeast of Brazil) reported a donation rate of only 17.2%[22], whereas another study among undergraduate students in health sciences of the University of São Paulo/Brazil showed a higher rate of 49.6% who had donated blood[23].

Despite most of participants having donated blood, the frequency of blood donation among postgraduate students remains low and requires encouragement to retain these donors. This is crucial for ensuring the quality and safety of donated blood[8]. Indeed, know the blood type makes donating blood easier. Compatible donors are essential to maintain blood bank stocks. If everyone knew their blood types, it would be easier to ensure a constant supply and meet the growing demands for blood in hospitals and clinics. In this study the most of participants reported awareness of their blood type (93.6%). Similar findings were observed in health students in India (95.9%)[24] as well as medical students in Santa Catarina (94.6%)[25] and Minas Gerais, both in Brazil (83.8%)[26].

This study shows that 90% of participants expressed an intention to donate blood, and this percentage increases to 99.1% when considering donation for a relative or friend in need. These findings demonstrate individuals' motivation towards blood donation and corroborate the significant prevalence of replacement donors both in Brazil and globally[2,6]. A survey among medical students in Kerala (India) showed that 98% would donate to their relatives, whereas 90% would donate to a stranger[18]. Similarly, a study involving undergraduate health students in Nigeria, found that 80.7% would donate to a relative, while only 67.7% would consider donating to a stranger[3].

In previous studies with students of the health area, the level of knowledge about blood donation showed discrepancies, which may be due to the lack of a standardized and validated assessment instrument on the topic, which did not allow for a comparison between them**.** Low or medium level of knowledge about blood donation, corresponding to the insufficient and fair levels, respectively, were observed in undergraduate level[18,21,24,27]. However, other studies with Brazilian and Nigerian medical students

showed the prevalence of a satisfactory level of knowledge[26,28]. It is noteworthy that medical students represent a small portion of health science students, evidencing a weakness in their academic training considering the hemotherapy content. This finding points to the need to develop strategies addressed to health students about blood donation and its importance, aiming to make them donors and knowing that, as health professionals, they have the responsibility to disseminate knowledge and encourage practices of blood donation that guarantee the well-being of the population[21,24].

An association was observed between the level of knowledge and blood donation, with satisfactory knowledge being positively correlated with the likelihood of donating blood. In contrast, individuals with unsatisfactory knowledge exhibited a significantly lower frequency of blood donation. In the same way, Casal-Otero et al. showed that Portuguese nursing students demonstrated that most people with a satisfactory level of knowledge intend to donate[21]. Thus, information and elucidation about blood donation and its processes are linked to higher adherence to this practice, emphasizing the need of developing and disseminating knowledge about it[11].

The association between knowledge and type of professional training was also significant. The majority of those who achieved a satisfactory level (78.7%) belonged to Group 1, which includes professions that are most typically associated with working in blood banks. On the other hand, the unsatisfactory level consists mostly of individuals from Group 2 (66.7%). These associations may reflect the greater approach to blood donation and the factors that go into it during the training of professionals in Group 1 or the relationship of this group with professional experience in a blood bank, a variable that proved to be an independent factor related to the level of satisfactory knowledge. Interestingly, Tadesse et al. in their work with health professionals from northern Ethiopia showed that having degree in their education level were 69% less likely to participate on blood donation compared to the specialist (Adjusted Odd Ratio - AOR = 0.315 95% CI 0.104–0.950). Participants having adequate knowledge on blood donation were 3.4 times more likely donate blood as compared to inadequate knowledge (AOR = 3.403 95% CI 2.296–5.044)[29].

Many observations indicate that there is an inconsistent knowledge of Transfusion Medicine (TM) among health care professionals as well as inconsistent knowledge in all aspects of the transfusion process, from blood donation to transfusion on the ward. The variability in education of undergraduates in medical schools is universal most likely due to an absence of a predefined common platform. Furthermore,

attending a class that approaches the topic of blood donation was associated with participants' understanding, demonstrating the value of educational techniques for the dissemination and consolidation of knowledge regarding blood donation[8]. Non-European Mediterranean countries that usually follow Council of Europe recommendations, as well as many other middle- income countries, face the lack of consistency both in training in Blood Banking and in the practice of TM[30].

In a recent study conducted with 12,606 university students (7,966 females and 4,640 males) from 16 countries, self-administered questionnaires that were available both online (Google Forms®) and paper surveys, evaluating knowledge, attitude, and practices in blood donation. Of them, 28.5% had a good knowledge level regarding blood donation, and 22.7% had donated blood at least once. Students in health science colleges had significantly more awareness of blood donation. University students showed insufficient knowledge about blood donation, with health science students displaying higher awareness levels. Despite their positive attitudes, blood donation rates remain low across all disciplines and Eltewacy et al.[31] concluded that is imperative to enhance education and accessibility to foster a culture of blood donation among students. A last aspect investigated was the self-assessment of respondents regarding their knowledge about the phases and requirements of blood donation, where the results revealed that respondents have a correct perception regarding their own knowledge. Indeed, the self-assessment of adequate knowledge about blood donation requirements also showed as an independent factor to satisfactory knowledge by the multivariate analysis[31].

Although there was a significant predominance of female participants (84.5%) in this study, due to the female professionals are the majority in the health area, it cannot be estimated whether the conclusions of this study can be impacted by this profile of participants. Recently, Halawani showed that female students had a higher rate of accurate responses toward the knowledge and attitude questions than male students ($p<0.01$)[32].

The present study has some limitations: the absence of inquiry about the causes influencing the decision to donate or not, as well as the assessment of the blood donation frequency by individuals who responded that they have already donated at some point, and the nature of this donation (voluntary or replacement), besides the lack of an appropriated and validated research instrument to measure knowledge on the topic. Indeed, the results only disclose the characteristics of a limited fraction of the

population because it was conducted in a single educational institution, making it impossible to investigate variables connected with other contexts, such as components provided by regional knowledge.

CONCLUSION

The analysis of these data provides for a better understanding of the motivations that determine the behavior patterns related to blood donation, and allows the creation of strategies to recruit and retain blood donors that target the identified gaps.

Most postgraduate students in health sciences demonstrated predisposition to blood donation, with 56% having donated previously, and 90% expressing interest. Professional experience in hemotherapy and perceived knowledge of donation requirements were associated with better knowledge about blood donation. Despite this, a low percentage of students obtained satisfactory knowledge about blood donation. Thus, plan actions focused on education about blood donation is necessary to retain them as donors and enable them to act as disseminators of correct information about blood donation, then increasing the number of donors and ensuring a safe blood supply.

This study may contribute to the creation of strategies aimed at public research, allowing for the planning of changes in the academic environment, as well as the implementation of actions to raise awareness about the importance of blood donation, clarify its processes, and encourage adherence to this practice.

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