

PROFESSIONAL ARTICLES

STRUČNI ČLANCI

Blood Transfusion Institute of Vojvodina, Novi Sad¹
University of Novi Sad, Faculty of Medicine Novi Sad²

Professional article
Stručni članak
UDK 615.38:316.628-057.875(497.113)
<https://doi.org/10.2298/MPNS2306141K>

ANALYSIS OF REASONS FOR BLOOD DONOR DEFERRAL IN STUDENT POPULATION OF VOJVODINA

ANALIZA RAZLOGA ZA ODBIJANJE DOBROVOLJNIH DAVALACA KRVU U STUDENTSKOJ POPULACIJI U VOJVODINI

Neda KOCIĆ¹, Nevenka BUJANDRIĆ^{1,2}, Milomir BEŽANOVIĆ¹ and Milana BERONJA¹

Summary

Introduction. The supply of blood from healthy blood donors (BD) is essential for safe blood transfusions. As students play an important role in providing adequate blood supplies, this study analyzes the frequency and reasons for blood donor deferral among the student population of Vojvodina, with the intention of reducing the rate of deferral and improving re-entry. **Material and Methods.** A retrospective study examined blood donor deferral records of the University of Novi Sad students who donated blood at the Blood Transfusion Institute of Vojvodina, from January 1 to December 31, 2022. The deferrals have been categorized based on pre-donation deferral causes, the blood donor deferral period, in relevance to the safety of both the blood donor and the recipient. **Results.** Of 867 students in total, 121 (13.9%) were deferred from donating blood. 72/121 (59.5%) of them were female, 49/121 (11.3%) were male, and 99/121 (81.8%) were regular blood donors. Temporary deferrals of less than 3 months were recorded for 98/121 (80.99%) students, while deferrals for 6 months were applicable to 19/121 (15.7%), with 4/121 (3.3%) experiencing permanent deferrals. The number of blood donors deferred due to safety reasons of the very donors was 85/121 (70.2%). The most common reasons were low hemoglobin level 17/121 (14.1%), medication deferral (pain-killers, antihistamines, antibiotics) 17/121 (14.1%) and adverse reactions prior to blood donation 15/121 (12.3%). **Conclusion.** Educating blood donors about high-risk behaviors, medication usage, screening for iron deficiency and hypertension could be the most important tool to reduce the rate of deferral and improve blood donor re-entry.

Key words: Blood Donors; Donor Selection; Dangerous Behavior; Blood Safety; Risk Assessment; Surveys and Questionnaires; Iron Deficiencies; Hypertension; Drug Therapy

Introduction

The supply of blood from healthy donors is essential for safe blood transfusions. Blood donors

Sažetak

Uvod. Snabdevanje krvlju od zdravih davalaca krvi je od suštinskog značaja za bezbednu transfuziju krvi. Kao značajan deo populacije davalaca krvi, studenti imaju važnu ulogu u obezbeđivanju adekvatnih zaliha krvi. Studija ima za cilj da analizira učestalost i razloge odlaganja davanja krvi u studentskoj populaciji Vojvodine, sa namerom da se smanji stopa odlaganja doniranja krvi i poboljša njihov ponovni dolazak. **Materijal i metode.** Retrospektivnom studijom analizirana je evidencija o odlaganju davanja krvi u studentskoj populaciji Univerziteta u Novom Sadu od 1. januara do 31. decembra 2022. godine. Studenti su davali krv u Zavodu za transfuziju krvi Vojvodine. Odlaganja se kategorišu prema: razlozima za odbijanje davalaca na prijemu, vremenskom periodu na koji se davalacstvo odlaže od davanja krvi, u odnosu na bezbednost davaoca ili primaoca krvi. **Rezultati.** Od 867 studenata, kod 121 (13,9%) je odloženo davanje krvi: 72/121 (59,5%) bile su žene, 49/121 (11,3%) muškarci, dok je redovnih davalaca bilo 99/121 (81,8%). Privremeno odlaganje davanja krvi na manje od tri meseca zabeleženo je kod 98/121 (80,99%) studenata, na šest meseci kod 19/121 (15,7%), dok je 4/121 (3,3%) bilo trajno odbijeno. Broj odbijenih davalaca iz razloga bezbednosti donora krvi bio je 85/121 (70,2%). Najčešći razlozi za odlaganje bili su nizak nivo hemoglobina 17/121 (14,1%), terapija (analgetici, antihistaminici, antibiotici) 17/121 (14,1%) i neželjene reakcije pre davanja krvi 15/121 (12,3%). **Zaključak.** Edukacija dobrovoljnih davalaca krvi o oblicima rizičnog ponašanja, upotrebi lekova, utvrđivanju nivoa gvožđa i hipertenziji, moglo bi biti najvažnije sredstvo za smanjenje stope odlaganja davanja krvi i poboljšanje ponovnog doniranja krvi.

Glavne reči: donori krvi; izbor donora; rizično ponašanje; bezbednost krvi; procena rizika; ankete i upitnici; deficit gvožđa; hipertenzija; medikacija

(BD) should be in good health at the time of donation and be in low risk of transfusion-transmitted infections [1]. Continuous promotion of healthy lifestyle, particularly among young people interested

Abbreviations

BTIV	– Blood Transfusion Institute of Vojvodina
BD	– blood donor
RBD	– regular blood donor
FTBD	– first time blood donor
WHO	– World Health Organization
Hb	– hemoglobin
UAE	– United Arab Emirates

in becoming volunteer blood donors, is also crucial [2]. Guidance for staff involved in donor selection should be clear and unambiguous [1].

Strict donor selection criteria should be consistently applied to all blood donors, whether they are first-time or regular donors. Health status and medical history of a prospective donor should be assessed for each donation on the day of collection. To evaluate the health and assess the risk of blood donors, a simple donor questionnaire should be employed [3]. Transfusion protocols should not jeopardize the safety of either the recipient or the donor. Blood donors may be disqualified from donating blood due to reasons pertaining to the donor and/or recipient safety and can be deferred temporarily or permanently [4].

Understanding the most common BD deferral reasons enables the prevention of the loss of potential and motivated blood donors. Conversely, it facilitates blood donor retention, ultimately leading to an increase in the number of collected blood units [4]. Young donors, such as students, play a crucial role in ensuring an adequate blood supply [5]. Understanding and being aware of the reasons behind BD deferrals within this specific demographic group can have significant implications for ensuring the long-term sustainability and safety of the blood supply in countries undergoing significant demographic shifts [4]. For blood transfusion services, it is vital to strike a balance between managing BD and maintaining an adequate blood inventory in accordance with regulatory guidelines and rules [6].

The World Health Organization (WHO) and the Council of Europe recommend that blood and blood components should be collected only from voluntary donors in order to ensure the safety of blood products. In Serbia, there are only voluntary (non-remunerated) types of donors. Voluntary blood donors are selfless people who donate blood for the sole purpose of saving lives without expecting anything in return [1]. All deferred donors expect to be treated with respect and care in a confidential manner, and staff should provide a clear explanation of the deferral reason followed by an opportunity to ask questions [4].

The aim of the study was to analyze the frequency and reasons for BD deferral among the student population of Vojvodina (the northern province of Serbia), which is underreported in Serbia. Our further intention was to develop strategies based on the study results to reduce the BD deferral rate and improve donor re-entry.

Material and Methods

The retrospective study was conducted at the Blood Transfusion Institute of Vojvodina (BTIV) to

analyze the deferral records of all blood donors among the student population of the University Novi Sad, from January 1 to December 31, 2022. The total of 867 students was divided in two groups according to their donor status: regular blood donors (RBD) – who have donated blood ones or more times in the past, and first-time blood donors (FTBD). Sociodemographic characteristics such as gender, age, deferral reason, study year, type and study group were obtained from the BTIV information system.

Procedures based on national guidelines were used for donor selection and deferral. The deferrals are categorized according to:

- the pre-donation selection process: 1) hemoglobin (Hb) level check using quantitative Hb analyzer; 2) Donor Questionnaire evaluation (Questionnaire contains questions about students' health and lifestyle, disease risk factors, and other factors that potentially affect the safety of both the donor and the recipient); 3) health examination by a physician. Non-donation was not analyzed because of the inability to obtain venous access since these donors were otherwise eligible.

- the reasons for deferral in regard to the safety of: 1) the blood donor (low Hb level, hypertension and tachycardia, hypotension, lack of sleep, adverse reactions, acute/chronic disease, insufficient body weight, menstrual cycle etc.); 2) the blood recipient (medication, risk behavior, tattoo/piercing/acupuncture and other reasons).

- blood donor deferral period: 1) temporary deferrals of less than 3 months (including reasons such as low hemoglobin level, medication, hypertension, tachycardia, hypotension, lack of sleep, adverse reactions, acute infection, insufficient body weight, and the menstrual cycle); 2) temporary deferrals for 6 months (risk behavior, tattoo/piercing/acupuncture); 3) permanent deferrals (encompassing certain chronic conditions, infectious diseases, autoimmune disorders, risky sexual behavior, risky habits, and other reasons).

The Social Sciences Statistical Package (SSSP) was used to create the database and process the statistical data. The Fisher's exact test and Chi-square (χ^2) test were used to determine the difference in variable distribution. A p-value of 0.05 and less was considered statistically significant.

The research was approved by the Ethics Committee of the Blood Transfusion Institute of Vojvodina, which adhered to medical ethics, donor anonymity, and professional secrecy.

Results

Out of a total of 867 students who voluntarily came to donate blood during the study period, 746 (86.1%) were found eligible to donate, while 121 (13.9%) were deferred. Among the donors, 549 (63.3%) were RBD, and 318 (36.7%) were FTBD. Overall, male donors accounted for 50.1% (435), and females made up 49.9% (432) of the participants. The youngest BD was 19 years old, while the oldest was 30 years old, with a mean age of 22.37 among all donors. In terms of academic levels, 752 (86.8%) were undergraduate students, and 115

Table 1. Blood donors deferrals in the pre-donation selection process.**Tabela 1.** Odlaganje davalaca krvi u procesu selekcije

Blood donors deferrals in the pre-donation selection process/Odlaganje davalaca krvi u procesu selekcije	RBD n (%)	FTBD n (%)	p level p nivo	Male Muškarci n (%)	Female Žene n (%)	p level p nivo
Low Hb level/Nizak nivo Hgb	11 (9.1)	6 (4.9)		7 (5.7)	10 (8.3)	
Donors Questionnaire Upitnik za davaoce	62 (51.2)	7 (5.7)	0.021523*	30 (24.7)	39 (32.2)	0.664272
Medical examination Medicinski pregled	26 (21.4)	9 (7.4)		12 (9.9)	23 (19.1)	

Legend: RBD – regular blood donor; FTBD – first time blood donor

Legenda: RBD – redovni dobrovoljni davaoci krvi; FTBD – davaoci koji prvi put doniraju krv; * $p < 0.05$ **Table 2.** Blood donor deferrals due to donor and patient safety.**Tabela 2.** Odlaganje davanja krvi zbog bezbednosti davaoca i primaoca krvi

Deferral due to donor and patient safety Odlaganje zbog bezbednosti davaoca i primaoca krvi	RBD n (%)	FTBD n (%)	p level p nivo	Male Muškarci n (%)	Female Žene n (%)	p level p nivo
Donor safety/Bezbednost davaoca krvi	66 (54.5)	19 (15.7)	0.06756	28 (42.4)	57 (47.1)	0.009287*
Patient safety/Bezbednost primaoca kvi	33 (27.2)	3 (2.5)		21 (17.3)	15 (12.4)	

Legend: RBD – regular blood donor; FTBD – first time blood donor

Legenda: RBD – redovni dobrovoljni davaoci krvi; FTBD – davaoci koji prvi put doniraju krv; * $p < 0.05$

(13.2%) were postgraduate students (enrolled in master's or doctoral programs).

The deferral rate was significantly higher for females 72/432 (16.7%) than for males 49/435 (11.3%) ($p = 0.021724$), as well as for RBD 99/549 (18.1%) compared to FTBD 22/318 (6.9%) ($p = 0.00001$).

The deferrals of blood donors during the pre-donation selection process are presented in **Table 1**. There are highly significant differences between RBD and FTBD in each category of blood donation ($p = 0.021523$).

Most of the BD were deferred due to donor safety, accounting for 85/121 (70.2%), while 36/121

Table 3. Blood donor deferral period with reasons for blood donor deferral**Tabela 3.** Period odbijanja davaoca krvi sa razlozima odbijanja

Blood donor deferral period/Period odbijanja davaoca krvi	Reasons for deferral Razlozi odbijanja	RBD n (%)	FTBD n (%)	p level p nivo	Male Muškarci n (%)	Female Žene n (%)	p level p nivo
	low Hb/nizak Hgb	11 (9.1)	6 (4.9)		7 (5.7)	10 (8.3)	
	medication/lekovi	16 (13.2)	1 (0.8)		7 (5.7)	10 (8.3)	
	Hypertension and tachycardia hipertenzija i tahikardija	7 (5.7)	1 (0.4)		5 (4.1)	3 (2.4)	
Temporary deferral for less than 3 months Privremena odlaganja na manje od 3 meseca	hypotension/hipotenzija	10 (8.3)	2 (1.6)		3 (2.4)	9 (7.4)	
	lack of sleep/nedostatak sna	8 (6.6)	1 (0.8)		5 (4.1)	4 (3.3)	
	acute diseases/akutne bolesti	5 (4.1)	1 (0.8)		2 (1.6)	3 (2.4)	
	adverse reactions neželjene reakcije	9 (7.4)	6 (4.9)	0.615899	4 (3.3)	11 (9.1)	0.004682*
	insufficient body mass nedovoljna težina	6 (4.9)	1 (0.8)		0 (0)	7 (5.7)	
	menstrual cycle/menzis	7 (5.7)	1 (0.8)		0 (0)	8 (6.6)	
Temporary deferral for 6 months/Privremena odlaganja na 6 meseci	risky behavior/rizično ponašanje	11 (9.1)	1 (0.8)		9 (7.4)	3 (2.4)	
	tattoos/piercings/acupuncture tetovaža/pirsing/akupunktura	6 (4.9)	1 (0.8)		5 (4.1)	2 (1.6)	
Permanent deferral Trajno odbijanje	chronic and other diseases/ hronične i druge bolesti	3 (2.4)	1 (0.8)		2 (1.6)	2 (1.6)	

Legend: RBD – regular blood donor; FTBD – first time blood donor

Legenda: RBD – redovni dobrovoljni davaoci krvi; FTBD – davaoci koji prvi put doniraju krv; * $p < 0.05$

(29.8%) were deferred due to patient safety (as shown in **Table 2**). In both groups, regular blood donors (RBD) were deferred more frequently than first-time blood donors (FTBD). Furthermore, both males and females were deferred more often for donor safety (42.4% vs. 47.1%) ($p=0.009287$).

There were 98/121 (80.99%) of temporary deferred BD for a period of less than 3 months, 19/121 (15.7%) of temporary deferred for a 6 months period, and 4/121 (3.3%) permanently deferred BD (**Table 3**). Unlike men, women were deferred for insufficient body weight and menstrual cycle. There is a significant difference between male and female BD in reasons for deferral ($p=0.004682$).

Overall, the three most common reasons for deferral were low Hb level 17/121 (14.1%), medication (pain-killers, antihistamines, antibiotics) 17/121 (14.1%) and adverse reactions prior to blood donation procedure 15/121 (12.3%).

Discussion

This study includes a large sample of students from the second-largest university center in Serbia, shedding light on blood donation deferral rates and reasons at the national level. The original paper presents, for the first time, data on BD deferral causes among the student population in Serbia.

An international comparison reveals that the deferral rate in this study (13.9%) is relatively higher than the rates reported in Germany (6.2%), France (10.8%), and the United States of America (USA) (12.8%) [3, 4, 7].

However, in this study, the deferral rate was significantly higher among RBD (81.8%) compared to the deferral rate in a study among Japanese student populations, where FTBD were more frequently rejected [5]. In both cases, rejections were primarily based on answers provided in the Donors Questionnaire. Nevertheless, temporary BD deferral may discourage them from returning for subsequent donations [8]. An encouraging study finding was that more than half of the students (63.3%) had already donated blood once or twice, which is considerably higher than the data reported in other studies, ranging from 14% to 40% [6, 7, 9]. We found that temporary deferrals (96.7%) were more common reasons compared to permanent deferrals (3.3%). This data is consistent with studies conducted in France, Japan, and the USA [4, 5, 7]. In our study, high blood pressure was classified as a temporary deferral. In contrast, one of the most common reasons for permanent deferral in India (36.6%), Nigeria (22.2%), and Saudi Arabia (14.8%) was high blood pressure [6, 10, 11]. Among students in Vojvodina, chronic diseases such as asthma, vitiligo and Hashimoto's disease were the primary reasons for permanent deferral.

The study conducted in Spain reported 37.3% BD deferrals due to answers arising from the Donor Questionnaire and 62.7% because of low Hb level [12]. According to the answers from the Donor Question-

naire, female BD were deferred more frequently than male BD (53% vs. 47%). Similar findings were observed in the study conducted in the USA, United Arab Emirates (UAE) and the Netherlands [7, 9, 13]. The results of our study, with a higher deferral rate among female BD (39% vs. 30%) and a significantly higher rate among RBD (62% vs. 7%), are consistent with those findings.

The low Hb level is a leading deferral cause, accounting for 13.3% to 60.7% deferrals among male and female BD in many studies reported from Japan, Saudi Arabia, Turkey, Brazil, Tanzania, Bangladesh, Iran, India, and Pakistan. All published data support our findings. The most common reasons for deferral were low Hb level (14.1%), medication (pain-killers, antihistamines, antibiotics) (14.1%) and adverse reactions before blood donating procedure (12.3%). Female BD are most commonly deferred because of low Hb level, the adverse reactions before blood donation procedure, menstrual cycle, lower weight and low blood pressure. These deferral reasons are aimed to protect women's health [5, 11, 14–20].

Pre-donation selection is typically performed to ensure both BD safety and the safety of blood recipients. In our study, 29.8% of BD was deferred due to patient safety concerns, such as risk behavior, tattooing, piercing, and acupuncture. The deferral period for tattooing, piercing, and acupuncture, as per Serbian national guidelines, is six months, in contrast to the American Red Cross criteria, which consider BD acceptable for blood donation if the procedure was conducted by a state-regulated entity using sterile needles [21]. Similar to a study conducted in the UAE, we found that deferrals due to BD risk behavior were unexpectedly more common among RBD than FTBD (9.1% vs. 0.8%) [9].

Young adults, in general, are in good health and may have a long donor career. Identifying the most common deferral reasons for both RBD and FTBD can help in developing a strategy to improve deferral rates and donor re-entry. The study results provide insights into the extent of donor deferrals and suggest that increasing student awareness of blood donation and the causes of deferrals is scientifically and socially acceptable approach that could lead to an increased number of blood donations.

Conclusion

The study findings suggest that increasing student awareness about the blood donation eligibility criteria is crucial. Education about high-risk behavior, medication usage, iron deficiency screening, and hypertension could minimize the loss of blood donors, retain temporarily deferred donors, and enhance blood safety. Understanding the reasons for blood donor deferral can be instrumental in planning recruitment programs and obtaining more accurate estimates of the actual eligible blood donor pool.

References

1. World Health Organization. The 2016 global status report on blood safety and availability [Internet]. Geneva: World Health Organization; 2016 [cited 2023 Aug 24]. Available from: <https://apps.who.int/iris/handle/10665/254987>
 2. Radonjić D, Varjačić M, Vukanović M. The problem of unusable transfusion units. *Med Pregl*. 2019;72(7-8):229-34.
 3. Müller-Steinhardt M, Weidmann C, Wiesneth M, Weck E, Seifried E, Brade J, et al. Donor deferral rates after the implementation of a new German blood donor questionnaire. *Transfus Med Hemother*. 2012;39(1):17-22.
 4. Sauvage C, Spinardi R, Pelat C, Pouget T, Danic B, Woimant G, et al. Noncompliance with blood donor selection criteria - Complidon 2017, France. *Transfusion*. 2019;60(1):73-83.
 5. Ngoma AM, Goto A, Nollet KE, Sawamura Y, Ohto H, Yasumura S. Blood donor deferral among students in northern Japan: challenges ahead. *Transfus Med Hemother*. 2014;41(4):251-6.
 6. Kandasamy D, Shastry S, Chenna D, Mohan G. Blood donor deferral analysis in relation to the screening process: a single-center study from southern India with emphasis on high hemoglobin prevalence. *J Blood Med*. 2020;11:327-34.
 7. Shaz BH, James AB, Hillyer KL, Schreiber GB, Hillyer CD. Demographic variations in blood donor deferrals in a major metropolitan area. *Transfusion*. 2010;50(4):881-7.
 8. Jovanović R, Radlovački V, Pečujlija M, Kamberović B, Delić M, Grujić J. Assessment of blood donors' satisfaction and measures to be taken to improve quality in transfusion service establishments. *Med Glas (Zenica)*. 2012;9(2):231-8.
 9. Al Shaer L, Sharma R, AbdulRahman M. Analysis of blood donor pre-donation deferral in Dubai: characteristics and reasons. *J Blood Med*. 2017;8:55-60.
 10. Okoroiwu HU, Asemota EA. Blood donors deferral prevalence and causes in a tertiary health care hospital, southern Nigeria. *BMC Health Serv Res*. 2019;19(1):510.
 11. Elsafi SH. Demographical pattern of blood donors and pre-donation deferral causes in Dhahran, Saudi Arabia. *J Blood Med*. 2020;11:243-9.
 12. Prados Madrona D, Fernández Herrera MD, Prados Jiménez D, Gómez Giraldo S, Robles Campos R. Women as whole blood donors: offers, donations and deferrals in the province of Huelva, south-western Spain. *Blood Transfus*. 2014;12(Suppl 1):s11-20.
 13. Spekman MLC, van Tilburg TG, Merz EM. Do deferred donors continue their donations? A large scale register study on whole blood donor return in the Netherlands. *Transfusion*. 2019;59(12):3657-65.
 14. Arslan Ö. Whole blood donor deferral rate and characteristics of the Turkish population. *Transfus Med*. 2007;17(5):379-83.
 15. Gonçalves TT, Sabino EC, Schlumpf KS, Wright DJ, Mendrone A, Lopes M 1st, et al. Analysis of donor deferral at three blood centers in Brazil. *Transfusion*. 2013;53(3):531-8.
 16. Valerian DM, Mauka WI, Kajeguka DC, Mgabo M, Juma A, Baliyima L, et al. Prevalence and causes of blood donor deferrals among clients presenting for blood donation in northern Tanzania. *PloS One*. 2018;13(10):e0206487.
 17. Haque R, Biswas DA, Sultana J, Rahman T, Anwar T, Parveen T. Study of donor deferral during blood donation: a single centre teaching hospital study. *Bangladesh J Med Sci*. 2022;21(3):645-7.
 18. Hatami H, Maghsoodlu M, Salehifar P, Karimian MS, Ferdowsi S. Analyzing the causes of blood donor deferrals and characteristics of deferred individuals in Kurdistan province, Iran. *International Journal of Basic Science in Medicine*. 2018;3(3):114-9.
 19. Thivya DR, Vijayashree R, Meghanath K. Profile of blood donor deferrals in a tertiary care centre - our institutional experience. *J Pharm Res Int*. 2021;33(55B):75-80.
 20. Shaikh FA, Noureen A, Saboor R, Sidrah, Ali A, Memon K, et al. Impact of universal donor history questionnaire in pre-donation deferrals a tertiary care hospital experience. *Pakistan Journal of Medical and Health Sciences*. 2023;17(2):808-8.
 21. American Red Cross. Eligibility criteria alphabetical [Internet]. 2020 [cited 2023 Aug 24]. Available from: <https://www.redcrossblood.org/donate-blood/how-to-donate/eligibility-requirements/eligibility-criteria-alphabetical.html>
- Rad je primljen 27. VIII 2023.
 Recenziran 18. IX 2023.
 Prihvaćen za štampu 20. IX 2023.
 BIBLID.0025-8105:(2023):LXXVI:5-6:141-145.