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Analysis of the most common reasons for voluntary blood donor deferral in Southeast Serbia

Анализа најчешћих разлога за одбијање добровољних давалаца крви на територији југоисточне Србије

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SUMMARY

Introduction/Aim Criteria for the selection of blood donors (BDs) and criteria for permanent or temporary postponement of blood donation have a vital role in the safety of blood transfusion. It is a well-known fact that the BDs deferral has a negative effect on the return of both first and regular donors. The aim of the study was to analyze the frequency of deferral and the reasons for deferral of voluntary BDs with an emphasis on temporary deferrals due to low Hb levels, in order to identify temporarily deferred donors and advise them properly in order to increase the number of voluntary donors.

Methods The study included voluntary BDs from January 1 to December 31, 2023. A total of 2,322 rejected voluntary BDs were included in the study. Donors of both sexes, aged between 18 and 65 years, were included.

Results The overall prevalence of deferred donors was 4.85%. The most common reason for temporary deferral was low hemoglobin (Hb) level, identified in 1,002 blood donors (43.15%). Other reasons included low blood pressure (265 donors, 11.41%), medication use (172 donors, 7.41%), recent blood donation (133 donors, 5.73%), high blood pressure (99 donors, 4.26%), thyroid dysfunction (96 donors, 4.13%), and recent surgical intervention (81 donors, 3.49%).

Conclusion The results of this study suggest that implementing parameters that more accurately reflect iron status would help ensure donor safety. To protect the health of blood donors (BDs) and maintain an adequate blood supply, appropriate procedures should be applied, which may include temporary iron supplementation.

Keywords: blood donors; selection criteria; deferral causes; hemoglobin

САЖЕТАК

Увод/Циљ Критеријуми за селекцију давалаца и критеријуми за трајно или привремено одлагање давања крви имају виталну улогу у безбедности трансфузије крви и осмишљени су да обезбеде сигурност по здравље даваоца и примаоца. Добро је позната чињеница да одбијање давалаца крви има негативан утицај на повратак како првих тако и редовних давалаца. Циљ студије је био да се анализира учесталост одбијања и разлози за одбијање добровољних давалаца крви са нагласком на привремена одбијања због ниског нивоа хемоглобина, како би се они идентификовали и правилно саветовали како би се повећао број добровољних давалаца.

Методе Студијом су обухваћени добровољни даваоци крви од 1. јануара до 31. децембра 2023. год. У студију је укључено укупно 2,322 одбијених добровољних давалаца крви. Укључени су даваоци оба пола, старости између 18 и 65 год.

Резултати Укупна преваленца одбијених давалаца била је 4,85%. Најчешћи разлог за привремено одлагање давања крви био је низак ниво хемоглобина (Hb) који је утврђен код 1.002 даваоца крви (43,15%). Остали разлози су укључивали низак крвни притисак (265 давалаца, 11,41%), медикаментозна терапија (172 даваоца, 7,41%), недавно давање крви (133 даваоца, 5,73%), висок крвни притисак (99 давалаца, 4,26%), поремећај функције штитне жлезде (96 давалаца, 4,13%), недавна хируршка интервенција (81 давалац, 3,49%).

Закључак Резултати ове студије сугеришу да би се коришћењем параметара који прецизније одражавају статус гвожђа успоставило безбедније давање крви за даваоце. У циљу заштите здравља давалаца крви и адекватног снабдевања крвљу треба применити одговарајућу процедуру, која може укључивати привремену суплементацију гвожђем.

Кључне речи: даваоци крви; критеријуми селекције; узроци одбијања; хемоглобин

INTRODUCTION

Transfusion of blood and blood components, as one of the forms of tissue transplantation, is an intervention that saves lives [1].

According to the Law on Transfusion Medicine (Official Gazette of RS No./ 40/2017), the preparation of blood and blood components includes the activity of promotion, planning, collection and testing, processing and distribution of blood and blood components and is performed in authorized transfusion institutions. Blood donation is a set of activities aimed at motivating, informing, educating, inviting and gathering blood donors, with the aim of providing adequate amounts of safe blood. Donating blood is a humane gesture based on voluntariness, gratuity and anonymity [2]. This definition is in accordance with the recommendations of the World Health Organization (WHO) related to donation [3].

The Council of Europe supports this approach by promoting and recommending the principle of self-sufficiency based on voluntary, non-remunerated donations [4]. Voluntary blood donation is primarily a privilege, as only healthy individuals can serve as the source of blood—an irreplaceable therapeutic resource that saves lives and improves the quality of life for many patients [5].

The main goal of the transfusion service is to maintain the quality of work, in all segments related to work with donors, to retain regular BDs, to recruit new ones and to persuade those who have stopped donating blood to come again.

Selection of BDs is carried out according to established, exclusively medical, criteria for temporary postponement of blood donation or permanent refusal due to ineligibility for blood donation, whether blood donation could endanger the potential donor or recipient. Donor selection is conducted without regard to gender, religion, sexual orientation, political affiliation, profession, social status, or any other comparable factor [5].

Prior to each blood donation, BD goes through the same procedure: filling out the Questionnaire for BDs, determining the hemoglobin (Hb) concentration, determining the blood group on the plate (at the first blood donation) and a medical examination. The medical

examination consists of an analysis of the answers given by BD in the Questionnaire for BDs and, accordingly, a well-taken medical history and physical examination. Following the physical examination, the physician determines the eligibility of the blood donor in accordance with the established Criteria for donor selection and the Criteria for permanent and temporary deferral from blood donation. General recommendations include: body weight > 50kg, body temperature up to 37°C, blood pressure not lower than 100/60mmHg (24/13.3 kPa), pulse between 50 and 100 beats per minute, Hb values must be above 135 g/L for men and above 125 g/L for women, the auscultatory findings over the heart and lungs must be normal, the pharynx calm, the lymph glands of the neck and armpits, liver and spleen must not be palpated. In our country, men can donate blood every 3 months (12 weeks), and women every 4 months (16 weeks) [4].

About 118,54 million blood donations are collected worldwide [6]. Generally 250,000 blood donations are collected each year in Serbia (Blood Transfusion Institute of Serbia, unpublished data, 2018). To maintain a stable and sufficient blood supply, Serbia's blood transfusion system requires approximately 40 blood donors per 1,000 inhabitants, representing about 4% of the total population [7]. Approximately 3% is the actual percentage of BDs in the entire population [7] and to guarantee a constant supply donated blood in Serbia arise from voluntary BDs.

The demand for blood and blood products evolves due to different factors. As a consequence of improvements in medicine, rise in the number of transplantations, and aging of the population the demand for blood and blood products is increasing [8].

The aim of the study was to analyze the deferral incidence and reasons for BD deferral with emphasis on temporary deferrals due to low Hb levels, in order to identify temporary deferred donors and properly advise them with the intention of increasing the number of voluntary BDs without compromising the quality of blood and the safety of donors and recipients.

Our further intention was to develop strategies based on the study results to reduce the rate of deferral of BDs and improve the rate of return of rejected donors.

METHODS

The study included blood donors from January 1. to December 31, 2023. A total of 2,322 deferred voluntary BDs, were included in the study. BDs of both genders, aged between 18 and 65 years, were included.

All voluntary BDs included in the study signed the approval. After completing the BD questionnaire form all BDs were screened. This form included the basic profiles of the donors (name, age, gender, address, etc.), medication intake, medical history, tests or treatment, jaundice, high-risk behavior, and any other clinically relevant illness.

Pre-donation screening involved a medical history questionnaire, followed by a physical examination and hemoglobin measurement.

During the research period, a validated quantitative method was used to determine Hb concentration from capillary blood on the Hemo Control analyzer (EKF, Barleben, Germany), as described in the literature [9]. The devices were calibrated and regularly maintained according to the manufacturer's instructions.

Data were collected from the register of deferred blood donors with reference to age and gender. All data are presented in the form of table.

Statistical analysis

Categorical variables were summarized as absolute numbers and percentages. The overall deferral rate was calculated as the proportion of deferred donors among all registered donors. Associations between donor characteristics (gender, age group, and donation status) and deferral status were evaluated using the chi-square (χ^2) test of independence. For comparisons between two groups (e.g., male vs. female donors; first-time vs. repeat donors), 2×2 contingency tables were constructed. For comparisons across multiple age groups, a 2×5 contingency table was used. Relative risks (RR) with 95% confidence intervals (CI) were calculated to estimate the strength of associations. All statistical tests were two-sided, and a p-value < 0.05 was considered statistically significant. All statistical analyses were performed using SPSS Statistics for Windows, version 29.0 (IBM Corp., Armonk, NY, USA).

Ethics: This retrospective cross-sectional study was conducted in the Blood Transfusion Institute of Niš, Serbia, after obtaining approval from the Ethics Committee of the Blood Transfusion Institute of Niš, Serbia (No. 1005, from March 3, 2024).

RESULTS

A total of 47,862 potential BDs were screened during the study period, 39,264 males (82.04%) and 8,598 females (17.96%). In this period, 45,540 voluntary BDs donated blood, 38,181 male (83.84%) and 7,359 females (16.16%), and 2,322 BDs donors were deferred (deferral rate – 4.85%). A total of 1,239 females (53.36%) and 1,083 males (46.64%) were deferred during this period (Table 1).

The deferral rate was significantly higher among female donors compared with male donors (14.41% vs. 2.76%). A chi-square test demonstrated a significant association between gender

and deferral status ($\chi^2(1) = 2022.4$, $p < 0.001$). Female donors had a 5.22-fold higher risk of deferral compared with male donors (RR = 5.22, 95% CI 4.87–5.60) (Table 1).

Low hemoglobin was the most frequent cause of deferral, accounting for 1,002 cases (43.15% of all deferrals). It was more common among female donors (737 cases; 59.48% of female deferrals) compared with male donors (265 cases; 24.47% of male deferrals). Other causes of deferral included low blood pressure (11.41%), medication use (7.41%), recent donation (5.73%), permanent deferral (4.05%), and other causes (Table 2).

Overall, 1,002 donors (2.09% of all screened donors) were deferred due to low hemoglobin. The incidence of low hemoglobin deferral was higher among first-time donors compared with repeat donors (2.55% vs. 1.95%). This difference was statistically significant ($\chi^2(1) = 14.2$, $p < 0.001$). First-time donors had a 31% higher risk of low hemoglobin deferral compared with repeat donors (RR = 1.31, 95% CI 1.15–1.48) (Table 3).

Deferral rates differed significantly across age groups ($\chi^2(4) = 496.2$, $p < 0.001$). The highest deferral rate was observed among donors aged 18–25 years (8.83%), followed by donors aged 56–65 years (5.92%). Donors aged 26–55 years demonstrated lower and comparable deferral rates ranging from 3.75% to 3.89% (Table 4).

DISCUSSION

The assessment of the suitability of potential blood donors depends on the results of hemoglobin measurement, medical history, and physical examination, all of which are mandatory before each blood donation [4].

Blood donor selection and deferral criteria are essential components of transfusion safety and are intended to safeguard the health of both donors and recipients. It is widely known than BD deferral has adverse effect on the return of both, first and repeat donors [10]. Therefore, it is necessary to understand the reasons for BD deferral and to spread productive strategies to maintain those already motivated but temporarily deferred voluntary blood donors.

The rate and reasons for deferral differ from region to region and from one center to another. In our study, 2,322 out of total 47,862 registered prospective BDs were found unfit to donate due to various reasons. Most of the deferred BDs were females 1,239 (53.36%), with men constituting 46.64% (1,083) of the donors. The prevalence of deferral in our institute was 4.85%. An international comparison reveals that the deferral rate in this study (4.85%) is relatively lower than the rates reported in Germany (6.2%), France (10.8%), and the United States of America (USA) (12.8%) [11-13].

Various researches have reported a similar deferral rate, (5.2%) by Nhachigule et al. [14], and (7.2%) by Minj et al. [15]. Some studies have even had a higher deferral rate of (24.2%) like study by Oyedeji et al. [16]. As deferral rates vary, the main reasons for refusing to donate blood also vary. This variation in delay can be caused by many reasons such as geographical variation in health problems, socioeconomic status, different donor selection criteria, gender variation etc.

The two types of donor deferrals include temporary, in which the donor is deferred for a specific period, defined according to the reason; and permanent, in which the donor is indefinitely deferred from donating blood [17].

We found that temporary deferrals (95.95%) were more common reasons compared to permanent deferrals (4.05%). This data is consistent with studies conducted in France, and the

USA [12, 13]. The main permanent deferral conditions were TTI (Transfusion Transmissible Infections)-positive donors, certain chronic systemic deseases and malignancies.

In our research, low Hb level was the most frequent cause for BD deferral and since this is a temporary cause, it gives us space to educate and counsel BDs about the deferral cause and treatment strategy to overcome it, which will enable them to donate blood in the future. Furthermore, education and motivation of deferred BDs is of primary importance, because it helps them to continue with blood donation later.

Of all blood donation postponements in our study, 1,002 BDs (43.15%) were deferred because of low Hb concentration, which was the most common reason for temporary deferral of blood donation. The results of the study from Croatia show similar values (36.3%) [18], as well as the results from Slovenia (30%) [19], Romania (30.6 %) [19] and India (51%) [20]. A slightly lower rate of rejection of BDs due to low Hb concentration was recorded in Turkey 20.7% [21], while in developed European countries these rates were significantly lower [19]. Percentage of temporarily rejected BDs due to low Hb concentration was recorded in 59.48% of women and 24.47% of men, which is quite similar to some other studies where this percentage was 44.82% of female donors versus 34.55% of male donors [18].

Each potential BD, regardless of the number of blood donations, has the Hb value determined every time. According to EU Directives and The European Directorate for the Quality of Medicines & HealthCare (EDQM) guidelines, Hb concentration for donors should be >135 g/L in men and >125 g/L in women, whereas in other countries, these values differ by 5-10 g/L [4].

One donation of blood (450 ml) include 210 to 240 mg of iron, as 1 mL of red cells contains 1.12 mg of iron [22]. Globally, more than 30% of the world's population are estimated to be anemic and many due to iron deficiency. Iron deficiency is a common consequence of repeated blood donations and a strong predictor of low Hb [23]. Insufficient iron stores may hamper the

recovery from subsequent donations, thus risking the development of low Hb and/or iron-deficient anemia.

The highest number of deferred donors belonged to the 18–25 age group, which is consistent with the findings reported by Gaikwad et al. and Patil et al. [24, 25].

The prevalence of low hemoglobin in adolescent blood donors, particularly among females, has been noted in previous studies as well as in the present study [17]. This suggests that low micronutrient levels in young people contribute to these findings, and that improving micronutrient intake could significantly reduce deferrals due to temporary conditions such as anemia [24].

Younger age and female gender were identified as the primary factors associated with absent iron stores (AIS), iron deficiency anemia (IDA), and deferral from blood donation due to low hemoglobin (Hb) levels [26].

Our analysis suggested that there is high prevalence of anemia even in first time BDs. Of the total of 1002 rejected donors due to low Hb level, 297 (29.64%) were first time donors. Anemia in females can be associated to physiological conditions such as menstruation and pregnancies. Although anemia in first-time male BDs may be associated with unrecognized medical conditions, occult gastrointestinal bleeding, vitamin b12 deficiency and hyperthyroidism [27].

It is considered that BDs are healthy persons and that they do not need extensive laboratory tests. However, we have clear evidence that multiple blood donations can put the donor at risk of developing anemia [22].

According to existing recommendations, transfusion centers rely on the method of testing Hb before donation, which is not the best method for testing iron status in any case. And with this problem European transfusion centers deal in different ways. In Denmark, the Czech Republic

and Italy, ferritin has been introduced as a method to control the iron status of BDs [5]. In Italy, ferritin is measured once a year in regular donors. In the Czech Republic, ferritin is measured at the first donation and in selected cases of repeated donations. In Denmark, ferritin testing is performed in all first donations and every tenth donation. The Netherlands has defined the values of ferritin at which it reacts and ferritin controls are performed at the first and fifth donation [5]. Therefore, with values < 15μg/L, they advise a 12-month suspension of blood donation, and with values < 30μg/L – 6 months [20].

The most important predictors for the occurrence of iron deficiency in BDs as the results of the Danish study are gender, number of previous donations, time since the last donation, and menopausal status [28]. All things consider, this large study shows that the most important predictor for low Hb in regular BDs is precisely low ferritin (<15μg/L). They suggest that these findings provide compelling evidence for the importance of ferritin monitoring in blood donors as a tool for evaluating donor risk [29].

In the USA, Canada and European Union countries these indicators were a clear signal for conducting studies that introduced iron supplementation after donating blood. In Denmark, the practice of sending 100 iron tablets to the home address of a donor with a determined ferritin level <15μg/L has been introduced [5]. If ferritin is at the level of 15-40 μg/L, the donor is sent 60 tablets for supplementation [20]. In Serbia there is still no recommendation to introduce iron supplementation in BDs.

Other causes of deferral among males in present study beside low Hb level were medication (126), recent donation (108), low blood pressure (98) and high blood pressure (89), while in females were low hemoglobin level, low blood pressure (167), thyroid disorders (76) and medication (46). Recent alcohol intake was seen only in male donors (5), as well as trauma (4), high Hb level (4) and high-risk behavior (14).

Blood pressure is declared high or low when it is outside the range of 100-180 mmHg for systolic blood pressure and 60-100 mmHg for diastolic blood pressure [4].

Our study showed that 11.41% of BDs were rejected due to low blood pressure. Low blood pressure represents a relatively common temporary cause of donor deferral in blood donation services. Hypotension may occur due to several physiological factors, including dehydration, prolonged fasting, fatigue, or anxiety associated with the donation process. These factors may trigger a vasovagal response, which can lead to a transient decrease in blood pressure and increase the risk of adverse donor reactions such as dizziness or fainting. Deferring donors with hypotension is therefore an important precaution to ensure donor safety during blood collection. Also, a study by AlNouri et al. announced that the most common medical examination cause of deferral was low blood pressure (11.60%) [30].

In our study, high blood pressure had a deferral rate 4.26% and it is detected much more often in male (8.22%) than in female (0.81%). This finding may be explained by the generally higher prevalence of hypertension in men, particularly in middle-aged and older populations. Hormonal factors, such as the protective effect of estrogen in premenopausal women, may contribute to lower blood pressure levels in female donors. In addition, lifestyle factors including higher rates of alcohol consumption, smoking, and obesity among men may increase the likelihood of elevated blood pressure during pre-donation screening. The leading cause for permanent deferral in study conducted by Gaikwad et al. was hypertension [24]. This correlates with the results of the study conducted by Patil et al. [25], who announced hypertension as the most common cause of permanent BDs deferral.

One of the most common cause for predonation BD deferral is medication, as revealed in our findings (7.41%). All of these deferrals can be avoided if a more detailed list of drugs that

should not be taken is made available to BDs. Still, a large number of people were unsure about the exact names or specifications of the medications they were taking.

A study by Oyedeji et al. reported that under medication was 2.9% [16] and Patil et al, reported even higher rate of 8.18% [25].

CONCLUSION

Our study found that 4.85% of blood donors were deferred, with low hemoglobin (Hb) levels being the most common reason, followed by inadequate blood pressure and medication use. Low Hb levels were particularly prevalent among female donors and younger age groups.

Our study showed that females represent a potential resource for increasing the number of blood donors. The results suggest that implementing parameters that more accurately reflect iron status would help ensure donor safety. To protect the health of blood donors and maintain an adequate blood supply, appropriate procedures should be applied, which may include temporary iron supplementation for those donors who require it.

It should be emphasized that the demand for blood, both globally and in our country, is increasing, while the donor population is declining due to the significant trend of population aging, particularly pronounced in Western Europe. Unfortunately, this trend is also evident in Serbia, where the average age exceeds 40 years. Therefore, donor care should be a key priority within our healthcare system.

Conflict of interest: None declared.

REFERENCES

1. World Health Organisation. User guide for navigating resources on stepwise implementation of haemovigilance systems. Geneva: World Health Organization; 2022. Licence: CC BY-NC-SA 3.0 IGO. Available from: https://iris.who.int/bitstream/handle/10665/360060/9789240047860-eng.pdf?sequence=1&isAllowed=y
2. Legal information system of the Republic of Serbia. Law on transfusion medicine, Official Gazette of the Republic Serbia, No 40/2017 [Internet]. Serbia: Official Gazette of the Republic Serbia; 2017. Available from: https://www.pravnoinformacionisistem.rs/SlGlasnikPortal/eli/rep/sgrs/skupstina/zakon/2017/4 0/2. (Serbian)
3. World Health Organisation. Good practices for blood establishments. Geneva, Switzerland: World Health Organisation; 2025. Licence: CC BY-NCSA 3.0 IGO. Available from: https://iris.who.int/bitstream/handle/10665/382401/9789240113619-eng.pdf?sequence=1&isAllowed=y
4. Council of Europe. Guide to the preparation, use and quality as surance of blood components. Recommendation No. R(95)15. 21th ed [Internet]. France: Council of Europe; 2023. Available from: https://www.edqm.eu/en/blood-guide
5. Kovač M, Balint B, Bogdanović G. Basic and clinical transfusionology. Beograd: Medicinski fakultet Univerziteta u Beogradu, Akademska misao; 2020. 540 p. (Serbian)
6. World Health Organisation. Blood safety and availability [Internet]. Geneva, Switzerland: World Health Organisation; 2023. Available from: https://www.who.int/news-room/fact-sheets/detail/blood-safety-and-availability
7. Blood Transfusion Institute of Serbia. Voluntary blood donor. Available at: http://www.nbti.org.rs/NBTI/1102/Voluntary-blood-donor.shtml
8. Lin YM, Ho TF, Ma CC, Chien JH. Forecasting blood supply and demand under population aging: implications and challenges for healthcare resource allocation. BMC Health Serv Res. 2026;26(1):369. [DOI: 10.1186/s12913-026-14150-9] [PMID: 41680782]
9. Avcioglu G, Nural C, Yilmaz FM, Baran P, Erel Ö, Yilmaz G. Comparison of noninvasive and invasive point-of-care testing methods with reference method for hemoglobin measurement. J Clin Lab Anal. 2018;32(3):e22309. [DOI: 10.1002/jcla.22309] [PMID: 28834598]
10. Maghsudlu M, Teimourpour A, Amini-Kafiabad S, Nazemi AM, O'Brien SF, Sarem F. The return rate of deferred blood donors in Iran. Transfus Clin Biol. 2024;31(3):135–40. [DOI: 10.1016/j.tracli.2024.04.002] [PMID: 38604406]
11. 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. [DOI: 10.1159/000335581] [PMID: 22896762]
12. Sauvage C, Spinardi R, Pelat C, Pouget T, Danic B, Woimant Get al. Noncompliance with blood donor selection criteria - Complidon 2017, France. Transfusion. 2020;60(1):73–83. [DOI: 10.1111/trf.15623] [PMID: 31837034]
13. 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. [DOI: 10.1111/j.1537-2995.2009.02501.x] [PMID: 19951315]
14. Nhachigule C, Matola O, Munguambe A, Nhangave A, Caetano M, Loquiha O, et al. Analysis of the most common causes of blood donor deferral in Southern Mozambique. BMC Infect Dis. 2025;25(1):994. [DOI: 10.1186/s12879-025-11393-5] [PMID: 40775295]
15. Minj MK, Wasnik M, Lahare S, Bhagat K. Analysis of Blood Donor Deferrals: Experience From a Newly Established Blood Centre in a Rural Medical College Hospital in a Tribal Area. Cureus 2025; 17(4): e81679. [DOI: 10.7759/cureus.81679] [PMID: 40322359]
16. Oyedeji OA, Edenyi SC, Olowoselu OF, Adewoyin AS, Davies NO, Osikomaiya BI. An evaluation of the prevalence and causes of blood donor deferral in Lagos state, Nigeria. Discov Public Health 2025; 22: 344. [DOI:10.1186/s12982-025-00748-7]
17. Zahidin MA, Saidin NIS, Ibrahim NA, Mohd Nasir NNA, Abdul Razak NI, Ramli M, et al. The Blood Donor Deferral Rate and the Reasons for Deferral at a Tertiary Care Teaching Institute in Northeastern Malaysia. Cureus 2024; 16 (2): e54954. [DOI: 10.7759/cureus.54954] [PMID: 38544652]
18. Cipek V, Ferenac Kiš M, Ratić D, Piškorjanac S, Samardžija M, Kralik K, Samardžija M. Reasons for deferral in deferred voluntary blood donors in Eastern Croatia. Acta Clin Croat. 2023;62(1):93–105. [DOI: 10.20471/acc.2023.62.01.12] [PMID: 38304378]
19. Vuk T, Magnussen K, De Kort W, Folléa G, Liumbruno GM, Schennach H, et al. International forum: an investigation of iron status in blood donors. Blood Transfus. 2017;15(1):20–41. [DOI: 10.2450/2016.0101-16] [PMID: 27643753]
20. Taneja K, Bhardwaj K, Arora S, Agarwal A, Analysis of the reasons for deferral of prospective blood donors in a Tertiary Care Hospital in North India. J App Hematol 2015;6(4):154–6. [DOI: 10.4103/1658-5127.171988]

21. Arslan O. Whole blood donor deferral rate and characteristics of the Turkish population. Transfus Med. 2007;17(5):379–83. [DOI: 10.1111/j.1365-3148.2007.00738.x] [PMID: 17725552]
22. Mantadakis E, Panagopoulou P, Kontekaki E, Bezirgiannidou Z, Martinis G. Iron Deficiency and Blood Donation: Links, Risks and Management. J Blood Med. 2022;13:775–86. [DOI: 10.2147/JBM.S375945] [PMID: 36531435]
23. van den Hurk K, Arvas M, Roberts DJ, Castrén J, Erikstrup C. Whole Blood Donor Iron Management Across Europe: Experiences and Challenges in Four Blood Establishments. Transfus Med Rev. 2024;38(4):150860. [DOI: 10.1016/j.tmrv.2024.150860] [PMID: 39369584]
24. Gaikwad MJ, Rathod KB, Chaudhari A, Nakate LA. Understanding deferral rate and reason among voluntary blood donors at a tertiary care center. IP J Diagn Pathol Oncol 2022; 7 (1): 1–5. [DOI: 10.18231/j.jdpo.2022.001]
25. Patil O, Jayaprakash CS.(2021) Evaluation of Causes of Deferral among Blood Donors. J Hematol Transfus 2021; 8 (1): 1089. [DOI: 10.47739/2333-6684/1089]
26. Simon TL, Garry PJ, Hooper EM. Iron stores in blood donors. JAMA. 1981;245(20):2038–43. [PMID: 7230400]
27. Mast AE. Low hemoglobin deferral in blood donors. Transfus Med Rev. 2014;28(1):18–22. [DOI: 10.1016/j.tmrv.2013.11.001] [PMID: 24332843]
28. Rigas AS, Sørensen CJ, Pedersen OB, Petersen MS, Thørner LW, Kotzé S, et al. Predictors of iron levels in 14,737 Danish blood donors: results from the Danish Blood Donor Study. Transfusion. 2014;54(3 Pt 2):789–96. [DOI: 10.1111/trf.12518] [PMID: 24372094]
29. Kotzé SR, Pedersen OB, Petersen MS, Sørensen E, Thørner LW, Sørensen CJ, et al. Predictors of hemoglobin in Danish blood donors: results from the Danish Blood Donor Study. Transfusion. 2015;55(6):1303–11. [DOI: 10.1111/trf.13011] [PMID: 25647099]
30. AlNouri AK, Maghrabi LA, Hamdi SS, Abd El-Ghany SM, AlNouri KA. Analysis of the most common causes of blood donor deferral in northern Jeddah: a single-center study. J Blood Med. 2019;10:47–51. [DOI: 10.2147/JBM.S178822] [PMID: 30774492]

Table 1. Donor characteristics and deferral status

Characteristic	**Total donors (n = 47,862)**	**Deferred n (%)**	**Deferral rate (%)**
Gender			
Male	39,264	1083 (46.64%)*	2.76
Female	8598	1239 (53.36)*	14.41
Total	47,862	2322 (100)	4.85

*Percentage represents proportion of total deferrals.
Statistical test: $\chi^2(1) = 2022.4$, $p < 0.001$
Relative risk (female vs. male): RR = 5.22 (95% CI 4.87–5.60)

Table 2. Causes of donor deferrals and their proportions

Causes	No. deferred (%)	No. deffered males (%)	No. deffered females (%)
Low hemoglobin	1002 (43.15%)	265 (24.47%)	737 (59.48%)
High hemoglobin	4 (0.17%)	4 (0.37%)	0 (0%)
Low blood pressure	265(11.41%)	98 (9.05%)	167 (13.48%)
High blood pressure	99 (4.26%)	89 (8.22%)	10 (0.81%)
Underweight	13 (0.56%)	2 (0.18%)	11 (0.89%)
Medication	172 (7.41%)	126 (11.63%)	46 (3.71%)
Thyroid disorders	96 (4.13%)	20 (1.85%)	76 (6.13%)
Asthma	33 (1.42%)	25 (2.31%)	8 (0.65%)
Epilepsy	17 (0.73%)	6 (0.56%)	11 (0.89%)
Common cold	65 (2.80%)	48 (4.43%)	17 (1.37%)
Menstruation	46 (1.99%)	0 (0%)	46 (3.71%)
Recent surgery	81 (3.49%)	66 (6.09%)	15 (1.21%)
Recent donation	133 (5.73%)	108 (9.97%)	25 (2.02%)
Recent alcohol intake	5 (0.22%)	5 (0.46%)	0 (0%)
Recent tattoo/piercing	34 (1.46%)	25 (2.31%)	9 (0.73%)
High risk behavior	14 (0.60%)	14 (1.29%)	0 (0%)
Tick bite	45 (1.94%)	40 (3.69%)	5 (0.40%)
Vaccines	6 (0.26%)	4 (0.37%)	2 (0.16%)
Trauma	4 (0.17%)	4 (0.37%)	0 (0%)
Skin lesions	28 (1.21%)	19 (1.75%)	9 (0.73%)
Sick leave	41 (1.77%)	31 (2.86%)	10 (0.81%)
Giving up before donation	11 (0.47%)	6 (0.56%)	5 (0.40%)
Permanent deferral	94 (4.05%)	68 (6.28%)	26 (2.10%)
Others	14 (0.60%)	10 (0.93%)	4 (0.32%)
Total	2322	1083	1239

Table 3. Low hemoglobin deferral by donation status

Donation status	Total donors	Low hemoglobin (n)	Incidence (%)
First-time	11,634	297	2.55
Repeat	36,228	705	1.95
Total	47,862	1,002	2.09

Statistical test: $\chi^2(1) = 14.2$, $p < 0.001$
Relative risk (first-time *vs*. repeat): RR = 1.31 (95% CI 1.15–1.48)

Table 4. Deferral rate by age group

Age group (years)	Total screened	Deferred	Deferral rate (%)
18–25	7519	664	8.83
26–35	11,474	446	3.89
36–45	12,377	464	3.75
46–55	10,581	398	3.76
56–65	5911	350	5.92
Total	47,862	2322	4.85

Statistical test: $\chi^2(4) = 496.2$, $p < 0.001$

