Original Article

Recruitment and retention of voluntary blood donors during the COVID-19 pandemic

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Abstract:

Introduction: *COVID-19 pandemic has resulted in declining blood donations and a prolonged cumulative blood shortage. It caused the postponement of surgeries and medical treatments for patients, which can be life-threatening.* ***Objective:*** *This study aimed to determine the donor characteristics and frequency of blood donation during the COVID-19 pandemic.* ***Materials and Methods:*** *In a retrospective cohort study, data were collected from the blood donation application forms in 2021. The 15,868 donors were divided according to various characteristics: age, gender, occupation, type of blood components, complications of donations, ABO, and Rh blood group. Blood donors were divided into two large groups; first-time and repeat blood donors which were subdivided into 2, 3, 4, and equal to or more than five donations.* ***Results:*** *Donors aged 17-29, females, and government officers, were the groups with the highest number among blood donors. The characteristics of blood donation were whole blood 99.27%, blood group O 37.57%, and RhD-positive 99.40%. Significant associations between blood donation during the pandemic and age, gender, and occupation were found.* ***Conclusion:*** *Adolescents, females, and government officers were the groups with the highest number among blood donors, both first-time and repeat blood donors. Therefore, the issuance of mobile blood donation units among these donor groups will help increase blood inventory during the COVID-19 pandemic or blood shortages.*

Keywords : ● *Blood donor* ● *Blood donation* ● *Blood transfusion* ● *COVID-19* ● *Beta thalassemia*

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นิพนธ์ต้นฉบับ

การสรรหาและการคงรักษาผู้บริจาคโลหิตโดยสมัครใจในช่วงการระบาดของโควิด-19

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บทคัดย่อ

บทนำ *การระบาดใหญ่ของโควิด-19 ส่งผลให้การบริจาคโลหิตลดลงและเกิดการขาดแคลนโลหิตสะสมเป็นเวลานาน ทำให้ผู้ป่วยต้องเลื่อนการผ่าตัดและการรักษาพยาบาลออกไป ซึ่งอาจเป็นอันตรายถึงชีวิตได้* ***วัตถุประสงค์*** *เพื่อศึกษาคุณสมบัติของผู้บริจาคโลหิตและความถี่ของการบริจาคโลหิตในช่วงการระบาดของโควิด-19* ***วัสดุและวิธีการ*** *การศึกษาแบบย้อนหลัง โดยเก็บข้อมูลจากใบสมัครผู้บริจาคโลหิตในปี พ.ศ. 2564 จำนวน 15,868 ราย นำมาแบ่งตามลักษณะต่างๆ ได้แก่ อายุ เพศ อาชีพ ชนิดของส่วนประกอบของโลหิต ภาวะแทรกซ้อนจากการบริจาคโลหิต หมู่โลหิตระบบ ABO และ Rh นอกจากนี้ยังแบ่งผู้บริจาคโลหิตแบ่งออกเป็น 2 กลุ่มใหญ่ คือ ผู้บริจาคโลหิตครั้งแรกและผู้บริจาคโลหิตประจำ มีการบริจาค ซึ่งแบ่งออกเป็น 2, 3, 4 และมากกว่าหรือเท่ากับ 5 ครั้ง* ***ผลการศึกษา*** *ผู้บริจาคโลหิตอายุ 17-29 ปี เพศหญิง กลุ่มอาชีพข้าราชการ ทหาร ตำรวจ พนักงานรัฐวิสาหกิจ เป็นกลุ่มที่บริจาคโลหิตมากที่สุด และพบว่าโลหิตที่บริจาคเป็นชนิดโลหิตครบส่วน ร้อยละ 99.27 มีหมู่โลหิตโอ ร้อยละ 37.57 และหมู่โลหิต RhD-positive ร้อยละ 99.40 และพบความสัมพันธ์ที่มีนัยสำคัญทางสถิติระหว่างการบริจาคโลหิตในช่วงโรคระบาดกับอายุ เพศ และอาชีพของผู้บริจาคโลหิต* ***สรุป*** *วัยรุ่น สตรี และข้าราชการ เป็นกลุ่มที่เป็นผู้บริจาคโลหิตสูงสุดทั้งในกลุ่มการบริจาคโลหิตครั้งแรกและบริจาคเป็นประจำ ดังนั้นในช่วงที่มีการระบาดของโรคโควิด-19 หรือขาดแคลนโลหิตจึงควรออกหน่วยเคลื่อนที่เพื่อรับบริจาคโลหิตจากผู้บริจาคกลุ่มดังกล่าว*

คำสำคัญ : ● *ผู้บริจาคโลหิต* ● *การบริจาคโลหิต* ● *การให้โลหิต* ● *โควิด-19*

วารสารโลหิตวิทยาและเวชศาสตร์บริการโลหิต. 2566;33:261-8.

Introduction

Medical advances have improved the treatment of severe illnesses through blood transfusions, such as trauma, surgery, and cancer treatment. Of the estimated 234 million blood transfusions worldwide annually, 63 million for surgery, 31 million for cancer treatment, and another 10 million for pregnancy-related complications were reported[1-3]. The national requirements for blood services are partly determined by the capacity of a country's health care system and population coverage. In developed countries with advanced health care systems, blood demand increases to support more sophisticated medical and surgical procedures, wound care, and management of blood disorders. The elderly population requiring more medical care has increased the blood demand[4,5].

The COVID-19 pandemic directly impacts blood services as blood comes from donors[6,7]. Blood donors have declined due to the country declaring a state of emergency. For example, the closure of travel, making it impossible for blood donors to donate blood, or the closure of provinces, making it impossible to travel to the mobile units. In addition, blood donors need to avoid contacting COVID-19 from the blood collecting staff and other blood donors.

The current blood shortage problem for patients with both accidents and diseases is related to the increased need for blood. Hospitals have frequently announced requests for blood donations, reflecting the increased blood demand caused by blood shortages. Therefore, there must be sufficient blood reserves to meet the needs of various hospitals. Related organizations have realized the importance of campaigning to motivate people to see the importance of donating blood[8-10].

Therefore, this study aimed to determine the characteristics and frequency of blood donations during the COVID-19 pandemic. The data from this study will allow relevant parties to improve service quality according to their needs and be able to formulate strategies to increase the number of blood donors. It also incentivizes new donors to donate blood, which can help increase blood supply, reduce scarcity, and ensure continuous high-quality blood.

Materials and Methods

Study population

A retrospective cohort study allowed the investigators to determine the characteristics and frequency of blood donations during the COVID-19 pandemic using the data of 15,868 grants from blood donor applications from January to December 2021 (Figure 1) at Blood Bank Laboratory, Maharaj Nakhon Si Thammarat Hospital. They provided a total of 15,868 blood donor application forms. The research population was the blood donor applications from data during the COVID-19 pandemic in 2021 with first-time and repeat blood donors. Based on annual blood donor data, the estimated sample size for this study was 16,822. However, after selecting

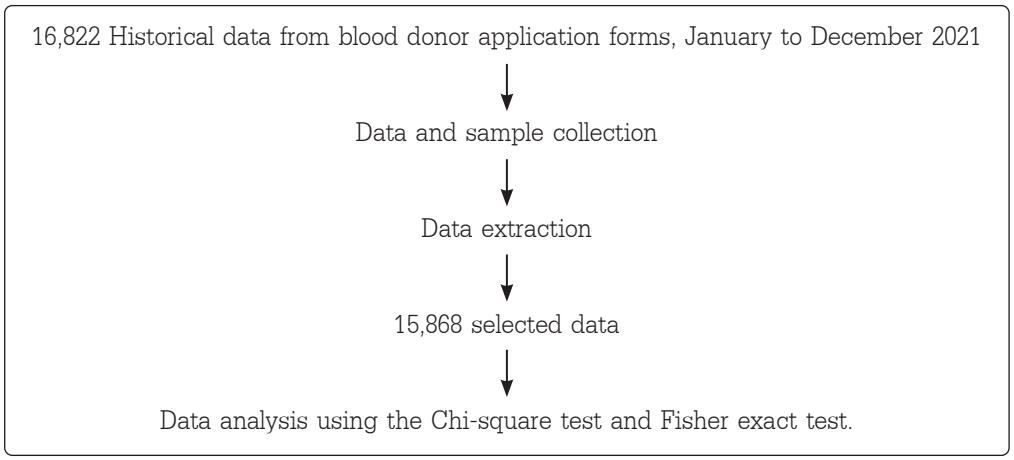

Figure 1 Study flow diagram

the data according to the inclusion criteria, the data in this study were 15,868 from the 2021 blood donor application forms.

Data collection

All 15,868 blood donor applications in 2021 were collected from Blood Bank Laboratory, Maharaj Nakhon Si Thammarat Hospital. The data in the blood donor application was analyzed for factors affecting blood donation during the COVID-19 pandemic. The inclusion criteria for blood donor applications were 1) being a blood donor in 2021 and 2) being a first-time or repeat blood donor. The exclusion criteria were 1) blood donors in years other than 2021 and 2) blood donor application forms with incomplete data. Data from the blood donor application recorded for analysis consisted of 1) name 2) frequency of donation 3) age 4) gender 5) occupation 6) type of donation 7) ABO blood group and 8) Rh blood group.

Ethics statement

This study has been reviewed and approved by Ethics Committee in Human Research, Walailak University, Thailand (WUEC-21-288-01).

Statistical analysis

Categorical and continuous data were analyzed separately using SPSS version 20 (IBM, Chicago, IL, USA). Quantitative data were presented as the number, percentage, mean, and standard deviation of all blood donors using the Chi-square and Fisher exact tests. $p < 0.05$ was considered statistically significant.

Results

Since the pandemic of COVID-19, blood donations at Blood Bank Laboratory, Maharaj Nakhon Si Thammarat Hospital have dropped (Figure 2). The number of donors decreased during the COVID-19 pandemic period (2020-2021) compared to the pre-pandemic period (2018-2019). Blood donations were divided into three sources: donation at a blood bank laboratory, donation from patients' relatives, and donation at mobile blood donation units. As a result of lockdown restrictions, the inability to conduct off-site blood donation drives has decreased the number of off-site donors. Consequently, blood banks have initiated campaigns to encourage individuals to donate blood directly at the laboratory,

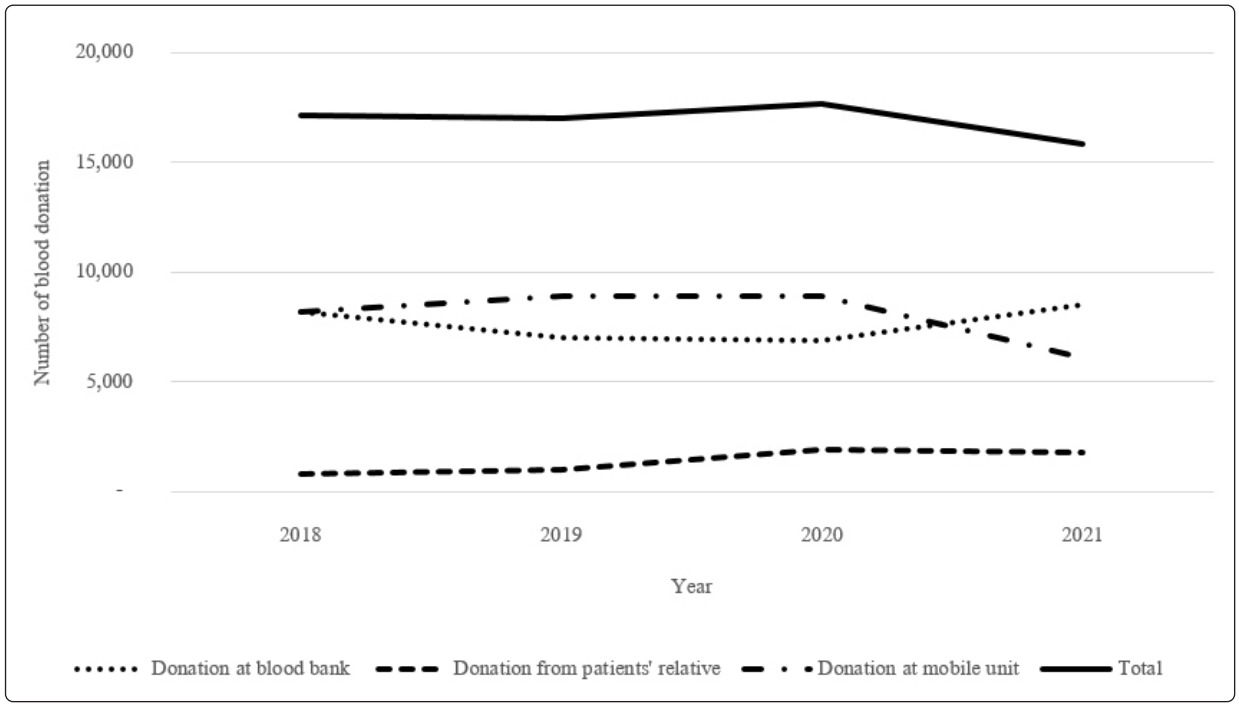

Figure 2 Number of blood donors during the COVID-19 outbreak at Blood Bank Laboratory, Maharaj Nakhon Si Thammarat Hospital

serving as a response to address the reduced availability of off-site donors. The number of patients' relatives who donated blood increased due to insufficient blood supply to meet the demand.

Data from 15,865 blood donation applications in 2021 were divided according to various characteristics: age, gender, occupation, type of blood components donated, complications of previous donations, ABO and Rh blood groups. In addition, blood donors were divided into two large groups; first-time and repeat blood donors which were subdivided into 2, 3, and 4, equal to or more than five donations (Table 1).

The donors aged 17-29 were the group with the highest blood donations. The age group with the highest number of first-time donations was 17-29 years, while the age group with the highest number of equal to or more than five times donations was 40-49 years. Gender with the highest number of donors was female. First-time donors were mostly males, while repeat donors who donated five times or more were primarily females. For the occupations, government officers had the highest number of blood donors. The occupation with the highest number of first-time donation was student, and the occupation with the five-time donations or more were others.

Blood donations were divided into whole blood, single-donor red cells, single-donor platelets, and single-donor plasma. Whole blood was the most common type of donation. There were 15,752 units (99.27%), the number of donations from 1 to equal to or more than 5 were 3,705 (23.35%), 1,841 (11.60%), 1,236 (7.79%), 977 (6.16%), and 7,993 (50.37%), respectively. While single-donor red cells, single-donor platelets, and single-donor plasma accounted for 80 (0.50%), 31 (0.20%), and 5 (0.03%), respectively.

ABO blood group was divided into A, B, AB, and O. The blood group with the highest number of donors was group O. There were 5,962 (37.57%) group O donors, the frequency of donations was 1 to equal to or more than 5 were; 1,358 (8.56%), 675 (4.25%), 469 (2.96%), 376 (2.37%), and 3,084 (19.44%) donors, respectively. While blood groups A, B, and AB accounted for 3,942 (24.84%), 4,645 (29.27%), and 1,319 (8.31%) donors, respectively.

The Rh blood group was divided into Rh-positive and Rh-negative. The Rh blood group with the highest number of donors was Rh-positive, 15,772 (99.40%), the number of donations from first-time to equal to or more than 5 times Rh-positive donors was 3,724 (23.47%), 1,844 (11.62%), 1,235 (7.78%), 979 (6.17%) and 7,990 (50.35%), respectively. The prevalence of Rh-negative individuals was observed to be 96 (0.60%).

All results demonstrated that the factors affecting the frequent donations were age, gender, and occupation.

Discussion

Using donated blood is necessary for transfusion to patients to replace blood lost in general medicine, surgery, hematology, and oncology. At present, nothing can be synthesized to replace blood. Therefore, it is necessary to receive blood donations from people to obtain blood for life-saving use.

Since the pandemic of COVID-19, blood donations across the country have dropped dramatically[11]. Accumulated blood shortages last more than five months. Patients were postponed many surgeries and medical treatments, which can endanger the patients' lives in this blood shortage situation. The drop in blood donations is explained by city lockdowns and fears of infection from traveling to donate blood[12].

This study identified the number of blood donors during the COVID-19 pandemic. Data were collected from the blood donation application forms to determine the factors that could increase or maintain the number of blood donors during epidemics or blood shortages. The data analysis found that first-time and repeat blood donors with the highest number of donors were 17-29 years old, female, and government officer group.

In most nations, the minimum age for blood donor is 18 years old, but in some countries, national legislation allows 16 to 17-year-old that meet the physical and

Table 1 Characteristics of blood donors between first-time and repeat blood donation

Characteristics	First-time blood donation	Repeat blood donation (times)				Total	*p*-value
	1 n (%)	2 n (%)	3 n (%)	4 n (%)	≥ 5 n (%)		
			Age				
17 - 29	2,010 (12.67)	1,085 (6.84)	652 (4.11)	463 (2.92)	1,642 (10.35)	5,852 (36.88)	< 0.001
30 - 39	923 (5.82)	420 (2.65)	300 (1.89)	275 (1.73)	2,206 (13.90)	4,124 (25.99)	
40 - 49	606 (3.82)	250 (1.58)	208 (1.31)	162 (1.02)	2,488 (15.68)	3,714 (23.41)	
50 - 59	182 (1.15)	95 (0.60)	75 (0.47)	80 (0.50)	1,496 (9.43)	1,928 (12.15)	
60 - 70	5 (0.03)	2 (0.01)	5 (0.03)	4 (0.03)	234 (1.47)	250 (1.58)	
			Gender				
Male	1,933 (12.18)	875 (5.51)	513 (3.23)	391 (2.46)	3,982 (25.09)	7,694 (48.49)	< 0.001
Female	1,793 (11.30)	977 (6.16)	727 (4.58)	593 (3.74)	4,084 (25.74)	8,174 (51.51)	
			Occupation				
Student	748 (4.71)	393 (2.48)	266 (1.68)	160 (1.01)	408 (2.57)	1,975 (12.45)	< 0.001
Government Officer	690 (4.35)	432 (2.72)	266 (1.68)	210 (1.32)	2,059 (12.98)	3,657 (23.05)	
Employee	744 (4.69)	376 (2.37)	238 (1.50)	210 (1.32)	1,475 (9.30)	3,043 (19.18)	
Monk, priest	28 (0.18)	10 (0.06)	7 (0.04)	6 (0.04)	78 (0.49)	129 (0.81)	
Agriculturist	342 (2.16)	115 (0.72)	78 (0.49)	75 (0.47)	672 (4.23)	1,282 (8.08)	
Business	626 (3.95)	248 (1.56)	180 (1.13)	130 (0.82)	1,066 (6.72)	2,250 (14.18)	
Others	548 (3.45)	278 (1.75)	205 (1.29)	193 (1.22)	2,308 (14.54)	3,532 (22.26)	
			Blood donation type				
Whole blood donation	3,705 (23.35)	1,841 (11.60)	1,236 (7.79)	977 (6.16)	7,993 (50.37)	15,752 (99.27)	0.58
Erythrocytapheresis	15 (0.09)	10 (0.06)	4 (0.03)	6 (0.04)	45 (0.28)	80 (0.50)	
Plateletpheresis	5 (0.03)	1 (0.01)	0 (0.00)	0 (0.00)	25 (0.16)	31 (0.20)	
Plasmapheresis	1 (0.01)	0 (0.00)	0 (0.00)	1 (0.01)	3 (0.02)	5 (0.03)	
			Complication of donation				
No complication	3,721 (23.45)	1,844 (11.62)	1,236 (7.79)	977 (6.16)	8,054 (50.76)	15,832 (99.77)	0.67
Fainting	1 (0.01)	4 (0.03)	0 (0.00)	2 (0.01)	3 (0.02)	10 (0.06)	
Bruise	0 (0.00)	1 (0.01)	1 (0.01)	1 (0.01)	1 (0.01)	4 (0.03)	
Phlebotomy problem	4 (0.03)	3 (0.02)	3 (0.02)	3 (0.02)	6 (0.04)	19 (0.12)	
Not allowed to donate	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	2 (0.01)	2 (0.01)	
Blood vessel injury	0 (0.00)	0 (0.00)	0 (0.00)	1 (0.01)	0 (0.00)	1 (0.01)	
			ABO blood group				
A	913 (5.75)	477 (3.01)	335 (2.11)	235 (1.48)	1,982 (12.49)	3,942 (24.84)	0.15
B	1,145 (7.22)	538 (3.39)	335 (2.11)	276 (1.74)	2,351 (14.82)	4,645 (29.27)	
AB	310 (1.95)	162 (1.02)	101 (0.64)	97 (0.61)	649 (4.09)	1,319 (8.31)	
O	1,358 (8.56)	675 (4.25)	469 (2.96)	376 (2.37)	3,084 (19.44)	5,962 (37.57)	
			Rh blood group				
Rh-positive	3,724 (23.47)	1,844 (11.62)	1,235 (7.78)	979 (6.17)	7,990 (50.35)	15,772 (99.40)	< 0.001
Rh-negative	2 (0.01)	8 (0.05)	5 (0.03)	5 (0.03)	76 (0.48)	96 (0.60)	

hematological requirements and acquire sufficient consent to donate. Teenagers are a source of interest not only for their blood supply, but also the information about the topic of "giving blood" may facilitate the spread of a healthy lifestyle and contribute to the development of a mature and responsible culture[13].

Females tend to be more altruistic than males in giving blood. The percentage of first-time donors and repeat donors is high among females. However, there are restrictions for females who donate blood, such as low hemoglobin concentrations, which reduce the number of female blood donors. They also have more trouble when their blood is withdrawn and are more susceptible to fainting, negatively affecting their donor experience. Cultivating a supportive environment and recognizing the significance of female involvement can effectively promote regular blood donation among females, thereby contributing to maintaining a steady and adequate blood supply for individuals requiring transfusions[14].

The government officers from the questionnaire consisted of soldiers, policemen, and state enterprise workers. Many blood donors in this group might donate because mobile blood donation units were issued directly to their offices. People working in such places were more likely to donate blood than other occupation groups.

Phlebotomy-related issues constitute the most prevalent complications associated with blood donation. These problems can arise from factors such as unguided phlebotomy procedures, flawed techniques, or the involvement of inexperienced phlebotomists[15]. Additionally, occurrences such as fainting, bruising, not being allowed to donate, and blood vessel injury have also been observed.

Blood group O and RhD-positive have the highest number of donors. This number corresponds to the distribution of blood groups in Thai population: O (37.5%) and B (34.7%), A (20.3%) and AB (7.5%), respectively. RhD-negative was found only in 114 donors (0.2%)[15].

During the COVID-19 outbreak at Maharaj Nakhon Si Thammarat Hospital's blood bank, a decline in the number of blood donors was observed. Specifically, off-site blood donors decreased from an average of 8,926 to 6,642 (26%), while blood donors in the hospital and the overall number of blood donors slightly increased, accounting for 26 and 3%, respectively.

The main obstacle to blood donations during the COVID-19 pandemic is the fear of infection (80.6%)[12]. An approach to increase the number of donors is to encourage friends and family members to become regular blood donors. It is crucial to conduct targeted public awareness campaigns, organize mobile blood drives with strict safety measures, encourage appointment-based donations, utilize virtual platforms for promotion, relax certain eligibility criteria, partner with healthcare providers and businesses, and implement donor recognition strategies. These measures will help alleviate concerns, ensure donor safety, and maintain a steady blood supply to meet the critical needs of patients during this challenging time.

The study's limitations are that the control measures implemented varied across different pandemic areas. The demand for blood also differed, with more promotion likely occurring in high-demand areas. The absence of comprehensive data regarding donor counts at hospitals or other blood centers imposes constraints on understanding the prevailing blood shortage amidst this exigent situation.

Conclusion

Adolescents, females, and government officers were the groups with the highest number of blood donors, both first-time and repeat blood donors. Therefore, the issuance of mobile blood donation units for these groups will help increase blood donation numbers during the COVID-19 pandemic or blood shortages.

Acknowledgments

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