



The effect of motivational strategy on voluntary plasma donation, a field trial

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ABSTRACT

Background: Plasma protein therapies (PPTs) are a group of medicines extracted from human plasma through fractionation. The manufacture of adequate amounts of PPTs requires a large volume of human plasma. WHO emphasized that whole blood and blood component donations should be voluntary and non-remunerated. So, motivating people to donate plasma is crucial. In this study, we evaluated the impact of social media on motivating blood donors to donate plasma without any compensation and the moderating effects of blood donation history on plasma donation.

Methods and materials: we allocated blood donors (n = 501) to intervention and control groups randomly. Participants in the intervention group got educational and motivational messages through a WhatsApp channel. Then, we followed up all participants for six months and registered the information of the plasma donation during this period.

Result: In the intervention group, 6.8% had returned to donate plasma, while this was 2% in the control group (p = 0.016, OR:3.59, 95%CI:1.3–9.89). Among regular blood donors in the intervention group, 17.86% had returned to donate plasma but, no regular donor returned to donate plasma in the control group (p = 0.055). In addition, 10.8% of donors who had academic education in the intervention group returned to donate plasma, although this was 2.54% in the control group (P = 0.0485).

Conclusion: Our findings suggest that the educational interventions have more effects on academically educated donors to motivate them to donate plasma.

1. Introduction

Plasma protein therapies (PPTs) are a group of medicines extracted from human plasma through fractionation that are used to treat inherited or acquired deficiencies of essential proteins such as hemophilia A and B, different immunodeficiencies, and alpha 1- antitrypsin deficiency. Also, PPTs can be employed to treat acute blood treat acute blood loss, burns, and sepsis. In that regard, there is a significant market for these products. Manufacture of adequate amounts requires a large volume of human plasma as the raw material purification process [1].

In the world, plasma donation is often compensated [2]. Although some studies suggest that monetary payment encourages donors to continue donating [3–6], some report the opposite results [3, 7–11]. Moreover, evidence shows that paying donors to donate plasma would induce more people to ignore their disease status or risk factors [2]. The

World Health Organization (WHO) emphasized that blood donation, including whole blood and blood components, should be voluntary and non-remunerated [12]. It also increasingly advocates for self-sufficiency in both blood components for direct clinical use and Plasma-Derived Medicinal Products (PDMPs) based on Voluntary Non-Remunerated Donation (VNRD) [12–14].

Iranian Blood Transfusion Organization (IBTO) is a well-organized national blood service that is the sole provider of safe and adequate blood supply. IBTO has achieved 100% VNRBD by improving donor management [15]. Also, IBTO has started contract fractionation by surplus recovered plasma since 2004 to meet the national demand of hospitals for PDMPs [16]. Although surplus recovered plasma provides enough IVIG and Factor 9, more plasma must be collected to reach PDMPs self-sufficiency. So, IBTO started planning to motivate and recruit plasma donors to donate voluntarily non-remunerated. In Australia

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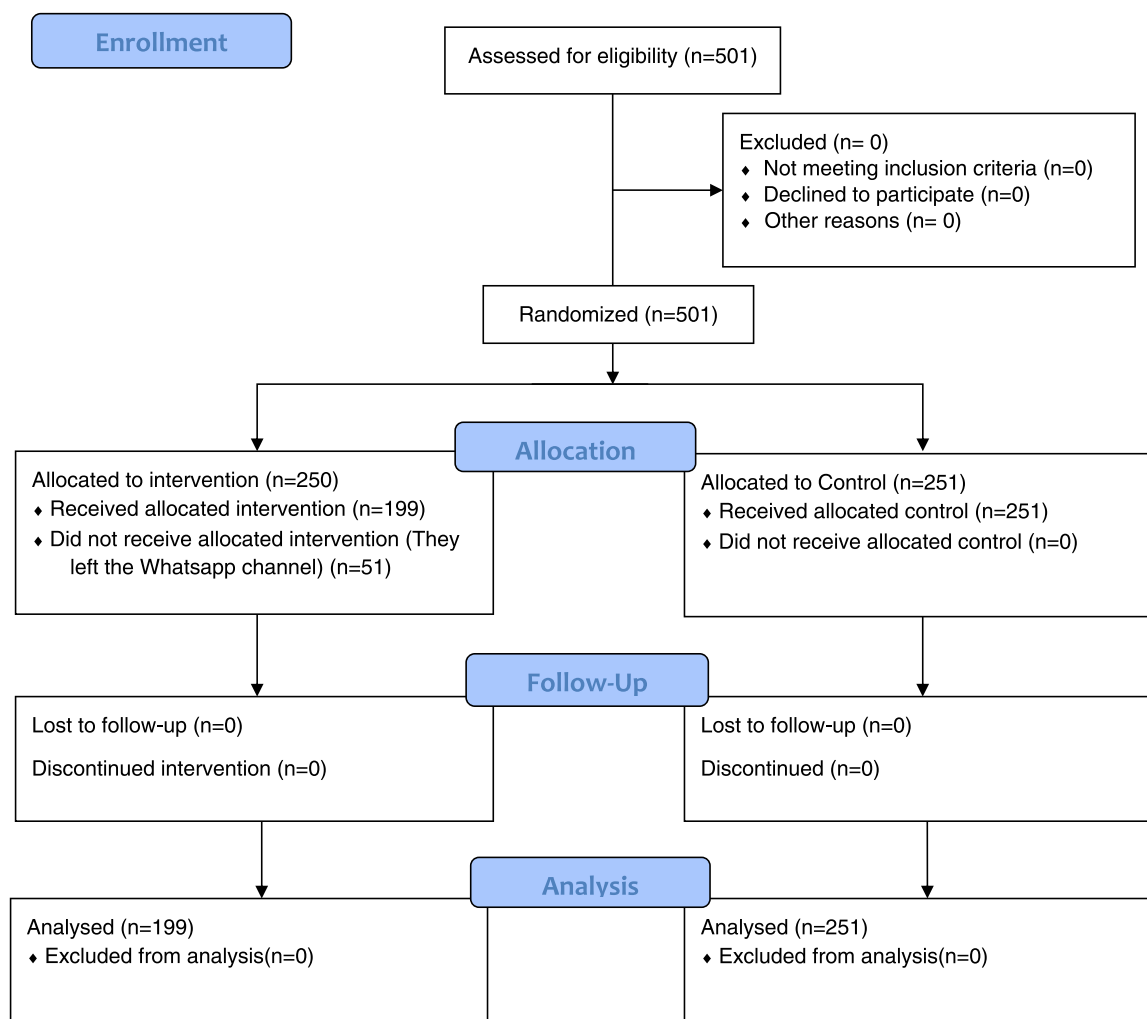


Fig. 1. Flow diagram of the progress of the randomized trial.

and Netherland, the whole blood donors were motivated to recruit plasmapheresis donors [17].

Therefore, the different impacts of different strategies on donor behavior must be explored. In this project, we studied the impact of providing information by social media on motivating blood donors to donate plasma without compensation. We also investigated the moderating effects of blood donation history on plasma donation.

2. Methods

The present research was conducted as a field trial in Tehran blood center. The study population included the blood donors referred to the center during May and Jun 2019 and were eligible for blood donation based on Iranian Blood Transfusion Organization (IBTO) standards. The participants had experienced at least a successful whole blood donation. The donors who had repeated reactive results in ay screening laboratory tests were excluded.

In order to calculate the required sample size, G*power software was used by considering a small effect size ($d=0.251$) and a significant level of 0.05 and power of 0.8 with one allocation ratio; the total required sample 500 were computed. We used block randomization for assigning the intervention to the study subjects. The random sequence was generated by an online web-based software located at <https://www.sealedenvelope.com/simple-randomiser/v1/lists> First, of 501 blood donors, 250 were randomly assigned to intervention and 251 to control group. Then they were asked whether or not they wanted to regularly

join social media to get information about plasma donation. If their answer was negative, they were excluded from the study. After signing the consent form, participants completed a form that contained demographic information, educational and occupational status, and history of blood donation. According to IBTO standard operating procedure, they were categorized as the first-time donor; the individual with no donation, or experience repeated blood donor; the one, who has donated blood in the past but not in the last 12 months; and regular blood donor; the one who has donated twice or more within 12 months [18]. Then the participants were randomly assigned to each group.

In May 2019, we created the Plasma Donation channel on WhatsApp. Then we added 250 participants to the channel as the intervention group. Some participants left the channel ($n = 51$); therefore, 199 participants remained in the intervention group. Then, we shared educational and motivational messages, such as texts, pictures, or videos, with the group members. The message contained the definition of plasma, how it is extracted from the whole blood, what the plasma derivative drugs are, who needs plasma products, and who gets benefits from them. We also provided videos of plasma donor experiences and why they donated plasma. The messages were concise and contained pictures.

Some videos with less than two minutes of duration were about patients who had received plasma and improved health. Some videos were produced by IBTO, while the rest were downloaded from available free online sources. Sending messages was scheduled every two days for six months. Participants could send their questions and comments via private direct message to the admin. The admin answered Questions

Table 1
Sex, education status, Donor type, Past Plasma Donation and Age in intervention and control groups.

Characteristics	Group	N (%)	P-value
Sex	Intervention	Female	16 (6.4%)
		Male	234 (93.6%)
	control	Female	20(8%)
		Male	231 (92%)
Education	Intervention	Academic	121 (48.2%)
		Non-Academic	130 (47.6%)
	Control	Academic	131 (52.4%)
		Non-Academic	119 (47.6%)
Donor type	Intervention	First time	170 (68%)
		Repeated	33 (13.2%)
		Regular	47 (18.8%)
	Control	First time	170 (67.7%)
		Repeated	29 (11.6%)
		Regular	52 (20.7%)
Age	Intervention	[18,28)	57 (37.6%)
		[28,38)	60(24%)
		[38,48)	39 (15.6%)
	Control	[18,28)	57 (22.7%)
		[28,38)	103 (41%)
		[38,48)	63 (25.1%)
		28 (11.2%)	

Table 2
The association between intervention and plasma donation.

Group	Plasma donation	N (%)	OR 95% CI	P-value
Intervention	Yes	17(6.8%)	3.59 (1.3, 9.89)	0.016
	No	233(93.2%)		
Control	Yes	5(2%)		
	No	246(98%)		

appropriately and gave necessary feedback. The participants in both groups were followed for six months. The donors in both groups were routinely invited to donate plasma while referring to the blood center.

Frequency and percentage were reported for qualitative variables as the descriptive statistics. A Chi-square test was used to evaluate the association between two qualitative variables, and Fisher exact test was used if needed. The intention to treat approach was used to analyze the data. All statistical analyses were performed in R software. In this study, a statistically significant level was set at 0.05.

3. Results

In this randomized control field trial, 501 blood donors entered the study. Two hundred fifty donors were randomly assigned into the

Table 3
The subgroup analysis for between and within group association of intervention and plasma donation.

Group		Plasma donation		donation Rat%	P-value*	P-value**	
		Yes	No				
Sex	intervention	Male	17	217	7.83%	0.6102	0.0177
		Female	0	16	0.0%		
	Control	Male	5	226	2.21%	1.00	-
		Female	0	20	0.0%		
Education	Intervention	Academic	12	119	10.8%	0.1923	0.0485
		Non-Academic	5	114	4.4%		
	control	Academic	3	118	2.54%	0.6744	-
		Non-Academic	2	128	1.56%		
Donor type	Intervention	First time	8	162	4.94%	0.081	0.1085
		Repeated	4	43	9.3%		
		Regular	5	28	17.86%		
	Control	First time	2	168	1.19%	0.123	-
Repeated		3	49	6.12%			
Regular		0	29	0.0%			
Age	Intervention	[18,28)	4	53	7.55%	0.3625	0.679
		[28,38)	4	60	6.67%		
		[38,48)	4	56	7.14%		
		[48,60]	5	34	14/71%		
	control	[18,28)	2	55	3.64%	0.5517	-
		[28,38)	1	102	0.98%		
		[38,48)	1	62	1.61%		
		[48,60]	1	27	3.7%		

*Within-group comparison (group: intervention vs. control), ** between-group comparison.

intervention group and 251 to the control group. After a while, 51 donors from the intervention group withdraw from the study. Fig. 1 is show the Flow diagram of the progress of the randomized trial (Fig. 1). Table 1 indicates the Participant baseline characteristics of the two groups.

The randomization was successful since there was no statistically significant difference between the two groups' age, history of donation, and level of education (Table 1).

A significant relationship was observed between intervention and the rate of plasma donation (Table 2), such that the odds of plasma donation in the intervention group were 3.59 times greater than the control group (OR=3.59, 95%CI: 1.3, 9.89, P-value=0.016).

The subgroup analysis is performed for each baseline characteristic factors (Table 3). The intervention had a significant positive effect on men in the intervention group compared to those in the control group (donation rate: 7.83% vs. 2.21%, P-value=0.0177). Similarly, the plasma donation rate for donors with academic education level in the intervention group was significantly higher than their counterpart in the control group (donation rate: 10.8% vs. 2.54%, P-value=0.0485).

4. Discussion

In the present study, we evaluated the impact of social media on motivating blood donors to donate plasma. This study showed a significant difference between the return rate of total blood donors after six months with and without intervention (OR=3.59, 95%CI: 1.3, 9.89, P-value=0.016). The results showed that educational intervention generally leads to more referrals for plasma donation; meanwhile, in Australia, Thorpe et al. found that telephone and e-mail communications can bring new plasma donors back to the donation in 6 months [19]. Another study in Australia by Bagot et al. mentions that focusing on increasing knowledge about different aspects of plasmapheresis donation could lead to behavior change in recruiting plasma donors [20].

Among regular blood donors, even though the plasma donation rate was 17.86% in the intervention group and 0.0% in the control group, but no significant difference was observed ($P = 0.055$). While in a study conducted by Thijson et al. showed that regular blood donors had a higher return rate within 18 months [21]. A study conducted in 2011 showed that internal motivations, including altruistic reasons and religious beliefs, were significantly bolder in Iranian regular blood donors [22].

We observed that, among participants with academic education, the intervention group had significantly higher plasma donation rate than the control group (10.8% vs. 2.54%, respectively, $P = 0.0485$). This finding is consistent with the Hashemi et al. study posited that sending an educational letter to Iranian well-educated blood donors significantly affected their return rate to donate blood [23].

The Educational message via social media were found to have more effects on men than women (7.83% vs. 2.21%, $P = 0.0177$). This can be related to men facing fewer blood and plasma donation barriers, such as pregnancy, bodyweight less than 50 Kg and anemia. Although, in a study, Glynn et al. mentioned that only 15% of men and women were recruited via a blood drive organizer or recruiter. However, once recruited, men were significantly less likely than women to respond to reminders from blood collection agencies via telephone, e-mail, TV, radio, or print media [24].

The strength of this study was that this is a randomized trial that considers donor practice as an outcome of the study. Also, few studies use media as a social marketing method to encourage donors to donate plasma.

The study limitations were: first, the number of females in this study was minimal, and this is because female donors supplied only 5.2% of the blood in IBTO [25]. Second, at the design stage, Telegram was selected for the study as the most popular application in Iran, but due to some governmental restrictions, we were forced to use WhatsApp instead, which is less popular among Iranians and caused several donors in the intervention group to leave the channel.

In conclusion, it appears that blood donors are not willing to donate plasma voluntarily. However, educational interventions have relatively more significant effects on academically educated donors and motivate them to donate plasma. Therefore, recruiting voluntary plasma donors, can help focus on this group of donors. Moreover, further research is needed to extract effective ways to motivate blood donors to donate plasma.

Author contribution

Mahtab Maghsudlu: Conceived of the presented idea and developed the theory. Designed the study. She had supervised the project moreover, revised and confirmed the final version of the manuscript, **Ghazal Hajinasrollah:** Drafted the manuscript. Performed the analytic calculations. Prepared educational and motivational messages as texts, pictures or videos. Performed interventions, **A. Teimourpour:** Performed the statistical analysis. **M. Tabatabai, A. Sedaghat and B. Haji Beigi:** Contributed to sample preparation and prepared educational and motivational messages. **A. Teimourpour:** Performed the statistical analysis. **M.R. Sohrabi:** Cooperated to design the study, **Nazemi:** Contributed to sample preparation, took consent from participants and filled their information forms. Prepared educational and motivational messages. Performed interventions.

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Conflicts of interests

The authors declare that they have no conflicts of interests".

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