Knowledge, Attitude and Self-Efficacy Towards Blood Donation Among University Students: An Online Intervention Study

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ABSTRACT

Background: Long-term shortages in the blood supply perpetuate increased morbidity and mortality from treatable diseases. However, how much people are motivated to donate blood was less studied, especially among university students. This study aimed to determine the effectiveness of online intervention for knowledge, attitude, and self-efficacy towards blood donation among undergraduate university students.
Methods: A pre-and post-test study was conducted among undergraduate students. Four hundred students were invited for the study. Knowledge, positive and negative attitudes, and self-efficacy towards blood donation were measured using a structured questionnaire. Two digital infographics of blood donation information and one 10-minute video were used as intervention materials. Following the intervention, statistical and practical significance was reported. Multivariate analysis of variance was done to determine the differences in invention effect across age, gender, and study discipline.
Results: Following the intervention, there was 29.11% and 5.11% increased knowledge and self-efficacy from the base, respectively. The positive attitude towards blood donation increased by 2.81%, while the negative attitude decreased by 2.14%. Multivariate analysis of variance showed that online health education on blood donation is effective irrespective of age, gender, and discipline of study.
Conclusion and recommendation: Due to the Covid-19 pandemic, the intervention was integrated into a remote health intervention model based on the Internet or mobile communication network. This study has provided a scientific conclusion on whether the intervention could facilitate motivating people to donate blood.

Keywords: Blood donation, Knowledge, Attitude, Self-efficacy, Intervention, Sarawak, Malaysia.

INTRODUCTION

Blood and blood components are vital in stabilising patients with complications in various medical illnesses and during advanced operative procedures (World Health Organization, 2020). There is no alternative source for this essential component of the human. Thus, blood donation remains the major source of blood and blood components worldwide in the management in which replacement of blood components is required (Enawgaw et al., 2019). Blood transfusion can be defined as the injection of a blood volume obtained from a healthy person (known as the donor) into the patient's (known as the recipient) circulation, whose blood is deficient in quantity or quality (Mulatu et al., 2017).

Blood donation in Malaysia shows an increasing trend, which records an increase from 590,517 donations in 2010 to 743,892 in 2019. Despite the increase in blood donors, Malaysia still faces a critical blood shortage due to its growing population and blood demand (Nur Hairani et al., 2018). This is evident because only 2.2% of the entire population are donors compared to 3.5% to 5.0% recorded in developed countries in 2014 (Ling et al., 2018). This condition was further exacerbated during the Covid-19 pandemic, where the number of whole blood donors dropped by 67%, and the success rate of recruitment for donation dropped by 60%. This is due to the public's concern regarding the possibility of acquiring Covid-19 during blood donation (Wang & Fang, 2020). Malaysia is reported to achieve 100% voluntary non-remunerated blood donation in 2008. This plan of action assures a safe and less risky blood supply. However, not all healthy individuals are willing to donate blood due to barriers such as fear of the needle, pain, discomfort, the sight of blood, time constraints, the myth of contraction of infectious disease, and concern about sterilising blood drawing equipment (Nur Hairani et al., 2018). This call for a strategy to encourage blood donation from university students as the future of a safe blood supply, low-risk group, and longer donor career (Jaafar et al., 2020).

Numerous studies have identified a disconnect between university students' willingness to donate blood and actual donation rates due to misconceptions and fears (Baig et al., 2013; Majdabadi et al., 2018; Melku et al., 2018; Waggiallah, 2023). Attitudes towards blood donation are complex and influenced by knowledge, societal and cultural beliefs (Bednall & Bove, 2011; Melku et al., 2018; Melku et al., 2016; Zucoloto et al., 2020). However, educational campaigns have successfully improved attitudes and increased donation rates (Abdel Gader et al., 2011; Alfouzan, 2014; Attitalla, 2011). These campaigns address blood shortages by tapping into a healthy donor pool and fostering a habit of regular donation, ensuring a consistent blood supply for the future (Gomes et al., 2019; Li et al., 2021; Torrent-Sellens et al., 2021). They effectively increase donation prevalence by educating students and dispelling myths associated with the process (Borges & Forés, 2015). Hence, given their significant role in improving attitudes and promoting blood donation, such campaigns and or interventions are a key public health strategy for this demographic. The assessment involving knowledge regarding blood donation has revealed that only 60% of the people in developing countries have adequate blood donation knowledge (Gebresilase et al., 2017). Most students have poor practice towards blood donation (Elnajeh et al., 2017). Furthermore, the intention to donate blood could predict practice towards blood donation. An individual intention to donate blood is closely related to demographic, knowledge status, and behavioural factors (Pule et al., 2014). Therefore, health education materials such as posters, brochures, and social media, including "*Facebook*" and "*Instagram*", play an important role in promoting blood donation (Lefrère & Danic, 2012; Masser et al., 2016).

Several studies were conducted among undergraduate and secondary school students that found positive changes in the behaviour of increased willingness to participate in blood donation after health education intervention using brochures and videotape presentations (France et al., 2011; Sarason et al., 1992). By assessing the level of knowledge, attitude, and self-efficacy among university students toward blood donation, the findings could be shared with different stakeholders to design interventions to increase donations. Moreover, the effectiveness of the educational materials developed in this study could determine their usage to promote blood donation among students. Therefore, this research assesses undergraduate students' knowledge, attitude, and self-efficacy towards blood donation.

METHODS

Participants and setting

This study was an intervention study designed to assess university students' knowledge, attitude, and self-efficacy toward blood donation. The study used a pre-test post-test design in which randomisation of individual students was absent. The inclusion criteria for the respondents include (a) students who have enrolled for an undergraduate degree and (b) who were willing to participate. The students have been classified into Science and Non-science

faculty except the Faculty of Medicine and Health Sciences. The exclusion criteria for the respondents include (a) non-university students, (b) pre-university students, and (c) postgraduate students.

Sample and sampling procedure

The sample size was calculated using G*Power version 3.1.9.7 (Faul et al., 2007). We assume to achieve a power of 80% and a level of significance of 5% (two-sided) for detecting an effect size of 0.2 between pairs. The expected sample size was 199. A total of 100 students were required to be recruited for each group. We have planned to recruit 400 hundred students, with 100 students in each faculty to get precise results. This study followed a multistage sampling strategy. The first sampling stage was to select the participating faculties. Two faculties, each from the science stream and non-science stream, were randomly selected among the faculties. The selection was made via an online random generator with the link, https://www.random.org/lists/. The results determined that faculties representing the science stream were (a) Faculty of Engineering (FE) and (b) Faculty of Resource Science and Technology (FRST). In comparison, the faculties representing the non-science stream were (a) Faculty of Economics and Business (FEB) and (b) Faculty of Social Sciences and Humanities (FSSH). One hundred students were selected from each faculty. The second stage was the recruitment of respondents from the respective faculties. The students were selected based on their willingness to participate. In this study, year-1 students were recruited as participants. According to their stream, the participants were assigned into two groups: (a) Group 1-science stream and (b) Group 2-non-science stream (Figure 1).
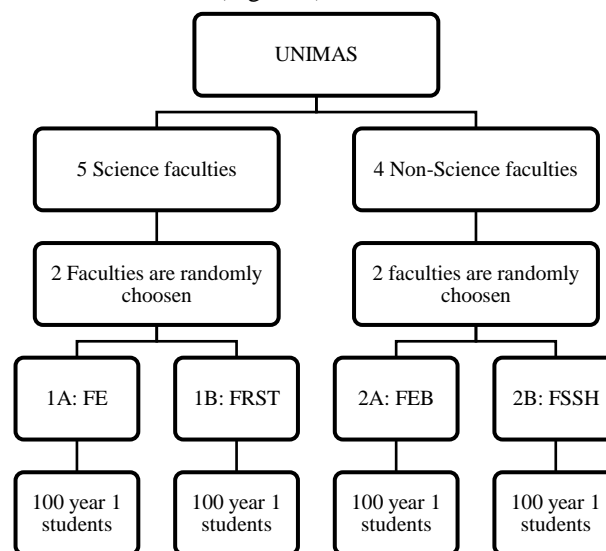
Figure 1:Schematic Diagram of the sampling procedure

Measurements

Knowledge on blood donation: The questionnaire on knowledge is adopted and adapted from previous research (Baig et al., 2013; Nwogoh et al., 2013; Zucoloto & Martinez, 2018). It was assessed with structured answer options, namely 'do not know', 'yes' and 'no'. The answer was based on the respondents' education on blood donation. Out of 34 questions, 19 questions with answer option 'yes' as the correct response and 11 questions with 'no' as an incorrect response, and four questions were on the 'correct response' based on the options given by the researcher (Annex 1).

Attitude towards blood donation: The questionnaire on attitude towards blood donation was adopted and adapted from Allerson (2012) and Jalalian et al. (2010). It has 18 items with seven-point Likert scales of agreement where '1' strongly disagrees and '7' strongly agrees. Out of 18 questions, nine questions were considered a positive attitude, and the remaining nine questions were considered a negative attitude (Annex 2).

Self-efficacy: This measures people's beliefs about their capabilities to produce effects (Bandura, 1994). The self-efficacy questionnaire is adopted and adapted from Nwogoh et al. (2013) and Jalalian et al. (2010) questionnaires. It has ten items with seven-point Likert scales of agreement where '1' strongly disagree and '7' strongly agree. Items number 2 and 4 were reversed coded, and the rest were as positive agreement (Annex 3).

All the scores were summed up and converted into a percentage for easy interpretation (Glen, 2014). The post-test score was deducted from the pre-test score to get the percentage of changes following the intervention.

Data collection

Data collection was started upon receiving participation and informed consent from the students. The students were added to a WhatsApp group following their assigned group: Group 1A, 1B, 2A, and 2B. The questionnaire's link was sent through the WhatsApp group to be completed within three days. Only the students who have never donated blood would be further assessed in pre-test on their level of knowledge, attitude, and self-efficacy towards blood donation, while students who have donated blood before would not be invited to complete the questionnaires. The students were contacted to check if they faced any problems or if there were any missing data. Seminar sessions were arranged for each group separately for not more than seven days upon completing the pre-test. Thirty-minute seminar sessions were held as the intervention. No re-enforcement seminar was given to the groups. Seven days after the seminar, the link for the post-test questionnaire was distributed to the students. Three days were given to them to complete the questionnaire.

Intervention

As this is an interventional study, the intervention was given to achieve the aim of the study. The intervention would be given within one week upon the completion of the pre-test. This intervention was held in the form of a seminar session. The seminar comprised three parts: health education infographic 1, health education video, and health education infographic 2. Immediately after the seminar session, the post-test questionnaire was distributed to the students for post-test data collection. Infographic 1 was focused on knowledge of blood donation, such as the eligibility and deferral criteria of blood donation and information on the benefits of blood donation in Malaysia. Infographic 2 described the purpose of blood donation and its uses in certain diseases, type of blood products used in transfusion and the procedures before and after blood donation. The health education video was recorded during a blood donation drive illustrating the blood donation process. These health education materials were used to motivate and positively improve their blood donation attitude.
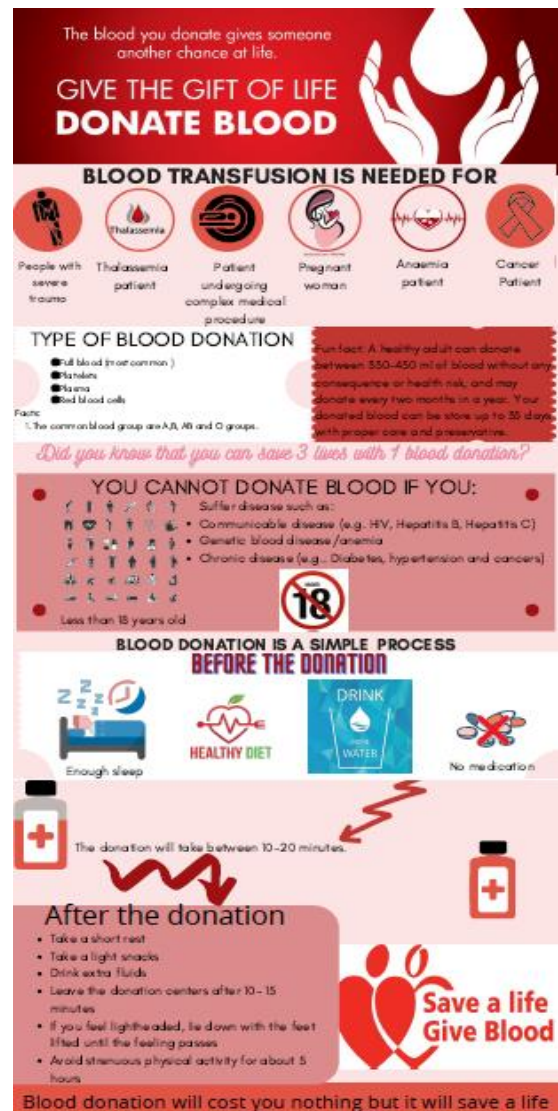
Figure 2(a): Infographic 1; 2(b): Infographic 2

Pre-test of questionnaire and health education materials

A pilot study for both questionnaires and health education materials was conducted among 41 medical students at the same university. This was to ensure that all questions are comprehensible and not too time-consuming to fill up the questionnaire. To ensure internal consistency, we calculate the Cronbach alpha. Analysis revealed no substantial changes of question and the Cronbach alpha was more than 0.80. The content of the health education materials was compatible and fulfilled the content of the knowledge, at the same time, understandable. It was pre-tested and analysed quantitatively (Abildgaard et al., 2016) using a structured questionnaire adapted from Ryan et al. (2014) regarding content, clarity, and illustration.

Data analysis

Data were entered directly into Microsoft Excel through google form. Then, data were exported to the IBM SPSS software version 27. The entered data was reviewed to check for missing data, duplication, and inconsistent responses. Two groups of students from the research team double-checked the data to validate the responses. Respondents who were not followed up were removed from the study. An exploratory data analysis was done to determine outliers, inconsistencies, and assumptions (Garson, 2012b, 2015). Qualitative variables were analysed with frequency, percentage in descriptive analysis, mean and standard deviation for quantitative variables. A 95% confidence interval was used to assess data variability and normality. Multivariate analysis of covariance was done to determine the relation of intervention outcome with age, gender, and discipline of study (Tabachnick &

Fidell, 2019). The p-value of 5% was used to determine the statistical significance, and Cohen's d was reported with small, medium, and large for practical significance (Cohen, 1988).

Ethical issues

Ethical approval was obtained from the Ethics Committee of the Faculty of Medicine and Health Sciences (Ref: FME/21/61). Before data collection, the students were briefed about the objectives and benefits of the study and were assured of data confidentiality and privacy. The student's identity and name would not be disclosed in any form.

RESULTS

Participants

A total of 472 students completed the questionnaires and fulfilled the research criteria. Out of 472 respondents, 71 (15.0%) students have donated blood before, while 401 (85.0%) students have never donated blood. As such, 401 students were recruited for pre-test and post-test studies. However, only 321 of them attended the intervention session. They completed the post-test study giving the follow-up rate of 80.1% (actual drop-out rate = 19.9%). Finally, 321 respondents were recruited for pre-test and post-test for the level of knowledge, attitude, and self-efficacy towards blood donation. The actual flow chart is shown in Figure 3.
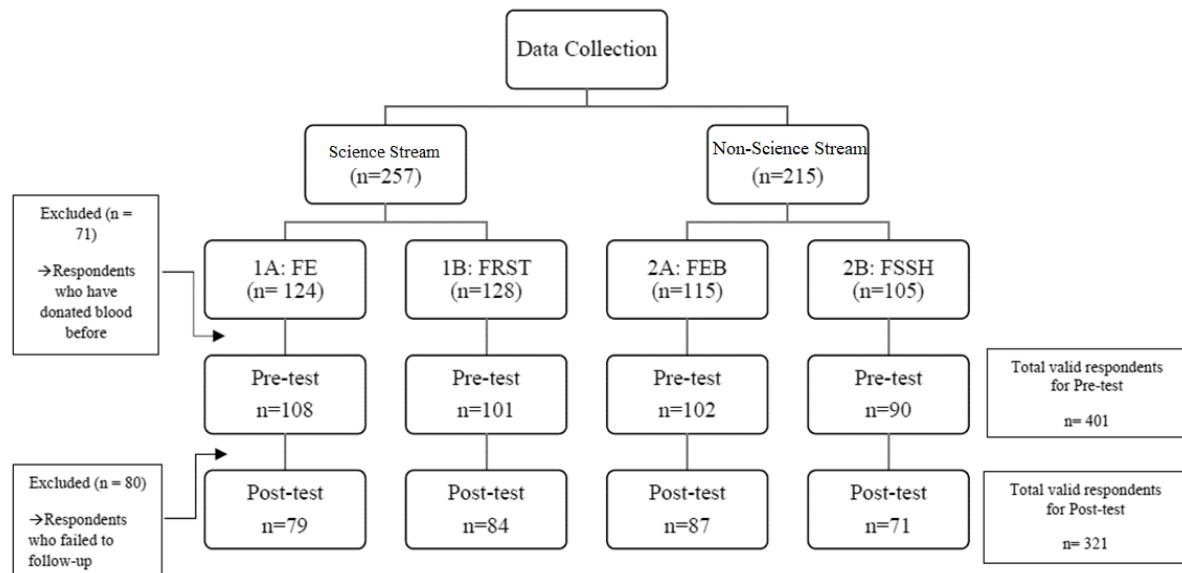

Figure 3: Flow Diagram of the recruitment in the science stream and non-science stream group

Out of 472 respondents, a total of 71 had donated blood before. Therefore, they were also excluded from the analysis.

Characteristics of the students

Out of 321 participants, 52.3% were from science stream faculties, and the rest were from non-science stream faculties. The mean age of the students was 20.73 years, with a standard deviation of 1.02 years. The minimum age of the students was 19, and the maximum age was 26 years. Two-thirds of the participants were female (65.1%), and 34.9% were male, with the male to female ratio of 0.53:1. The highest percentage of the students were Bumiputera, other than Malays (41.7%), followed by Malays (27.1%) and Chinese (25.2%). More than two-fifths (45.8%) were Christian, followed by Muslim (38.3%). Among the students, 41.7% had STPM, i.e. Higher Secondary Education Certificate followed by Foundation Course Certificate (26.2%) and Matriculation Course Certificate (22.7%). It was noted that only 6.9% had attended a blood donation campaign. Parental education revealed that the highest percentage of the parents had a secondary level of education (father = 48.6%, mother = 53%), followed by the undergraduate level of education.

Table 1: Characteristics of the participants

Characteristics	n	%
Participants		
Science	168	52.3
Non-science	153	47.7
Age in years		
19-20	153	47.7
21-22	143	44.5
≥23	25	7.8
Gender		
Male	112	34.9
Female	209	65.1
Attendance of blood donation campaign		
Yes	22	6.9
No	299	93.1

Pre- and post-test results

Exploratory analysis revealed that the data were not normally distributed with some skewness and kurtosis. After removing the skewed data (57 data were removed), paired sample t-test was done to determine the changes in pre- and post-intervention knowledge, attitude and self-efficacy. However, easy interpretation and comparison of the outcome of variables were standardised into the percentage. Table 2 illustrates the pre-and post-intervention knowledge, attitude and self-efficacy of blood donation. Analysis indicated that knowledge on blood donation increased 29.11% from base knowledge, and self-efficacy increased to 5.11%. The positive attitude towards blood donation increased by 2.81%, and the negative attitude decreased to 2.14%. Analysis revealed that following intervention, the knowledge, positive attitude and self-efficacy towards blood donation significantly increased ($p<.001$) and the negative attitude significantly improved with decreased attitude ($p<.001$). However, Cohen's d showed a medium effect in attitude towards blood donation for positive attitude (Cohen's d= 0.293) and negative effect (Cohen's d = 0.239). The intervention showed a large impact on knowledge (Cohen's d = 1.647) and self-efficacy (Cohen's d = 0.665).

Table 2 Pre- and post-test results of knowledge, attitude and self-efficacy on blood donation

Variables	N	Mean	SD	% changed	Min	Max	Q1	Q2	Q3	Cohen's d	p-value
Knowledge											
Pre-test	264	49.50	18.11	29.11	0.00	85.29	38.24	50.00	61.76	*1.647*	*<.001*
Post-test	264	78.61	11.26		26.47	97.06	73.53	82.35	85.29		
Positive attitude											
Pre-test	264	62.05	9.67	2.81	33.33	77.78	54.63	62.96	70.06	*0.293*	*<.001*
Post-test	264	64.87	10.62		33.33	77.78	56.79	66.67	74.07		
Negative attitude											
Pre-test	264	29.94	9.40	2.14	11.11	64.20	23.46	29.63	36.73	*0.239*	*<.001*
Post-test	264	27.80	10.56		11.11	59.26	20.06	27.16	32.10		
Self-efficacy											
Pre-test	264	45.99	9.39	5.11	17.00	70.00	40.00	45.00	52.00	*0.665*	*<.001*
Post-test	264	51.10	10.76		26.00	70.00	42.00	50.00	60.00		

p-value reached from paired sample t-test
*p<05, **p<.01, ***p<.001
Cohen'd = Small=0.2, medium = 0.5, large =0.80

Multivariate analysis of variance (MANOVA)

We examined the effects of the intervention of knowledge, attitude, and self-efficacy among the students after controlling for age, gender, and type of faculty. A multivariate analysis of variance was done with the percentage of the changed score of knowledge, attitude, and self-efficacy as the dependent variable. The multivariate analysis variance was done to minimise the type 1 error (Garson, 2012a; Hair et al., 2019) instead of a one-way analysis of variance (ANOVA). The independent or factor variables were the type of faculty (science stream vs. non-science stream), age (<21 years vs.>21 years), and gender (male vs. female). Exploratory data analysis was done to determine the substantial violation of normality based on mean and median, skewness and kurtosis, and Shapiro-Wilk test (Hair et al., 2019). After checking univariate and multivariate normality, 57 data were removed based on Cook's distance (Cook, 1977; Hair et al., 2019) and Mahanobolis distance (Garson, 2012b). The variance inflation factor (VIF) values for all dependent variables are between 1 to 1.5, indicating no multicollinearity among variables. Levene's test was not significant for all variables (p>.05). The homogeneity of variance was assumed. The Box's test of equality of covariance matrices showed a significant p-value (p= .004). We proceed to conduct MANOVA due to the large sample size, and it is a robust test. As the age interacted with the dependent variable, we categorised it to less than 21 years and more than 21 years. Finally, a three-way MANOVA was used, with the main effect determined. The descriptive statistic of the test variable (dependent variables) by factors is illustrated in Figure 4.

Multivariate analysis of variance indicated no statistically significant difference between type of faculty (p>0.05), gender (p>0.05), and age group (p>0.05). The mean percentage score of knowledge was highest among male students aged less than 21 years in the non-science stream (36.8%) and the lowest among female students aged less than 21 years in the science stream (28.1%). In terms of self-efficacy, the highest percentage of change was observed among female students aged more than 21 years in science stream faculties (7.9%), and the lowest among male students with an age group of more than 21 years in the non-science stream faculties (1.4%). Similarly, the attitude towards blood donation increased among female students in the age group of 21 years and above in science stream faculties (49.8% to 5.8%), and the lowest among male students in the age group of 21 years and above in the non-science stream faculties (0.2% to 0.7%). This analysis concluded that the online intervention significantly impacted the increase in knowledge, attitude, and self-efficacy towards blood donation (p<.05). It was equally effective irrespective of age, gender, and type of faculty.
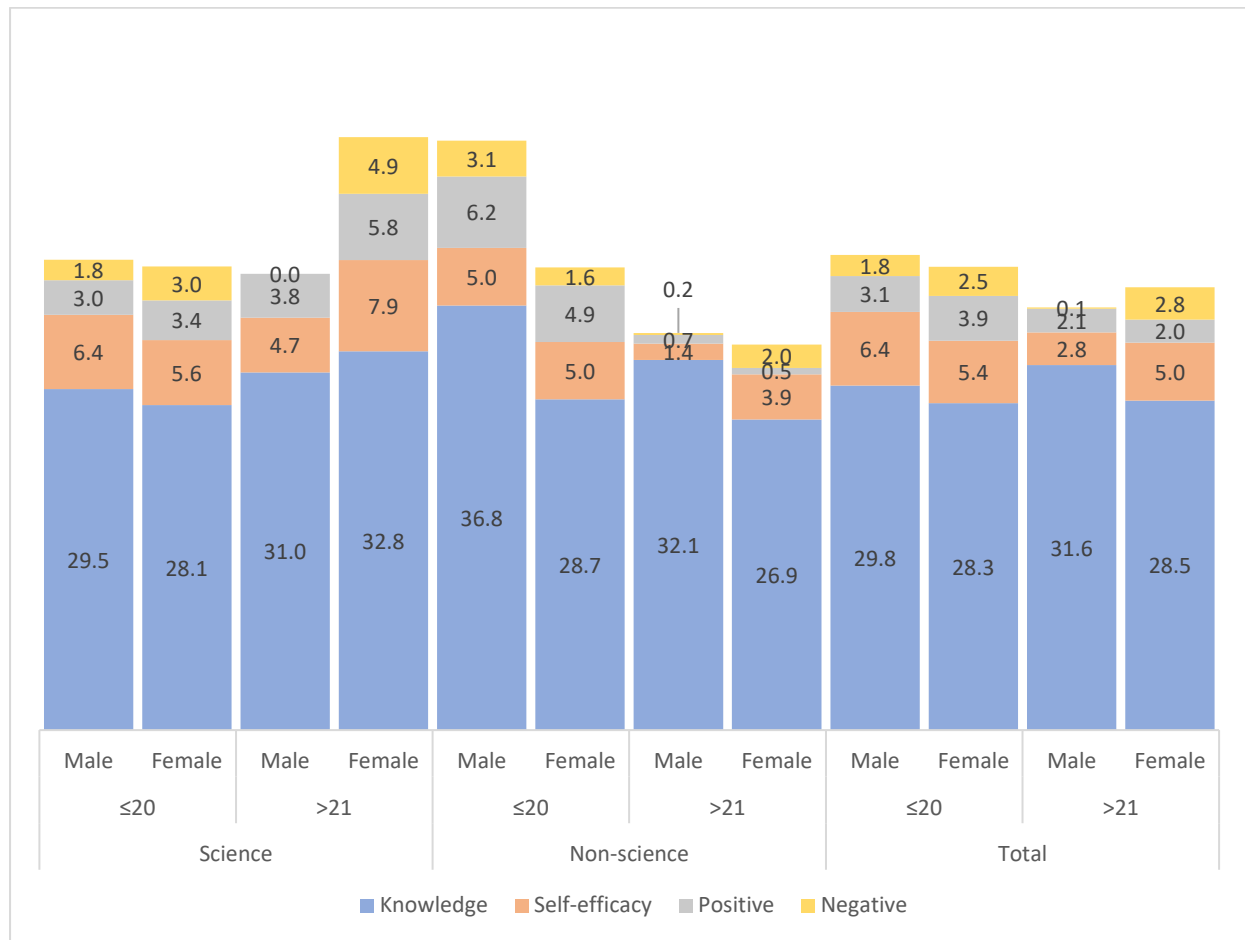
Figure 4: Mean percentage of changes of knowledge, attitude, and self-efficacy by subject, age, and gender

DISCUSSION

Malaysia has experienced a shortage of blood supply which further worsened during the Covid-19 pandemic. As various medical and surgical treatments are dependent on blood transfusion, the Ministry of Health Malaysia has targeted a minimum of 5% of the Malaysian population to become blood donors (Ling et al., 2018).

The pre-test analysis on knowledge towards blood donation among university students was below 50% in this study. This showed that the level of knowledge towards blood donation among university students was still low. In the study, the percentage of knowledgeable donors was higher than the non-donors. Thus, the low rate of blood donation in this study showed that there is still room for improvement among the study population. At the same time, students from science stream faculties were found to have a higher level of knowledge than students from non-science stream faculties. This finding is supported by Demissie (Nigatu & Demissie, 2014), which found that students from the Faculty of Natural Sciences scored better than those from the Faculty of Social Sciences in knowledge assessment. Science students are more scientifically inclined than non-science students; they are expected to be more motivated towards blood donation, which was considered a health issue (Gamage & Jayawardana, 2017). This is supported by the assessment on knowledge of non-communicable diseases done in Sri Lanka, showing non-science stream students having a lower level of knowledge than science stream students (Gamage & Jayawardana, 2017).

The methodology on participants recruitment based on volunteerism might have contributed to the high positive attitude towards voluntary blood donation. The high positive attitude was found to be conflicted with the findings from a few previous studies, which concluded that the low blood donation rate was due to a low positive attitude or high negative attitude towards blood donation (Ahmed et al., 2014; Aslami et al., 2015; Nigatu & Demissie, 2014). However, this study showed a high positive attitude towards blood donation. This could be further supported by most of the respondents agreeing that donating blood is a positive behavior. The Internet and easy

availability of information may have played a role in improving the attitude of the respondents about blood donation (Javaeed et al., 2020). Similarly, science students have a higher positive attitude and lower negative attitude compared to non-science students. Science students had higher positive behavior, and attitudes towards blood donation as knowledge can influence behavior (Xu et al., 2010). The highest agreement in negative attitude among the study participants was the fear of pain while donating blood. This may be one of the most prevalent hindrances towards blood donation. A similar scenario was indicated in the previous study in Malaysia, which stated that the most prevalent barrier towards blood donation among non-donors was the fear of needle prick, pain, or discomfort (Chin, 2018).

This study also assessed the self-efficacy towards blood donation among students showing that the respondents generally had a high positive behavior concern towards self-efficacy. The majority agreed that they were confident that they could donate blood if they were asked to do so. This showed that they were willing to donate blood only if they were approached to do so. From research conducted among the King Abdulaziz Medical City population, the majority of the respondents (52.4%) mentioned that the idea of blood donation did not come across their minds. In comparison, 41.3% of them mentioned that they had difficulty accessing blood donation centres (Alfouzan, 2014). Comparing science and non-science students has given the same finding on the level of knowledge and attitude. There was a positive association between knowledge, attitude, and self-efficacy (Javaeed et al., 2020). However, our analysis did not show a good correlation between knowledge, attitude, and self-efficacy.

The interventional seminar session fulfilled most of the criteria listed in the health education materials evaluation. The intervention has proven successful, with a significant increase of 29% in blood donation knowledge among the students. This signifies the importance of exposing the students to proper knowledge of blood donation. In the post-test study, most of the questions had correct answers showing the students had captured most of the knowledge shared via the sessions. Other than knowledge, attitude and self-efficacy has also shown improvement after intervention. Education materials are vital in addressing common myths and fears by providing clear information to allay apprehensions (World Health Organization, 2010). This will also clear up common misconceptions about blood donation, such as blood donation leading to anemia or being a blood donor. Some misconceptions that blood donation may expose them to HIV, Hepatitis B, and C may hinder blood donation (Chin, 2018). Multivariate analysis of variance showed that the online intervention is equally effective irrespective of age, gender, and discipline of study. A study towards promoting happiness via online intervention showed similar results (Manthey et al., 2016). Hence age, gender, and discipline of the study did not show significant changes across them. Though the percentage of attitude and self-efficacy changes was minimum, the practical implication was tremendous. Our analysis found a medium to large effect size. The changes in attitude and self-efficacy require a longer time and this study's period is insufficient to change someone's behavior towards attitudes and self-efficacy (Frothingham, 2019).

Although this study produced a better outcome on the student's knowledge, attitude, and self-efficacy towards blood donation after intervention provided, additional research is required to address some limitations in the current research design. The sampling method of this study is convenience sampling, in which the respondents were recruited voluntarily. There is a possibility of producing biased results which cannot be generalised to the population at large. Secondly, the study was conducted online due to the Covid-19 pandemic. One of the limitations was the lack of non-verbal communication. This leads to increased difficulties in explaining the issues by the presenter and less understanding of people's feelings. Thirdly, the online surveys are affected by both students' internet connection and self-administered questionnaires. During the intervention seminar session, poor internet connection caused some respondents to face technical problems, contributing to the drop-out rate in the post-test study. Although the actual drop-out rate was lower than the anticipated drop-out rate in sample size calculation, which was considered reassuring for the sample population, shifting the study from virtual to the physical platform is expected to decrease the drop-out rate. Finally, self-administrated questionnaires lack face-to-face monitoring resulting in a low engagement. The answers might not be reliable due to survey fatigue as they hurry to finish the survey without utterly understanding the questions. All the above factors could have affected the follow-up rate in the post-intervention study. At the same time, one of the contributing factors towards poorer knowledge level demonstrated, especially among students from non-science faculties, could have been technical problems.

CONCLUSION

The research concluded with noteworthy findings, indicating an average knowledge score of 49% among students. It revealed a prevalent inclination towards positive over negative attitudes, as well as an encouraging tendency towards self-efficacy regarding blood donation. It was found that students from science-stream excelled in the three aspects - knowledge, attitude, and self-efficacy towards blood donation, outdoing their counterparts from the non-science-stream. An intervention involving health education materials enhanced these areas, proving its effectiveness in inciting blood donation motivations. This robustly supported the hypothesis that post-intervention attitudes and self-efficacy towards blood donation were higher than pre-intervention levels. The impact of this campaign on university students was profound, significantly boosting their willingness to donate blood and cultivating a more positive attitude towards this vital act of service, indicating the potential for such campaigns to bolster the blood donation rates amongst young adults significantly.

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Appendix

Annex 1: Knowledge on blood donation

#	*Questions*	*Response*
1.	Do you know the main blood groups?	Yes
2.	What is your own blood group	Correct response
3.	For the criteria of donating blood, men are eligible to donate blood.	Yes
4.	For the criteria of donating blood, women are eligible to donate blood.	Yes
5.	For the criteria of donating blood, old age group (> 65 years old) individuals are eligible to donate blood.	No
6.	For the criteria of donating blood, young age group (<17 years old) individuals are eligible to donate blood	No
7.	For the criteria of donating blood, vulnerable group (those who easily fall into illness) individuals are eligible to donate blood	No
8.	For the criteria of donating blood, healthy individuals are eligible to donate blood.	Yes
9.	For the criteria of donating blood, the diseased individual is eligible to donate blood	No
10.	Women who are menstruating are eligible to donate blood.	No
11.	Women who are breastfeeding are eligible to donate blood.	No
12.	Pregnant women are eligible to donate blood.	No
13.	In order to donate blood, the person needs to be fasting.	No
14.	Can a person gain a disease after donating blood?	Yes
15.	Human Immunodeficiency Virus (HIV) will be screened in the donated blood.	Yes
16.	Hepatitis B virus will be screened in the donated blood.	Yes
17.	Hepatitis C virus will be screened in the donated blood.	Yes
18.	Syphilis will be screened in the donated blood.	Yes
19.	Malaria will be screened in the donated blood.	Yes
20.	Whole blood is one of the types of blood products that been produced from the donated blood.	Yes
21.	Apheresis is one of the types of blood products that been produced from the donated blood.	Yes
22.	Half-blood is one of the types of blood products that been produced from the donated blood.	No
23.	The packed cell is one of the types of blood products that been produced from the donated blood.	Yes
24.	White blood cells is one of the types of blood products that been produced from the donated blood.	No

25.	What is the minimum interval that is required for an individual to donate next time?	Correct response
26.	What volume of blood is collected during each donation?	Correct response
27.	What is the duration of a donation process?	Correct response
28.	The donated blood can only last 24 hours after the blood donation.	No
29.	There is storage to keep the donated blood for longer use.	Yes
30.	The blood from one donor is enough for one person that needs blood.	Yes
31.	Blood transfusion is for a Cancer patient	Yes
32.	Blood transfusion is for a Pregnant mother	Yes
33.	Blood transfusion is for a Thalassaemia patient	Yes
34.	Blood transfusion is for a Trauma patient	Yes

Annex 2: Attitude towards blood donation

#	Statement	Agreement
1.	I think donating blood is a positive behavior.	Positive
2.	I think donating blood is unnecessary.	Negative
3.	If I donate blood, I will be saving lives.	Positive
4.	If I donate blood, I will feel pain.	Negative
5.	If I donate blood, I will feel that I am doing something harmful to me.	Negative
6.	If I donate blood, I will lose weight.	Negative
7.	Performing an act that can save lives is desirable to me.	Positive
8.	Doing something harmful to me is desirable to me.	Negative
9.	If I knew more about blood donation in Malaysia, I would be more likely to donate blood.	Positive
10.	I am confident that I could donate blood if I were asked to do so.	Positive
11.	With the current information I know, I am capable of making an appointment to donate blood.	Positive
12.	I believe donating blood takes too much time.	Negative
13.	I believe donating blood is too much of an inconvenience.	Negative
14.	I would be more likely to donate blood if I were paid to do so.	Negative
15.	Overall, I think donating blood is pleasant.	Positive
16.	Overall, I think donating blood is a good idea.	Positive
17.	Overall, I think donating blood is the wrong thing to do.	Negative
18.	How likely are you to donate blood within the next 12 months?	Positive

Responses: 1=Strongly Disagree, 2=Disagree, 3=More or less disagree, 4=Uncertain, 5=More or less agree, 6=Agree and 7=Strongly agree

Annex 3: Self-efficacy

#	Statements	Coding
1.	I am confident I could donate blood if I am asked to do so.	
2.	I think I am too weak to donate blood.	Reverse
3.	For me, it is easy to donate blood.	
4.	I think I do not have enough blood to donate.	Reverse
5.	I feel confident that I can do things to keep me from having a bad blood donation experience.	
6.	I am able to reduce the intensity of a negative reaction such as faintness, dizziness, weakness, light-headedness or nausea.	
7.	If I do certain things before donating blood, I can increase the chances of having a positive experience.	
8.	I can prevent negative reaction by changing the things that I do.	
9.	There are things I can do to reduce any uncomfortable blood donation reaction.	
10.	I can do things to control how much I am affected by a negative reaction to donation.	

Responses: 1=Strongly Disagree, 2=Disagree, 3=More or less disagree, 4=Uncertain, 5=More or less agree, 6=Agree and 7=Strongly agree