Original Article

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Assessing Knowledge, Public Awareness, and Confidence Assurance of Apheresis Donors among Blood Bank Donors in Tobruk, Libya

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Abstract

Background: Blood donation is a critical component of healthcare, and apheresis has emerged as an advanced technique for collecting specific blood components, such as platelets, plasma, and red blood cells. Despite its advantages, apheresis remains less well-known to the general public than whole blood donation. This study aimed to compare apheresis donors with whole blood donors in Tobruk, Libya, to assess their knowledge, public awareness, and confidence in the procedure. **Methods:** A cross-sectional survey was conducted among 36 blood donors in Tobruk, Libya, focusing on demographics, trust, concerns, and procedure understanding. Descriptive statistical analysis was used to compare apheresis and whole blood donors, while logistic regression analysis was used to identify factors influencing donor confidence and willingness to donate via apheresis. A p-value of <0.05 was considered statistically significant. **Results:** The study revealed that male donors are more likely to donate apheresis than female donors, with younger donors being more likely $p < 0.05$). Apheresis donors are generally more educated, with 50% having higher education compared to 40% of whole blood donors. Confidence in the apheresis device is higher among apheresis donors (80%). Concerns about infection and health safety are more common among whole-blood donors(30%). **Conclusions:** The study revealed that male donors are more likely to donate apheresis than females, with younger donors being more motivated. Apheresis donors have higher confidence in the device, but 15% report concerns about infection and health safety.

Keywords: blood donation; apheresis; attitudes; whole blood donors; knowledge

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Introduction

Blood donation is a vital component of modern healthcare, providing essential blood components for transfusions that save lives in emergencies, surgical procedures, and patients with chronic conditions [1]. While whole blood donation is the most common method, apheresis offers a more targeted approach by selectively collecting specific components such as platelets, plasma, or red blood cells [2]. This method enables donors to contribute multiple times in a shorter period and is particularly beneficial for patients requiring specific blood components [3]. Despite these advantages, apheresis remains less well-known among the general public compared to whole blood donation [4]. Increasing public awareness, knowledge, and donor confidence in the process is essential to expanding participation and ensuring a stable supply of blood components [5]. In Tobruk, Libya, blood donation programs have traditionally relied on whole blood donations, with apheresis being less commonly promoted or practiced. The limited awareness and understanding of apheresis contribute to recruitment challenges for blood banks, leading to shortages of critical blood components, particularly platelets and plasma [6]. This study aims to assess the knowledge, public awareness, and confidence of blood donors in Tobruk by comparing apheresis donors with whole-blood donors. By surveying 36 blood donors, this study evaluates their understanding of apheresis, attitudes toward the procedure, and factors influencing their willingness to donate via apheresis. The findings from this study will provide insights for future educational campaigns aimed at improving public awareness, enhancing donor confidence, and strengthening blood donation programs in Tobruk. Identifying barriers to apheresis donation will help blood banks develop targeted strategies to increase donor participation and diversify the donor pool, ultimately ensuring a more sustainable blood supply [6].

Materials and Methods:

Study subjects and design:

A cross-sectional survey was conducted among 36 blood bank donors in Tobruk, Libya. Donors who attended the Central Blood Bank of Tobruk were willing to participate in the study within the two months from December-2024 to January-2025. Participants were selected using random sampling techniques. The questionnaire sheet consisting of 21 questions was used.

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Data collection methods

The study was based on an interview questionnaire. The questionnaire was in Arabic language and divided into three parts:

- The first part consists of demographic information (age, gender, employment status, educational level, and Blood Group).
- The second part includes questions regarding the awareness and understanding of the donation process (apheresis and whole blood donation). This part consisted of a total of twelve questions. These questions included the importance of donating blood, what are your sources of knowledge about the blood donation process? Have you ever donated blood? If your answer is yes, how many times did you donate? If your answer is no, what is the reason for not donating blood? What type of donation did you make? Do you know your blood group? Did you experience any complications during your last donation? What was your physical condition during the donation process? How was your donation experience?
- The third part of the questions was about the donor attitudes, including trust in the apheresis device, perceived benefits, and concerns. These questions Have you ever been familiar with the technical separation device used in the platelet donation process? Do you trust the technical blood apheresis device? What are your concerns (if any) about using the technical separation device? What do you know about the usefulness of the technical separation device?

Ethical considerations

Every participant had the option to leave the research at any moment, and participation was entirely voluntary. The researchers gave participants an explanation of the study's purpose. The director of the Central Blood Bank of Tobruk gave the study protocol ethical approval.

Statistical Analysis

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Data entry and statistical analysis were performed using SPSS® version 25.0. Statistical analyses included frequencies, percentages, and chi-square tests for categorical variables, while independent t-tests were used for continuous variables. Logistic regression analysis was applied to determine factors influencing donor confidence and willingness to donate via apheresis. A p-value of <0.05 was considered statistically significant.

Results and Discussion:

The data gathered from the survey of blood donors provided several insights into donor demographics, donation knowledge, trust in apheresis devices, and concerns about the donation process. Even though there are no statistically significant associations regarding gender, education, employment status, or Blood group, there is a significant difference in age between whole blood donors and apheresis donors with apheresis with ($p < 0.05$). This suggests that age may influence the type of donation chosen**.** In addition, the results suggest that prior awareness of apheresis is highly associated with choosing apheresis donation ($p < 0.05$). However, whole-blood donors are significantly less likely to be aware of apheresis ($p > 0.05$).

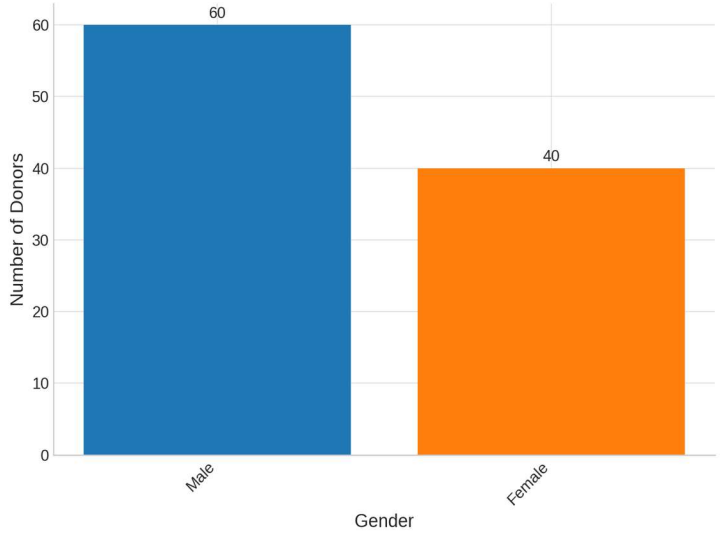

Figure 1(A): Gender Distribution of apheresis donors.

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1. Demographics:

1.1. Gender Distribution:

The study found that a higher proportion of male donors participated in both the apheresis and whole blood donation groups. Specifically, 60% of apheresis donors and 70% of whole blood donors were male; the remaining 40% and 30% were female, respectively. as shown in Figure 1. This aligns with global trends, where male donors tend to outnumber female donors in blood donation programs. Factors such as higher hemoglobin levels in males and societal norms may contribute to this discrepancy [7]. Despite this, apheresis donations appear to have a slightly more balanced gender representation, with more female participation (40%) compared to whole blood donation (30%). This could indicate that apheresis donation is more appealing or accessible to females for certain reasons, such as the reduced frequency of donation compared to whole blood donation [8].

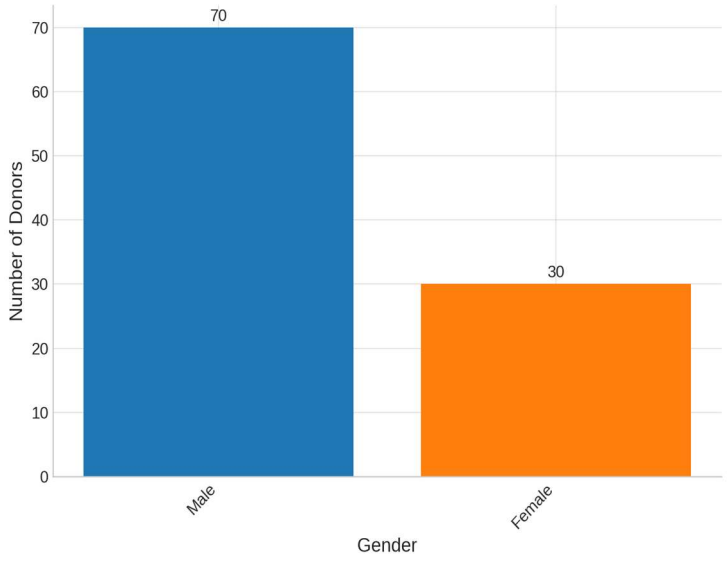

Figure 1(B): Gender Distribution of Whole Blood Donors

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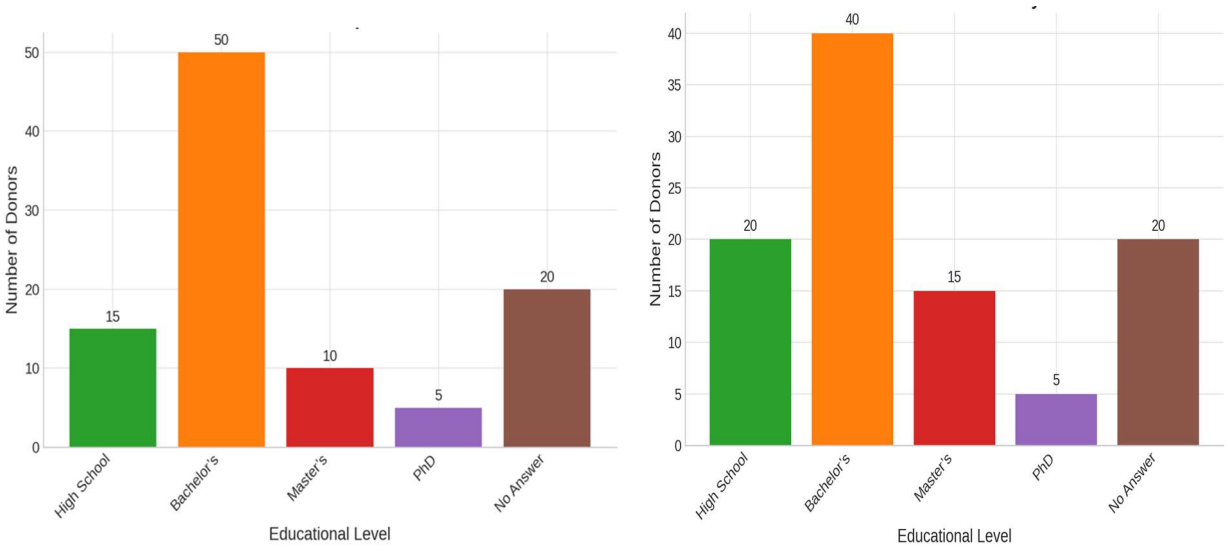
1.2. Educational Level:

The educational level distribution showed that 50% of apheresis donors had higher education (a Bachelor's degree or higher), while only 40% of whole blood donors fell into this category. As shown in Figure 2, apheresis donors may be more informed about the procedure and its benefits, which could be a factor in their decision to donate through this method [3]. The data also revealed that 20% of apheresis donors reported having no answer regarding their educational level, which could indicate that some donors are not fully aware of their educational background or did not respond to this section. Higher educational levels are often correlated with better awareness and understanding of medical processes, including blood donation [3].



(A) (B)

Figure 2: Educational Level of apheresis blood donors(A) and Whole Blood Donors(B).

1.3. Age distribution by donation type (apheresis and whole blood donation):

Whole blood donors tend to be older than apheresis donors, while apheresis donors have a more concentrated age range (younger donors are more likely to donate via apheresis). As shown in Figure 3.

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There is a significant difference in age between whole blood donors and apheresis donors. This suggests that age may influence the type of donation chosen with p-value = 0.0182 (statistically significant at $p < 0.05$). T-statistic = 2.42. Moreover, the negative coefficient (-0.0641) suggests that as age increases, the likelihood of choosing apheresis donation decreases.

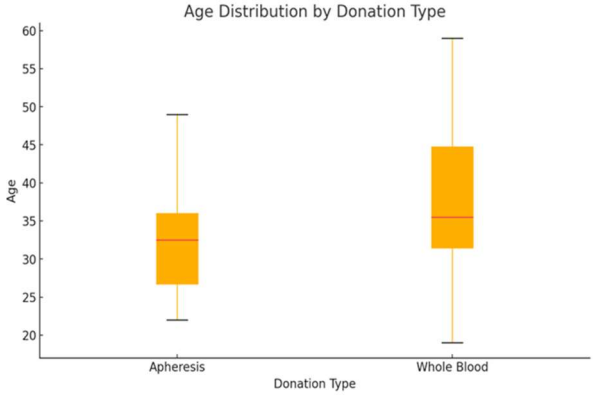

Figure 3: Age distribution by donation type

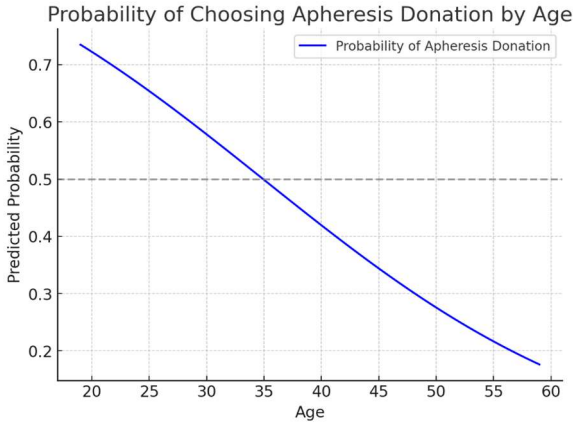

Figure 4: The probability curve showing the likelihood of choosing apheresis donation based on age

(apheresis and whole blood donation).

Logistic Regression predicts donation type based on age as shown:

- Intercept: 2.237 ($p = 0.026$)
- Age coefficient: -0.0641 ($p = 0.023$)
- Pseudo R^2: 0.05784 (indicating a modest explanatory power)

In addition, younger donors have a higher probability of choosing apheresis donation. However, older donors are less likely to donate by apheresis, as the probability decreases with age. The 50% probability threshold (dotted line) indicates the age range where donors are equally likely to choose either donation type, as shown in Figure 4.

2. Donation Knowledge:

2.1. Importance of Donating Blood:

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Both apheresis and whole blood donors reported that blood donation is very important, with 50% of apheresis donors and 66.7% of whole blood donors recognizing the significance of donating blood. This highlights that both donor groups are generally aware of the importance of blood donation, which is a positive finding, as shown in Figures 5 & 6. The fact that the vast majority of participants in both groups perceive blood donation as important shows that awareness of the need for blood donations is high in Tobruk. However, the slightly higher percentage of whole blood donors who recognize the importance could suggest that apheresis donation is still not as widely understood or promoted in the community [3].

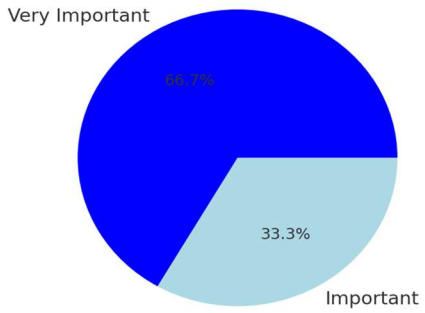

Figure 5: Importance of Donating Blood in whole blood donors

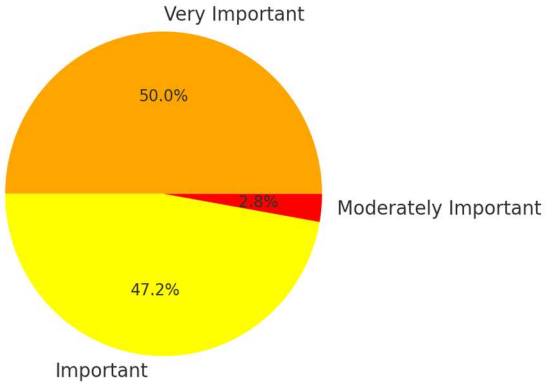

Figure 6: Importance of Donating Blood in apheresis donors

2.2. Trust in Apheresis Device:

The study found a significant difference in trust between the two groups. Eighty percent of apheresis donors expressed trust in the apheresis device, compared to 60% of whole blood donors who reported trust in the apheresis device, as shown in Figure 7. This higher level of trust among apheresis donors is likely due to their first-hand experience with the process, which may foster greater confidence in the device's safety and efficacy. The fact that 40% of whole blood donors were not sure or did not trust the device suggests that there is a knowledge gap that needs to be addressed. Some donors may have concerns related to the unfamiliarity of the apheresis process or misconceptions about the technology, indicating that outreach efforts are needed to educate the public about the safety and advantages of apheresis donation [9].

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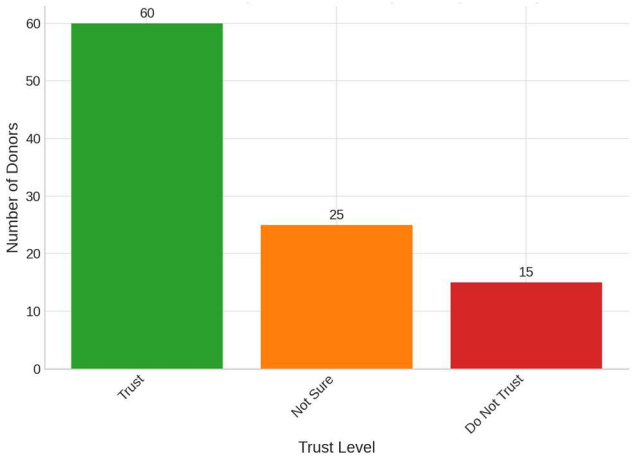

Figure 7 (A): trust in the apheresis device (whole blood donors).

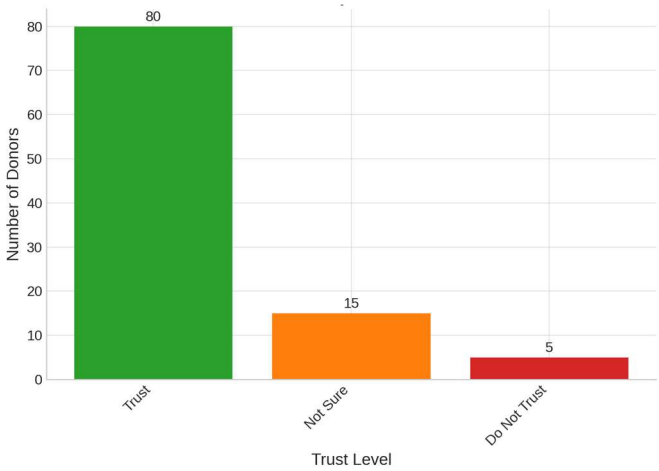

Figure 7 (B): trust in the apheresis device (apheresis donors).

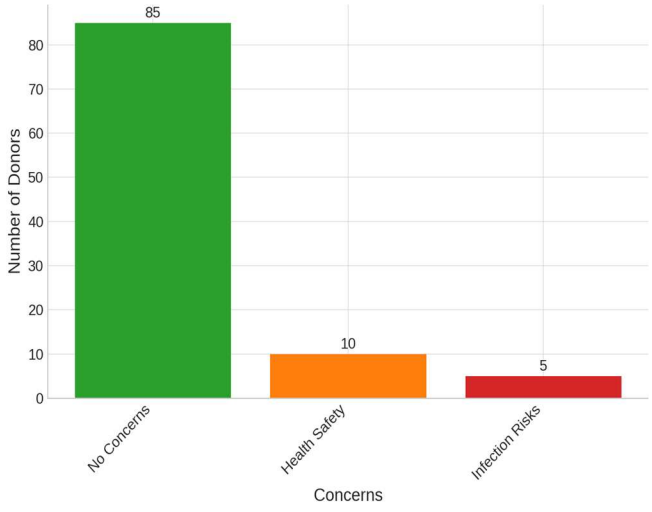

Figure 8 (A): Concerns about Using the Apheresis Device (apheresis donors).

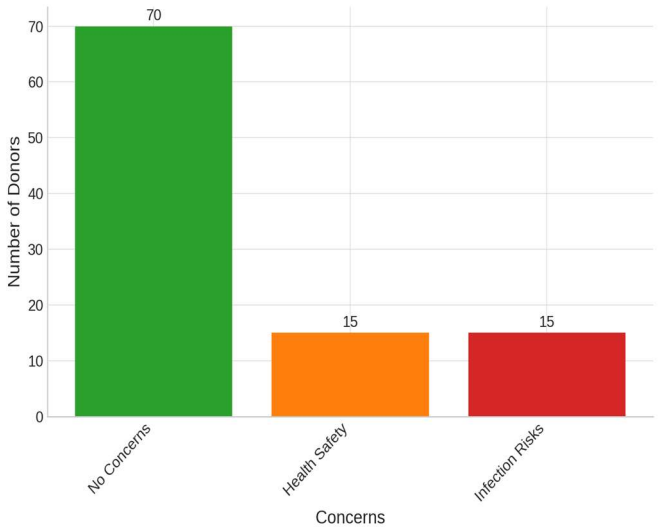

Figure 8 (B): Concerns about Using the Apheresis Device (whole blood donors).

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2.3.Health and Safety Concerns:

Concerns about the apheresis device were lower among apheresis donors (15%) than whole blood donors (30%). This suggests that those who have experienced apheresis donation have a greater sense of reassurance regarding the safety and efficiency of the procedure, as shown in Figure 8. Among the 15% of apheresis donors who expressed concerns, the main issue was related to potential infection risks or the invasive nature of the procedure. However, these concerns were less prevalent compared to whole blood donors, who voiced a wider range of concerns, particularly about the safety and risks associated with the procedure. In addition, the higher percentage of concerns among whole blood donors highlights a knowledge gap. Many whole blood donors might not fully understand the apheresis process or may have heard misinformation about it. Educational campaigns can play a key role in addressing these concerns and increasing public confidence in the apheresis process [10].

2.4. Type of Donation:

Whole blood donors typically donate voluntarily, with some exceptions for family-related reasons, unlike apheresis donors who donate for their families. This pattern suggests that both donor groups are generally motivated by altruism and a desire to help others, which is an encouraging finding for blood donation programs [11]. There was a highly significant value ($p < 0.05$) indicating a strong association between prior awareness of apheresis and choosing apheresis donation. Therefore, apheresis donors are much more likely to have been aware of apheresis before donating, as shown in Figure 9. At the same time, whole blood donors are significantly less likely to be mindful of apheresis.

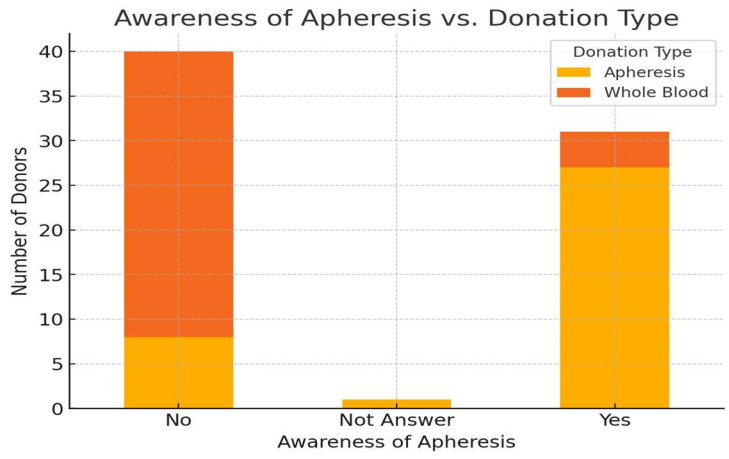

Figure 9: Awareness of Apheresis vs. Donation Type

Conclusion

This study explores the knowledge, attitudes, and behaviors of apheresis and whole blood donors in Tobruk, Libya. The findings reveal that while both donor groups understand the importance of blood donation, they differ in key aspects such as education, trust in apheresis devices, and safety concerns**.** Statistical analysis showed no significant associations between donation type and demographic factors like gender, education, employment status, or blood group. However, age was a significant factor ($p < 0.05$), indicating that older or younger individuals may have different preferences for apheresis versus whole blood donation. Additionally, prior awareness of apheresis was strongly linked to choosing apheresis donation ($p < 0.05$), meaning those with previous knowledge were more likely to donate via apheresis. Conversely, whole blood donors were generally less informed about apheresis, though this difference was not statistically significant ($p > 0.05$).

Future Research and Recommendations:

Increasing public awareness, addressing safety concerns, and fostering trust in the apheresis process is essential for expanding the donor pool and enhancing the effectiveness of blood donation programs in Tobruk. Targeted educational initiatives can play a crucial role in improving donor engagement, dispelling misconceptions, and ensuring a sustainable blood supply for the community.

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