RESEARCH ARTICLE

Knowledge and Attitude of Undergraduate Medical Student toward Blood Donation at the University of Sulaimani, a cross sectional study

Awayi Ghazy Abdulkareem [1]

1. *Department of pediatric nursing, College of Nursing, University of Sulaimani, City of Sulaimani, Iraq.*
Corresponding author: Awayi Ghazy Abdulkareem
Email: awayi.abdulkareem@univsul.edu.iq

ORCID: 0000-0002-5408-7805

ABSTRACT

General Background: Blood donation is a procedure that can help save the lives of others. Blood is the most precious gift that anyone can give to another person - the gift of life ,just one donation can save up three lives ,and has both emotional and physical health advantages

Aim: To explore the knowledge and attitudes of blood donation among undergraduate students in the university of sulaimani.

Methods: a cross-sectional study was done between (1-12-2021) to (24-1- 2022) for determine the knowledge and attitude of students in medical colleges at university of sulaimani

Results: 67.3% of participants were female and 53.8% of participants age were between 20-25 most of them in college of medicine 56.3%,74% of participants were live in urban area most of them were single 97.1%,most of them have sufficient knowledge about blood donation and good attitude .

Conclusion: majority of them have good knowledge and positive attitude about blood donation ,most reason for not donating is because of fear of anemia and willing to donate in the future ,the main source of getting knowledge about blood donation is from school and colleges ,most of them believe that blood donation reduce heart attack.

Recommendation: Because it is the age of technology, most people of all ages use it, and it plays an important role in community awareness, the role of the media and social media in disseminating information about blood donation and its benefits
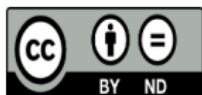
INTRODUCTION

Blood is crucial to life. Blood circulates via the body ،There no any alternative for blood. It can't be made or manufactured. Generous blood donors are the handiest supply of blood for sufferers in want of a blood transfusion. Blood delivers oxygen and nutrients to all parts of the body so they can continue to their functions and eliminate carbon dioxide and other waste products from the body. It also fights infections and transports hormones throughout the body. Blood is an important body fluid and performs several important bodily functions. In the case of a serious injury or fatal illness, the body may lose blood, which may require a blood transfusion (FELIMBAN et al., 2019)

Blood is made up of formed elements (cells and cell debris) suspended in a liquid called plasma. Which dissolved in the plasma large amounts of proteins, nutrients, metabolic waste and other molecules that are transported between organ systems. The cells are red blood cells RBCs, white blood cells WBCs, and the cell fragments are platelets. Red blood cells that transport oxygen to the tissue and carbon dioxide from the tissue. White blood cells can prevent infection, and platelets play a role in blood clotting(Arthur C. Guyton/ M.D., n.d.)

The red blood cells (Male: 4.35-5.65 million cells/mcl, Female: 3.92-5.13 million cells/mcl), white blood cells (3,400 to 9,600 cells/mcl), and platelets (Male: 135,000 to 317,000/mcl, Female: 157,000 to 371,000/mcl) make up about 45% of the blood volume, with the remaining 55% being liquid plasma (Whole Blood and What It Contains) (Staff, 2020).

The blood volume of the human body gradually corresponds to 7% of the body weight. It can vary depending on a person's weight, gender, and where they live, so it can estimate the average blood volume in the body. A full-term infant has about 75 ml of blood per kg of body weight, and about 5 liters of blood per kg of body weight for adult. (medical news today)

The blood also has antigens that are made of the proteins and sugars that are located on the RBC and give the type of blood type. Though at least 33 blood group systems exist, Only two are widely used. These are ABO and Rh-positive/Rh-negative blood group systems. Combining these two groups together represents the eight basic blood types that most people are familiar with (A+, A-, B+, B-, AB+, AB-, O+, O-) (Donna Christiano, 2022).

The most common type of blood is O+ and anyone with O blood is a universal donor and is always required for red blood cell donation.

Because this blood type is a universal plasma donor, type AB blood must donate plasma (Gordon, 2017).

Blood is an important body fluid and performs several important bodily functions. In the case of a serious injury or fatal illness, the body may lose blood, which may require a blood transfusion (FELIMBAN et al., 2019).

A blood transfusion is the process of transporting donor blood or blood components through veins into the recipient's circulatory system. It is considered a lifesaving procedure in normal and emergency situations. Severe bleeding from accidents, surgery, severe anemia, cancer, chronic diseases, malignancies, complications of pregnancy and other medical situations(Alfouzan, 2014; Melku et al., 2018) (Questions & Answers)

The first recorded successful blood transfusion took place in England, where doctor Richard Lower saved a dog's life by transfusion of blood from another dog. It was not until 1818 that British obstetrician-gynecologist James Blundell successfully transfused human blood into a patient for the first time to treat postpartum hemorrhage(Allerson, 2019).

Donating blood is a boon to life that improves health and reduces premature deaths, but many patients who require blood transfusions do not receive safe blood in a timely manner. Voluntary and unpaid blood donors can ensure an adequate and sustainable safe blood supply, because blood transfusion has the lowest rate of infection(Beyene, 2020).

Every year, 112.5 million units of donated blood are collected around the world. Nearly half of the world's blood supply is collected in high-income countries and, on average, the average blood donation rate is 9 times greater in these countries than in low-income countries(Beyene, 2020).

Taking 1,000 people as a sample, the blood donation rate of high-income countries is 31.5%, that of upper-middle-income countries is 15.9%, that of low- and middle-income countries is 6.8%, and that of low-income countries is 5% (Blood safety and availability, 2020).

On June 14, 2011, the theme for World Blood Donor Day was "More blood, more life." This was intended to emphasize the importance of regular blood donations worldwide. Based on reports from 173 countries to WHO, around 43 million people are donating blood annually(Alfouzan, 2014).

An indicator of general awareness is the blood donation rate of a country. In recent decades, the number of active blood donors has decreased, unable to meet the high blood transfusion needs. Most people don't donate blood voluntarily and only donate blood to relatives and friends who need blood transfusion. Few donors get paid(FELIMBAN et al., 2019).

Because of the motivation to contribute to society, voluntary donors are more likely to meet the medical selection criteria for safe donors, to screen for any known potential for exposure(Dubey et al., 2014).

Donating blood is saving the lives of millions of people around the world. Because blood is an essential element of human life and cannot be replaced. The World Health Organization (WHO) estimates that donating blood from 1% of the population is usually the minimum amount needed to meet a country's most basic blood needs (Kurian & Sarkar, 2016)

Blood donation comes in different forms. Each form aids in the treatment of various medical conditions, whole blood, platelet, double red cell and plasma donation are the forms (Staff, Blood donation, 2021).

Whole blood is a common type of transfusion. It is used to treat patients who need large amounts of all blood components such as severe bleeding during labor or trauma, such as those who still have large amounts of blood. Whole blood is made up of red blood cells, white blood cells, and platelets floating in a liquid called plasma (Whole Blood and What It Contains).

Recent research displays that there's a requirement for blood transfusions each second. An appointment to donate complete blood can take as low as one hour, and real donation is the handiest 8-10 minutes of that time (Whole Blood and What It Contains).

A single donation has the potential to save several lives. A single donation can help save up to three lives. The typical transfusion of red blood cells is 3 pints (or 3 whole- blood donations) (Facts About Blood Donation, 2021)

Whole blood may be donated as soon as each 8 weeks and platelet each 14 days (2 weeks),plasma each month packer cell. There are approximately 1 billion RBCs in 2 to 3 drops of blood for each 6 hundred RBCs there are approximately 4 platelets and 1 WBC. (15, 25) An individual will donate approximately 470 ml of whole blood during a normal donation. This is around 8% of the blood volume of an average adult (Blood donation, 2021).

Platelet donation (plateletpheresis) collects only platelets, cells that clump together and create plugs (clotting) in blood vessels to help halt bleeding. People with clotting issues or cancer, as well as those undergoing organ transplants or severe procedures, are frequently given donated platelets (Staff, Blood donation, 2021).

Double red cell donation is possible by donating a concentrated amount of red blood cells. Organs and tissues receive oxygen from red blood cells. People with substantial

blood loss, such as after an injury or accident, and people with sickle cell anemia are usually given donated red blood cells (Staff, Blood donation, 2021).

Plasma donation (plasmapheresis) is the collection of the blood's liquid component (plasma). Plasma aids in the clotting of blood and contains antibodies that aid in the fight against infection to burn. People in emergency and trauma circumstances are frequently given plasma to assist stop bleeding, and in case of burn which the person losses large amount of fluids (Staff, Blood donation, 2021).

Blood transfusions are usually administered in a hospital, outpatient clinic, or doctor's office. A nurse or doctor will check the patient's blood pressure, pulse, and temperature before starting the procedures. The further required IV pharmaceutical therapy, a second IV access (i.e. antibiotics) will set, the only solution that can be transfused with blood products is normal saline, 0.9 percent Normal Saline solution (A Step-by-Step Guide to Blood Transfusions, 2021).

Special Y tubing with an in-line filter, 0.9% NaCl (Normal Saline) solution and blood warmer should supplies. signs that are absolutely necessary Which include heart rate, blood pressure, temperature, the use of a pulse oximeter, and breathing rate. Lung sounds and accurate pee yield should also be recorded, and the doctor should be alerted if their temperature is higher than 37.78° C (A Step-by-Step Guide to Blood Transfusions, 2021).

When the blood bank informs the health care provider that the blood is ready, the health care provider must schedule the blood's delivery from the blood bank. Once the

patient's blood has been discharged, the transfusion will take 20-30 minutes to begin and up to 4 hours to finish (A Step-by-Step Guide to Blood Transfusions, 2021).

Physician's order with patient identification compared to blood bank documentation, patient's name, date of birth, and medical record

number, patient's blood type versus donor's blood type and Rh-factor compatibility, and blood expiration date must all be verified by two registered nurses at the patient's bedside (A Step-by-Step Guide to Blood Transfusions, 2021).

Rashes, itching, elevated temperature, chest/back/headache, chills, sweats, increased heart rate, increased respiratory rate, decreased urine output, blood in urine, nausea, or vomiting are all signs and symptoms of a transfusion reaction that the patient should report to their registered nurse during the transfusion. Assess and document the patient's vital signs, including heart rate, respiratory rate, temperature, SPO2, blood pressure, lung sounds, urine output, and color (A Step-by-Step Guide to Blood Transfusions, 2021).

Transfusion begins by preparing the Y tube with normal saline and preparing the blood in the infusion pump, the blood flows slowly for the first 15 minutes (2 ml/min or 120 cc/h), the nurse must be with the patient to treat. The first 15 minutes, this is when most transfusion reactions can occur, the rate of transfusion after this period will be increased by the nurse if the patient is stable and there are no signs of transfusion reaction, record vital signs after 15 minutes, then every hour, and finally, at the end of the transfusion (A Step-by-Step Guide to Blood Transfusions, 2021).

Any of the following transfusion reactions should be looked for by the nurse: allergic, febrile, GVHD (Graft vs. Host Disease), TRALI (Transfusion Related Acute Lung Injury).

If they detect a reaction, they should immediately stop the transfusion, separate the blood tubing from the patient, stay with the patient and assess their status, continue to check for status changes every five minutes, call the doctor and blood bank, and document everything (A Step-by-Step Guide to Blood Transfusions, 2021).

Following the Transfusion Flushing the Y tubing with normal saline, disposing of the spent Y tubing in a red biohazard receptacle, and obtaining post-transfusion vital signs and documenting the patient's status (A Step-by-Step Guide to Blood Transfusions, 2021).

IV access (blood components can be delivered by a variety of central venous access devices (CVAD) or peripheral intravenous catheters) is one of the recommended supplies for a blood transfusion. Consider sizes 20-22 gauge for routine adult transfusions, 16-18 gauge for fast adult transfusions, and 22-25 gauge for pediatrics) (A Step-by-Step Guide to Blood Transfusions, 2021).

Sets for administration the requirements for these sets may vary, therefore verify the facility-specific rules first. Blood filter sets supplying blood components necessitates the use of a blood filter, which can have pore sizes ranging from 170 to 260 microns and is designed to remove clots, cellular debris, and coagulated protein (A Step-by-Step Guide to Blood Transfusions, 2021)

Blood banks are places where blood is collected, stored, and used in the future. In the event of a medical emergency, they have stored the collected blood in a way to prolong its life. The process of collecting, processing and storing blood requires different methods so that blood can be preserved properly (Questions & Answers).

In the city of sulaimani , there is only one blood bank that was founded in 1996. since then, thousands of people have visited to donate or get blood, and of all the city's hospitals rely on the blood in this bank for their patient. the data of the visitor for year 2021 was 90786 individuals, 36560 of them had donate blood but nearly 260 of them were female.

Platelets can be stored at room temperature and can be stored for up to 5 to 7 days in incubator must be shacked continuously, and plasma can be frozen and stored in the freezer for up to 1 year fresh plasma can be stored up to 2 days (What Happens to Donated Blood).

The biggest problem with blood donation is the expiration date. Blood can be stored for 42 days when stored in a refrigerator at 6 degrees Celsius, platelets can be stored for up to 5 days, and plasma can be stored all year when frozen. Expired blood is either used as research material or treated as medical waste and incinerated (Gordon, 2017).

Blood donation benefits the donor's health. Donation has both emotional and physical health advantages. It promotes the production of new red blood cells (RBCs), donating

blood can help the heart and circulatory system, giving blood is calorie-burning, a pure-donation screening provides donors with an update on their health, reduce stress, improve your emotional well-being, benefit your physical health, help get rid of negative feelings, provide a sense of belonging and reduce isolation, provide a free health checkup (Santos-Longhurst, 2019) (4 really selfish reasons you should donate blood).

While the majority of donors have no negative side effects, some donors have reported

experiencing symptoms after donating blood. Nausea, dizziness, and fainting are all possible side effects of blood donation. There's a chance will have a raised bump or continue to bleed and bruise at the needle site. After donating blood, some persons may endure pain and physical weakness (What are the side effects of donating blood?).

Blood donation causes a transient decrease in specific immune cells, such as circulating serum protein and antibodies, as well as a reduction in red blood cells. However, if your body requires these antibodies, it will rapidly make them, and your blood will revert to normal within a few weeks (What are the side effects of donating blood?).

Each time of donating blood, some iron is removed from the red blood cells. It may lead to anemia if losing iron is quicker than the body can replace it through the diet.

Although many donors have sufficient iron levels to properly donate blood, frequent blood donors should be informed that blood donation can result in low iron levels or anemia (Donate Blood).

TTIs (transfusion-transmitted infections) are illnesses that occur after a pathogen is introduced into a person through blood transfusion. Blood transfusions can transmit a wide range of species, including bacteria, viruses, prions, and parasites. The diseases include: Humans immunodeficiency virus(HIV), hepatitis A virus (HAV), hepatitis B virus (HBV), hepatitis C virus (HCV), Malaria, Syphilis and others (What are the side effects of donating blood?).

The donor's who donate blood, must be healthy and free from serious diseases(Kurian & Sarkar, 2016). Blood donors must be healthy, 17 years of age or older not more than 60 years of age, weigh at least 50 kg, have no history of hepatitis or AIDS, and no history of chest pain or heart surgery if patient has chronic disease such as Hypertension and Diabetes Mellitus must be controlled (CHOC Blood Bank). (15,

Blood donations are only allowed to those who are not at risk of infection. Blood donors need to answer a series of detailed questions about the health and risk of diseases that can be transmitted through the blood supply, such as the HIV and hepatitis C viruses. When responding to a health questionnaire, blood donors perform minimal physical activity to ensure that they are free of anemia, fever, or high blood pressure, the measures of Complete Blood count (CBC) must be normal range (Allerson, 2019).

Types of blood donors are either voluntary and unpaid, family/replacement or paying. Safe donors are those who donate blood voluntarily without knowing the recipient, without any expectations, and without direct or indirect pressure(Kurian & Sarkar, 2016).

A stable base of regular, voluntary, unpaid blood donors can ensure an adequate and reliable supply of safe blood. And these groups of donors are the safest group (Blood safety and availability, 2020).

It is well known that more than 50% of blood donations in developing countries come from paid and voluntary donors. The World Health Organization (WHO) estimates that 38% of reported voluntary blood donations come from people under the age of 25, arguing that countries should focus on young people to achieve 100% free voluntary blood donation(Sabu et al., 2011).

Certain medical disorders make it impossible for a person to donate blood, either temporarily or permanently. The following are some of the temporary conditions: (pregnancy, fever (acute), recent alcoholic drinking, tattooing and ear or body piercing, surgery, etc..).

Individuals with the following illnesses are not permitted to donate blood at any time: (cancer, cardiomyopathy is a condition that affects the heart, lung illness that is severe, hepatitis B and C are two types of hepatitis, HIV infection, AIDS, or Sexually Transmitted Diseases (STD), etc..). (Staff, Blood donation, 2021) (VOLUNTARY BLOOD DONATION).

Blood shortages are caused by a variety of factors, including donor eligibility, bad attitudes regarding blood donation, a lack of education, awareness, perceived behavioral hurdles, and alternative monetary compensatory donation opportunities. In order to better understand why blood shortages arise, researchers must first comprehend these aspects (Allerson, 2019).

Another factor contributing to the blood shortage is a scarcity of donors. Of course, eligibility and sickness play a role, but there are other relevant patterns to consider(Allerson, 2019).

When voluntarism is not already established and a cultural understanding of the act of donation is absent, the worldwide interest in doing research studies on blood donation attitudes or knowledge is more widespread in low and middle income nations(Martínez-Santos et al., 2021).

Lack of knowledge, fear, opportunity, convenience, unfavorable attitude toward donation, and quality of care have been

observed to be common factors influencing people's opinion on whether to voluntarily re-donate blood(Dubey et al., 2014; Kurian & Sarkar, 2016; Melku et al., 2018). In developing countries so many people are reluctant to donate blood because of ignorance, misperceptions and fears about the process(Dubey et al., 2014).

Understanding the motivations of blood donors is essential for improving the efficiency of donor recruitment and retention programs(Kurian & Sarkar, 2016). Potential donors must overcome problems such as fear, lack of time, lack of financial compensation and qualifications(Allerson, 2019).

METHOD

-Design of the Study

A quantitative design "descriptive" study case-control approach was carried out to achieve the objectives of study among participants.

-Setting of the Study

The present study was conducted at Dr. Jamal Ahmad Rashid Pediatric Teaching Hospital in Sulaimani City.

-Sample of the Study

A non-probability purposive sample of (105) children was definitely diagnosed with acute diarrhea in pediatric wards, and (105) children were selected as control group in outpatient unit in the same hospital that was not suffering from diarrhea for the last month.

-Criteria of the Study Sample

1. Patients diagnosed with acute diarrhea.
2. Child under five years old and both genders.
3. Mothers were willing to participate in the study.

-The study instrument

In order to collect the proper data, questionnaire form was developed by researcher based on related review of literature, and previous studies, to measure the variables underline the present study. It consists of three parts:-

Part one: Socio-demographic characteristics of mother consist of (6) items, which include: age, level of education, occupation, residency, financial status, and family size.

Part two: Socio-demographic characteristics of children consist of (5) items, which include: age, gender, birth order, birth weight, and vaccination status.

Part three: Sanitation and hygiene practice consist of (9) items include: methods of child defecation, methods of cleaning child after defecation, washing child hands before eating, mother washing hands after toilet, mother washing hands after cleaning child perineum, mother washing hands before feeding child, mother washing hands before preparing food, methods of storing food for later use, and having domestic animals. The SPSS (version 21) was used for the data analysis. The demographic characteristics of the samples were reported by using descriptive statistics (frequencies, percentages, and mean) and chi-square test used for associations.

-Validity of the study tools

Content validity of the questionnaire was determined through a panel of (15) experts of An on experimental, cross sectional survey was used for this study in an attempt to target the population.

-Pilot study

The purpose of pilot study Determine the reliability of the instrument, Assessing the clarity of instrument and estimate the average time required for data collection. The result of the pilot study shows that then is of the questionnaire were clear, there is no problem in filling online questionnaire. The sample of the pilot study was excluded from the study sample.

Setting of the study

This study was carried out in the university of Sulaimani medical college (medicine, dentistry, pharmacy and nursing).

University of Sulaimani founded in (1968) while the college of medicine in (1977), dentistry in (1996), pharmacy in (2004) and nursing in (2000).

Sample of the study

The study sample was composed of medical college students in all classes for the 2021-2022.

And the data collected started on 1 December 2021.

In addition, to participate in this research study some criteria are obtained. Those student are included who is aged more than 17, voluntary participated while those are incomplete the survey are excluded

The study instrument :

The instrument used in the research study was a research develop questionnaire to find the objectives of the study, and consist of three parts.

First part: consist of (7) questions that collected information about socio demographic characters of the student.

Second part: researchers develop (19) questions about knowledge regarding blood donation.

Third part: contain (12) questions regarding attitudes of the student.

The survey was electronically distributed to participants in the study.

-Data Collection

Data were collected using a special self-reporting structuring questionnaire designed for the purpose of the study based on literature review and WHO guideline for blood donation. The questionnaire distributed electronically on the student on all the stage of the medical colleges at university of Sulaimani.

Statistical analysis

All statistical computation is enhanced using statistical method (SPSS 21). The data had been coded, tabulated, and presented in a descriptive form. The statistical procedure that was applied to determine the results of the present study included

1.   Descriptive statistical data analysis (Frequency and percentage)

2.   Inferential data analysis: Chi square:

-There are criteria of the probability level of determining the significance of the test: P -value as:

1.   High significant (P< 0.001)

2.   Significant (P< 0.05)

3.   Non-significant (P> 0.05)

    4. Very highly significant (P< 0.000)

RESULTS

Table (1): Distribution of the sample according to Socio demographic characteristic

Table (1) shows the socio-demographic characteristics of the participants: 208 (67.3%) of the respondents were female and 68 (32.7%) were male. 112 (53.8%) of the respondents were between 20 and 25 years old, 93 (44.7%) of the respondents were younger than 20 years.

In addition, the majority of the state was two state accounting for 37.5% of the total number of respondents, and 24.5% were one state and 97.1% were single. The financial situation was sufficient with 83.3% and 13.5% was barely sufficient, while 74.0% of the respondents lived in the city and 21.2% in the Suburban.

Table (2) shows the characteristic of knowledge, the participants 50% have information about blood donation, and 43.7% have some information about blood donation, 15.38% received a mass medium, and 100% knew about blood groups, 92.4% need four types know and 6.3% know the three types, 74% have artificial human blood, 193 respondents 92.79% of the respondents were people should donate their blood to those in need and 101 (48.56%) of the respondents represented the possibility of reducing a heart attack Health benefits of blood donation In addition, 87.5% of the type of donation you intend to make was voluntary, the majority of donors to donate blood were over the age of 17, accounting for 60.1% of all respondents. 56.7% of the minimum weight required for the donor is at least 50 kg, 60.1% of patients benefit from one unit of blood patients21.2% has Single unit of blood may benefit for two patients,, the majority of the blood volume collected in each donation was 500 ml of blood collected in each donation, which was 55.8% and 80.8% of the blood donation interval. It was possible to donate blood every three months. The highest possible risk of blood donation was anemia, which was 47.6%, and 28.85 was fainting, 67.8% contracted an infectious disease after blood donation, 17.3% of infections transmitted during blood transfusion were HIV and 3.8% have HBV, 16.71%. fears anemia among reasons not to donate blood and 4.67% fears weight loss. Then, 1.9% are not entitled to donate blood because of alcoholism and also 4.8% has Communicable diseases, 89.4% has investigations done before transfusion.

Table (3) shows the characteristic attitudes that 88.5% of the participants have never donated blood and 24 (11.5) of the respondents have never donated blood and also 54.17% state blood bank as a donor site and 16.7 % of blood donors were donation camps, 66.3% have a willingness to donate blood in the future and 86.5% have no regular donor, 42.86% of non-regular donors were once a year. In addition, 64.9% say that donating blood is a good habit, and 52.4% say that voluntary donation is the best source of safe

donation. While 23.6% harm a blood donor after donation, 50.5% did not donate blood and lowered the donor's immunity, and only 14.9% have a donation that makes you weak, 27.9% have a donation led to anemia, 65.9% encouraged Table (4) illustrates the relationship between knowledge and gender. According to the study, the association between (male) and (female) is related to knowledge characteristics. There was a statistically significant association between gender in relatives (What do you think about the health benefits of blood donation, What type of donation do you intend, The minimum weight requirement for the donor is at least, and Possible risk of blood donation) because the p-value result was less than the usual alpha value of 0.05.

relatives to donate. Table (5) shows the relationship between knowledge and age. According to the study, the association between (< 20), (20-25), and (> 25) years is related to knowledge characteristics. There was a statistically significant association between ages in relatives (Who should people donate their blood to, How old must the donor's be in order to donate blood, Q15, and Q19) as the p-value result was less than the usual alpha value of 0.05.

Table (6) represents the relationship between knowledge and College. According to the study, the association between (Dentistry, medicine, Nursing and Pharmacy) college is related to knowledge characteristics. There was a statistically significant association between Colleges in relatives (What type of donation do you intend, How old must the donor's be in order to donate blood, Possible risk of blood donation, and Are investigations done before transfusion) as the p-value result was less than the usual alpha value of 0.05.

Table (7) illustrates the relationship between knowledge and stage. According to the study, There was a statistically significant association between stage in relatives (What type of donation do you intend, How old must the donor's be in order to donate blood, Possible risk of blood donation, Can a person be infected by infectious disease after receiving blood, and Are investigations done before transfusion) because the p-value result was less than the usual alpha value of 0.05.

Table (8) represents the relationship between attitude and age. According to the study, the association between (< 20), (20-25), and (> 25) years is related to attitude characteristics. There was a statistically significant association between ages in relatives (Ever donated blood, If yes, site of donation, Are you a regular donor, and If yes, how many times in the year) as the p-value result was less than the usual alpha value of 0.05.

Table (9) represents the relationship between attitude and College. According to the study, the association between (Dentistry, medicine, Nursing and Pharmacy) college is related to attitude characteristics. There was a statistically significant association between Colleges in relatives (If yes, site of donation, Willingness to donate blood in the future, Are you a regular donor, Do you think that donating blood is a good habit and Do you think that voluntary donation is the best source to make safe donations) as the p-value result was less than the usual alpha value of 0.05.

Table (10) represents the relationship between Ever donated blood and (Age and gender). According to the study, the association between Ever donated blood in related to Age and gender characteristics. There was a statistically significant association between Ever donated blood in age (p=0.01) because the result p-value was less than the usual alpha value of 0.05. There was no statistically significant association between Ever donated blood in gender (p=0.145) because (p-value>0.05).

Table 1. Demographic characteristics related to participants.

Variables	Items	Frequency	Percent %
Gender	Female	140	67.3
	Male	68	32.7
Age (years)	< 20	93	44.7
	20 – 25	112	53.8
	> 25	3	1.4
College	College of Dentistry	3	1.4
	college of medicine	117	56.3
	College of Nursing	61	29.3
	College of Pharmacy	27	13.0
Stage	One	51	24.5
	Two	78	37.5
	Three	46	22.1
	Four	30	14.4
	Five	3	1.4
	Six	0	0.0
Marital status	Engaged	2	1.0
	Married	4	1.9
	Single	202	97.1
	Divorced	0	0.0
Financial status	Barely sufficient	28	13.5
	Insufficient	11	5.3
	Sufficient	169	81.3
Residence	Rural	10	4.8
	Suburban	44	21.2
	Urban	154	74.0
Total		**208**	**100**

Table (2): Distribution of the sample according to Knowledge characteristic

Variables	Items	Frequency	%
Do you have information about blood donation	Yes	104	50
	No	13	6.3
	A few	91	43.7
If yes, where did you get it	Mass media	16	15.38
	Hospital	8	7.69
	Blood bank	9	8.65
	College or school	64	61.54
	Religious leaders	1	0.96
	Other	6	5.77
Do you know about blood groups	Yes	208	100
	No	0	0.0
How many types do you know	One	0	0.0
	Two	3	1.4
	Three	13	6.3
	Four	192	92.4

Is human blood manufactured artificially	Yes	54	74
	No	154	26
Who should people donate their blood to	No one	4	1.92
	Paid	3	1.44
	Relatives	8	3.85
	Anyone in need	193	92.79
What do you think about the health benefits of blood donation	Free medical check up	34	16.35
	Happiness	50	24.04
	Control weight	2	0.96
	Lower cancer risk	11	5.29
	Reduce heart attack	101	48.56
	Other	10	4.81
What type of donation do you intend	Paid	13	6.3
	Replacement	13	6.3
	Voluntary	182	87.5
How old must the donor's be in order to donate blood	Above 17 years old	125	60.1
	Above 20 years old	62	29.8
	Age is not important	21	10.1
The minimum weight requirement for the donor is at least	45 kg	50	24.0
	50 kg	118	56.7
	60 kg	40	19.2
How many patients benefit from a unit of blood	Single unit of blood may benefit for one patients	125	60.1
	Single unit of blood may benefit for two patients	44	21.2
	Single unit of blood may benefit up to three patients	39	18.8
The volume of blood collected in each donation	<500 mL of blood is collected in each donation	63	30.3
	>500 mL of blood is collected in each donation	29	13.9
	500 mL of blood is collected in each donation	116	55.8
How much is the Interval of blood	Possible to donate blood every month	32	15.4
	Possible to donate blood every three months	168	80.8

donation	Possible to donate blood weekly	8	3.8
Possible risk of blood donation	Anemia	99	47.60
	Infection	33	15.87
	Fainting	60	28.85
	Death	16	7.69
Can a person be infected by infectious disease after receiving blood	Yes	141	67.8
	No	14	6.7
	I don't know	53	25.5
Which diseases that can be transmitted during blood transfusion?	HBV	8	3.8
	HIV	36	17.3
	Malaria	2	1.0
	Syphilis	2	1.0
	None of them	2	1.0
	All of them	158	76.0
Reasons for not donating blood	Fear of anemia	68	16.71
	Fear of weight loss	19	4.67
	Fear of sight blood	0	0.00
	Fear of pain	31	7.62
	Not accessible	19	4.67
	No reason	41	10.07
	Feels medically unfit	21	5.16
	Due to safety reasons	32	7.86
	Never thought about donating blood	43	10.57
	No one has ever asked to donate blood	63	15.48
	Parents/friends told not to donate blood	18	4.42
	Due to disease	52	12.78
	Total	407	100
Reason not eligible for blood donation	Alcoholism	4	1.9
	Communicable diseases	10	4.8
	None of them	9	4.3
	Pervious history of Malaria or hepatitis	13	6.3
	Who use drugs (aspirin, anticoagulant)	5	2.4
	All of them	167	80.3
Are investigations done before transfusion	Yes	186	89.4
	No	5	2.4
	I don't know	17	8.2
Total		**208**	**100**

Table (3): Distribution of the sample according to Attitudes characteristic

Variables	Items	Frequency	%
Ever donated blood	Yes	24	11.5
	No	184	88.5
If yes, site of donation	Blood donation camp	4	16.7
	Government blood bank	13	54.17
	Private blood bank	7	29.16
	Total	24	100
Willingness to donate blood in the future	Yes	138	66.3
	No	15	7.2
	I don't know	55	26.4

Are you a regular donor	Yes	28	13.5
	No	180	86.5
If yes, how many times in the year	Once	12	42.86
	Twice	9	32.14
	Three times	5	17.86
	Four times or more	2	7.14
	Total	28	100
Do you think that donating blood is a good habit	Yes	135	64.9
	No	9	4.3
	Maybe	64	30.8
Do you think that voluntary donation is the best source to make safe donations	Yes	109	52.4
	No	17	8.2
	Maybe	82	39.4
Could harm occur to a blood donor after donation	Yes	49	23.6
	No	32	15.4
	Maybe	127	61.1
Do you think donating blood lower donor's immunity	Yes	34	16.3
	No	105	50.5
	Maybe	69	33.2
Does donation make you weak	Yes	31	14.9
	No	76	36.5
	Maybe	101	48.6
Could donation lead to anemia	Yes	58	27.9
	No	63	30.3
	Maybe	87	41.8
Do you encourage relatives to donate	Yes	137	65.9
	No	26	12.5
	Maybe	45	21.6
Total		208	100

Table (4): Association between Knowledge and gender

	Knowledge	Test	P-value	Results
Q1	Do you have information about blood donation	1.492	0.474	No
Q3	Do you know about blood groups	----	-----	----------
Q4	How many types do you know	1.145	0.564	No
Q5	Is human blood manufactured artificially	0.014	0.907	No
Q6	Who should people donate their blood to	8.772	0.269	No
Q7	What do you think about the health benefits of blood donation	27.771	0.048	Sig.
Q8	What type of donation do you intend	4.944	0.046	Sig.
Q9	How old must the donor's be in order to donate blood	2.998	0.223	No
Q10	The minimum weight requirement for the donor is at least	8.83	0.012	Sig.
Q11	How many patients benefit from a unit of blood	0.538	0.764	No
Q12	The volume of blood collected in each donation	0.598	0.742	No
Q13	How much is the Interval of blood donation	1.061	0.588	No
Q14	Possible risk of blood donation	19.474	0.044	Sig.
Q15	Can a person be infected by infectious disease after receiving blood	3.395	0.183	No
Q16	Which diseases that can be transmitted during blood transfusion?	3.751	0.586	No
Q17	Reasons for not donating blood	5.762	0.126	No
Q18	Reason not eligible for blood donation	8.918	0.112	No
Q19	Are investigations done before transfusion	2.516	0.284	No

Table (5): Association between Knowledge and age

	Knowledge	Test	P-value	Results
Q1	Do you have information about blood donation	1.922	0.75	No
Q3	Do you know about blood groups	----	-----	---
Q4	How many types do you know	4.141	0.387	No
Q5	Is human blood manufactured artificially	2.323	0.313	No
Q6	Who should people donate their blood to	49.092	0.000	Sig.
Q7	What do you think about the health benefits of blood donation	25.105	0.913	No
Q8	What type of donation do you intend	5.467	0.243	No
Q9	How old must the donor's be in order to donate blood	9.145	0.049	Sig.
Q10	The minimum weight requirement for the donor is at least	6.736	0.151	No
Q11	How many patients benefit from a unit of blood	2.068	0.723	No
Q12	The volume of blood collected in each donation	2.099	0.718	No
Q13	How much is the Interval of blood donation	1.514	0.824	No
Q14	Possible risk of blood donation	15.403	0.844	No
Q15	Can a person be infected by infectious disease after receiving blood	10.647	0.031	Sig.
Q16	Which diseases that can be transmitted during blood transfusion?	13.692	0.188	No
Q17	Reasons for not donating blood	16.905	0.997	No
Q18	Reason not eligible for blood donation	15.175	0.126	No
Q19	Are investigations done before transfusion	9.04	0.048	Sig.

Table (6): Association between Knowledge and College

	Knowledge	Test	P-value	Results
Q1	Do you have information about blood donation	3.342	0.765	No
Q3	Do you know about blood groups	---------	-------	-----
Q4	How many types do you know	6.686	0.351	No
Q5	Is human blood manufactured artificially	2.952	0.399	No
Q6	Who should people donate their blood to	15.417	0.801	No
Q7	What do you think about the health benefits of blood donation	48.965	0.673	No
Q8	What type of donation do you intend	16.48	0.011	Sig.
Q9	How old must the donor's be in order to donate blood	17.549	0.007	Sig.
Q10	The minimum weight requirement for the donor is at least	9.484	0.148	No
Q11	How many patients benefit from a unit of blood	6.183	0.403	No
Q12	The volume of blood collected in each donation	2.591	0.585	No
Q13	How much is the Interval of blood donation	2.681	0.848	No
Q14	Possible risk of blood donation	57.851	0.005	Sig.
Q15	Can a person be infected by infectious disease after receiving Blood	10.004	0.124	No
Q16	Which diseases that can be transmitted during blood transfusion?	15.856	0.392	No
Q17	Reasons for not donating blood	23.459	0.811	No
Q18	Reason not eligible for blood donation	20.355	0.159	No
Q19	Are investigations done before transfusion	21.359	0.002	Sig.

Table (7): Association between Knowledge and stage

	Knowledge	Test	P-value	Results
Q1	Do you have information about blood donation	9.286	0.319	No
Q3	Do you know about blood groups	---------	-------	
Q4	How many types do you know	4.066	0.851	No
Q5	Is human blood manufactured artificially	3.12	0.538	No
Q6	Who should people donate their blood to	29.362	0.394	No
Q7	What do you think about the health benefits of blood donation	63.649	0.748	No
Q8	What type of donation do you intend	14.621	0.049	Sig.
Q9	How old must the donor's be in order to donate blood	20.752	0.008	Sig.
Q10	The minimum weight requirement for the donor is at least	12.372	0.99	No
Q11	How many patients benefit from a unit of blood	6.518	0.589	No
Q12	The volume of blood collected in each donation	10.633	0.223	No
Q13	How much is the Interval of blood donation	12.481	0.131	No
Q14	Possible risk of blood donation	72.802	0.004	Sig.
Q15	Can a person be infected by infectious disease after receiving Blood	18.691	0.017	Sig.
Q16	Which diseases that can be transmitted during blood transfusion?	19.961	0.463	No
Q17	Reasons for not donating blood	52.053	0.136	No
Q18	Reason not eligible for blood donation	9.93	0.969	No
Q19	Are investigations done before transfusion	21.345	0.006	Sig.

Table (8): Association between Attitudes and age

	Variables	Test	P-value	Results
Q1	Ever donated blood	9.263	0.01	Sig.
Q3	Willingness to donate blood in the future	7.246	0.123	No
Q4	Are you a regular donor	9.132	0.01	Sig.
Q6	Do you think that donating blood is a good habit	2.637	0.62	No
Q7	Do you think that voluntary donation is the best source to make safe Donations	2.617	0.624	No
Q8	Could harm occur to a blood donor after donation	6.989	0.138	No
Q9	Do you think donating blood lower donor's immunity	2.218	0.696	No
Q10	Does donation make you weak	3.743	0.442	No
Q11	Could donation lead to anemia	2.812	0.59	No
Q12	Do you encourage relatives to donate	2.471	0.65	No

Table (9): Association between Attitudes and College

	Variables	Test	P-value	Results
Q1	Ever donated blood	4.784	0.188	No
Q3	Willingness to donate blood in the future	22.725	0.001	Sig.
Q4	Are you a regular donor	8.814	0.032	Sig.
Q6	Do you think that donating blood is a good habit	12.976	0.043	Sig.
Q7	Do you think that voluntary donation is the best source to make safe Donations	14.824	0.022	Sig.
Q8	Could harm occur to a blood donor after donation	5.758	0.451	No
Q9	Do you think donating blood lower donor's immunity	4.023	0.674	No
Q10	Does donation make you weak	9.929	0.128	No
Q11	Could donation lead to anemia	7.708	0.26	No
Q12	Do you encourage relatives to donate	6.253	0.395	No

Table (10): Association between Ever donated blood and (Age and gender)

Age (years)		Ever donated blood		Total
		Yes	No	
< 20	Count	11	82	93
	% of Total	5.3%	39.4%	44.7%
20 – 25	Count	11	101	112
	% of Total	5.3%	48.6%	53.8%
> 25	Count	2	1	3
	% of Total	1.0%	0.5%	1.4%
Total	Count	24	184	208
	% of Total	11.5%	88.5%	100.0%
Chi square Test		9.264	P-value	0.01
Gender		Ever donated blood		Total
		Yes	No	
Female	Count	13	127	140
	% of Total	6.3%	61.1%	67.3%
Male	Count	11	57	68
	% of Total	5.3%	27.4%	32.7%
Total	Count	24	184	208
	% of Total	11.5%	88.5%	100.0%
Chi square Test		2.129	P-value	0.145

DISCUSSION

The goal of this study was to determine the level of knowledge and attitudes concerning blood donation among undergraduate medical students. The aggregate of the student's knowledge level was 70% which is higher than the level of knowledge at Samara University in Ethiopia which was 54%(Tadesse et al., 2018).

The current study included both males and females and most of the respondents were females 67.3% and males 32.7%. According to the age of the respondents, the majority of them are between 20 and 25 years old with the rate of 53.8%. The colleges that data collected from were college of medicine 56.3%, college of Dentistry 1.4%, college of Pharmacy 13% and college of nursing 29.3% and most of them were students of stage two 37.5%(Safizadeh et al., 2009).

In this study the first source of getting information about the blood donation was college or school 61.54% then the mass media 15.38%, while in samara university in Ethiopia most get from mass media 72.2% then family or friends 40%(Tadesse et al., 2018).

This show up the positive aspect of the education systems, but in addition the mass media should have a bigger role in making awareness of the community, and blood banks should provide a program or hold a seminar to raise community knowledge about blood donation and its benefits, as well as broadcast material on social media and in the media. 26% of the participants think that blood manufactured artificially however to now blood couldn't be manufactured artificially(Tadesse et al., 2018).

The majority of respondents believe that people should donate their blood to anybody in need 92.79%, followed by relatives 3.85%, although a previous research in central Ethiopia found that people prefer to donate blood to relatives 66.1% and anyone in need 21.5%(Tadesse et al., 2018).

When it came to the benefits of blood donation, the respondents preferred these three options (reduce heart attack 48.56%, happiness 24.04% and free medical checkup 16.35%), but the results were different in a study conducted in central Ethiopia, where most of them believe that only the patient who received the blood will benefit, followed by happiness 45.9%(Beyene, 2020).

According to the study the majority of respondents opted to donate their blood voluntarily 87.5% then replacement 6.3%, although a similar study in central Ethiopia found the opposite, replacement 79.8% and voluntary 17.9%(Beyene, 2020).

To improve understanding about blood donation and hence boost voluntary blood donation, potential donors must be educated on the health benefits of donating blood, the amount of blood provided, and the number of patients who benefit from a single unit of blood donated. They had a high knowledge level aboutminimum

required body weight for blood donation 56.7%, and also about appropriate age for donation 60.1%, and the Interval of blood donation 80.8% but low knowledge level about the volume of blood collected in each donation 30.3% and also the number of patients who benefit from a unit of blood 18.8%. While in a similar study in Kerman city participants had high knowledge about minimum required body weight 51.2% and low knowledge about appropriate age for donation 11.7%.

The 67.8% of respondents believe that a person after receiving blood have a chance to infected by infectious disease this result of the study in the university of Gondar, Northwest Ethiopia which is 81% of them has same beliefs, and HIV and HBV were most frequently mentioned diseases which was similar to University of Gondar, Northwest Ethiopia(Melku et al., 2018).

Most of the participants don't donate their blood because of their fear of anemia, 15.48% of them indicate that no one asked to donate blood for this reason they don't donate yet, but in study of Central Ethiopia 44.4% of them mentioned that donation is not accessible and also fear of sight of blood is one of the options which more chosen. in another similar study in South India most of them feels that medically unfit to donation and never thought about donating blood, also more mentioned which the ratio is 27.4%, most of the respondents know about reasons that causes people not eligible for blood donation(Beyene, 2020; Sabu et al., 2011). Most respondents have a positive attitude toward blood donation when 66.3% of them are willing to donate blood in the future and 64.9% of them believe that blood donation is a good habit. But only 11.5% of them had donated blood previously whereas in the medical college in Karachi among students, central Ethiopia, Northwest Ethiopia the rate is higher with 44%, 17.1%, 85.5% of participants having donated blood in their lifetime respectively. This result indicates that there is a strong need to initiate donor recruitment programs in the country, increasing the general awareness among the masses and especially the health providers. (5)

The majority of the students seemed to be unsure about the risk of blood donation based on their responses to the question of whether it causes anemia. 41.8 % were unsure, whereas 30.3 % believe it's the cause of anemia. They also considered the subject of whether blood donation makes a person weak 48.6% answered they had no idea or were unsure, while 14.9% responded yes. As a result of all of this information, more information should be supplied to students and others in order to ensure that such events only affect a limited number of donors.

They have a positive attitude about blood voluntary blood donation when 52.4% of them believe that voluntary blood donation is the best source to make safe donations and 65.9% of them encourage relatives to donate however in central Ethiopia 53.2% believe that replacement is a best source and in solan, North India 82.67% of participants believe that voluntary is best source(Beyene, 2020; Meinia et al., 2016).

CONCLUSIONS

The majority of the respondents were between 20-25 years old. Most of them were female and from college of medicine.Knowledge was good regarding some aspects of blood donation.Most common reason for not donating blood was because of fear of anemia.Colleges and schools were the main source of getting information about blood donation.Most of them believe that people should donate their blood to anyone in need.One of the benefits about blood donation that major of the respondents believe in was to reduce heart attack.Most of them haven't donated blood before but they were willing to donate their blood in the future.Majority were well-versed in the blood donation criteria, but only a few were aware of how many patients can benefit from a single unit of blood donated and the volume of blood donated in each donation.Most of them have a positive attitude toward blood donation.

ETHICAL CONSIDERATIONS COMPLIANCE WITH ETHICAL GUIDELINES

Before the survey was disseminated and data were collected, permission was acquired from the scientific committee of college of nursing, later on official permission was obtained from university of sulaimani presidency/president office to all medical colleges to collecting data, in formal consent from participants was obtained by allowing them to read the survey. Completing is interpreted as their informal consent to participate, as well as the confirmation that the participants was 18 years of age or older.

AUTHOR'S CONTRIBUTIONS

Study concept; Writing the original draft;D ata collection; Data analysis and Reviewing the final edition by author.

DISCLOSURE STATEMENT:

The author report no conflict of interest.

REFERENCES

Alfouzan, N. (2014). Knowledge, Attitudes, and Motivations towards Blood Donation among King Abdulaziz Medical City Population. International Journal of Family Medicine, 2014. https://doi.org/10.1155/2014/539670

Allerson, J. (2019). Assessment of SelectedUniversity Students' Knowledge of Blood Donation and the Relationship with Intent to Donate Blood. Journal of Clinical and Diagnostic Research, 6(4).

Arthur C. Guyton/ M.D. (n.d.). of Medical. In Physiology.

Beyene, G. A. (2020). Voluntary blood donation knowledge, attitudes, and practices in central ethiopia. International Journal of General Medicine, 13. https://doi.org/10.2147/IJGM.S246138

Dubey, A., Sonker, A., Chaurasia, R., & Chaudhary, R. (2014). Knowledge, attitude and beliefs of people in North India regarding blood donation. Blood Transfusion, 12(SUPPL.1). https://doi.org/10.2450/2012.0058-12

FELIMBAN, R., Kabrah, S., Sadoun, H. Al, & Serihi, R. Al. (2019). Knowledge and attitudes towards blood donation among students of the Faculty of Applied Medical Sciences at King Abdulaziz University. Journal of Research in Medical and Dental Science, 9(8). https://doi.org/10.21203/rs.2.12655/v1

Kurian, R. N., & Sarkar, S. (2016). A Study to assess the Knowledge and Attitude regarding Blood Donation among the General Public in a Selected Urban Area of New Delhi. In International Journal of Nursing & Midwifery Research (ISSN: 2455- 9318) (Vol. 3, Issue 1).

8.   Martínez-Santos, A. E., Fernández-de-la-Iglesia, J. del C., Pazos-Couselo, M., Marques, E., Veríssimo, C., & Rodríguez-González, R. (2021). Attitudes and knowledge in blood donation among nursing students: A cross-sectional study in Spain and Portugal. Nurse Education Today, 106.

https://doi.org/10.1016/j.nedt.2021.105100

9.   Meinia, S., Kumar, Y., Meinia, A., Singh, G., & Dutt, N. (2016). A study to assess the knowledge, attitude, and practices about voluntary blood donation amongst the undergraduate medical students in Solan, North India. International Journal of Medical Science and Public Health, 5(12). https://doi.org/10.5455/ijmsph.2016.24052016523

10.   Melku, M., Asrie, F., Shiferaw, E., Woldu, B., Yihunew, Y., Asmelash, D., & Enawgaw, B. (2018). Knowledge, Attitude and Practice Regarding Blood Donation among Graduating Undergraduate Health Science Students at the University of Gondar, Northwest Ethiopia. Ethiopian Journal of Health Sciences, 28(5). https://doi.org/10.4314/ejhs.v28i5.8

11.   Sabu, K., Remya, A., Binu, V. S., & Vivek, R. (2011). Knowledge, attitude and practice on blood donation among health science students in a University campus, South India. Online Journal of Health and Allied Sciences, 10(2).

12.   Safizadeh, H., Pourdamghan, N., & Mohamadi, B. (2009). University Students Awareness and Attitude towards Blood Donation in Kerman City. IRANIAN JOURNAL OF BLOOD AND CANCER IJBC, 1(3).

13.   Tadesse, W., Ayalew, Y., Yisma, E., Liben, M. L., & Wudu, M. (2018). Knowledge, Attitude, Practice and Associated Factors towards Voluntary Blood Donation among Regular Health Science Students of Samara University, Ethiopia. Health Science Journal, 12(1). https://doi.org/10.21767/1791-809x.1000542

14.   Alfouzan, N. (2014). Knowledge, Attitudes, and Motivations towards Blood Donation among King Abdulaziz Medical City Population. International Journal of Family Medicine, 2014. https://doi.org/10.1155/2014/539670

15.   Allerson, J. (2019). Assessment of SelectedUniversity Students' Knowledge of Blood Donation and the Relationship with Intent to Donate Blood. Journal of Clinical and Diagnostic Research, 6(4).

16.   Arthur C. Guyton/ M.D. (n.d.). of Medical. In Physiology.

17.   Beyene, G. A. (2020). Voluntary blood donation knowledge, attitudes, and practices in central ethiopia. International Journal of General Medicine, 13. https://doi.org/10.2147/IJGM.S246138

18.   Dubey, A., Sonker, A., Chaurasia, R., & Chaudhary, R. (2014). Knowledge, attitude and beliefs of people in North India regarding blood donation. Blood Transfusion, 12(SUPPL.1). https://doi.org/10.2450/2012.0058-12

19.   FELIMBAN, R., Kabrah, S., Sadoun, H. Al, & Serihi, R. Al. (2019). Knowledge and attitudes towards blood donation among students of the Faculty of Applied Medical Sciences at King Abdulaziz University. Journal of Research in Medical and Dental Science, 9(8). https://doi.org/10.21203/rs.2.12655/v1

20.   Kurian, R. N., & Sarkar, S. (2016). A Study to assess the Knowledge and Attitude regarding Blood Donation among the General Public in a Selected Urban Area of New Delhi. In International Journal of Nursing & Midwifery Research (ISSN: 2455- 9318) (Vol. 3, Issue 1).

21. Martínez-Santos, A. E., Fernández-de-la-Iglesia, J. del C., Pazos-Couselo, M., Marques, E., Veríssimo, C., & Rodríguez-González, R. (2021). Attitudes and knowledge in blood donation among nursing students: A cross-sectional study in Spain and Portugal. Nurse Education Today, 106.

https://doi.org/10.1016/j.nedt.2021.105100

22. Meinia, S., Kumar, Y., Meinia, A., Singh, G., & Dutt, N. (2016). A study to assess the knowledge, attitude, and practices about voluntary blood donation amongst the undergraduate medical students in Solan, North India. International Journal of Medical Science and Public Health, 5(12). https://doi.org/10.5455/ijmsph.2016.24052016523

23. Melku, M., Asrie, F., Shiferaw, E., Woldu, B., Yihunew, Y., Asmelash, D., & Enawgaw, B. (2018). Knowledge, Attitude and Practice Regarding Blood Donation among Graduating Undergraduate Health Science Students at the University of Gondar, Northwest Ethiopia. Ethiopian Journal of Health Sciences, 28(5). https://doi.org/10.4314/ejhs.v28i5.8

24. Sabu, K., Remya, A., Binu, V. S., & Vivek, R. (2011). Knowledge, attitude and practice on blood donation among health science students in a University campus, South India. Online Journal of Health and Allied Sciences, 10(2).

25. Safizadeh, H., Pourdamghan, N., & Mohamadi, B. (2009). University Students Awareness and Attitude towards Blood Donation in Kerman City. IRANIAN JOURNAL OF BLOOD AND CANCER IJBC, 1(3).

26. Tadesse, W., Ayalew, Y., Yisma, E., Liben, M. L., & Wudu, M. (2018). Knowledge, Attitude, Practice and Associated Factors towards Voluntary Blood Donation among Regular Health Science Students of Samara University, Ethiopia. Health Science Journal, 12(1). https://doi.org/10.21767/1791-809x.1000542