Introduction

Voluntary blood donation is the foundation of blood safety and safe transfusion methods. It is vital to boost volunteer donor recruitment and retention to ensure a long-term safe blood transfusion practice, especially among university students. The goal was to evaluate Khulna University students’ blood donation knowledge, attitude, and practice (KAP) as well as associated factors. A cross-sectional study was conducted at Khulna University in April 2022. Using simple random sampling (SRS), 400 face-to-face interviews were taken, of which 394 records were used for further analysis. A Chi-square test was used to check the association between KAP toward VBD, and binary logistic regression was applied to identify the association between explanatory and outcome variables. The logistic regression reveals that students with good knowledge about VBD are associated with permanent residence (OR: 1.651; 95% CI: 1.028, 2.650) and education (OR: 1.746; 95% CI: 1.012, 3.014). Favorable attitude toward VBD is associated with gender (OR: 1.818; 95% CI: 1.073, 3.079), division (OR: 3.058; 95% CI: 1.241, 7.535) and social media time (OR: 0.068; 95% CI:0.001, 0.876). The practice of VBD is associated with gender (OR: 5.375; 95% CI:3.115, 9.273) and current residence (OR: 0.0397; 95% CI:0.181, 0.869). Efforts should be undertaken to use knowledge and a favorable attitude toward students at the Khulna university to accomplish the aim of 100% VBD in the future.

Keywords: Knowledge, Attitude, Voluntary blood donation, Khulna university students.
Every year, around 112.5 million units of donated blood are collected worldwide. Over half of these are collected in high-income nations, and the average blood donation rate in high-income countries is nearly nine times higher than in low-income countries (Lownik et al., 2012). In industrialized countries, the average contribution rate is 38.1 donations per 1000 people (range 4.92–68.01), whereas, in underdeveloped countries, the average donation rate is 2.3 (range 0.40–7.46). (Urgesa et al., 2017). The majority of the 500,000 women who die each year during pregnancy and delivery reside in underdeveloped nations, with hemorrhage, which inevitably necessitates blood transfusion, the leading cause of maternal fatalities (Ahmed et al., 2014). By the WHO information, 1% of the population generally donates blood from a South Asian country. However, the people of this area contribute 15% (14.86 million) of world blood donation. Of this donated blood, 83.7% comes from voluntary non-remunerated donations (Manikandan et al., 2013).

In Bangladesh, more than 70% of annual demands for blood were collected from paid donors till 2001 (Ahmed et al., 2014). According to a report from Bangladesh Blood Transfusion Service, (BTS) majority of the people are collecting blood from patient’s relatives and friends, indicating that 85% of blood is taken from relatives/family blood donors and only 15% from voluntary non-remunerated blood donors (Choudhury, 2011). There were no donors under the age of 18 recruited; 80% of donors were between the ages of 18 and 24, and 20% were between the ages of 25 and 44. Between the ages of 44 and 60, no donations have been documented. In Bangladesh, around 600,000 units of blood are required each year. This forecast is based on the year 2010. According to SBTP (2010), 70% of blood is obtained from directed or relative blood donors, the remainder coming from voluntary blood donors (Situation Assessment of Public and Private Blood Centres in Bangladesh).

In every civilization, youngsters are the most likely to be blood donors especially university students constitute a significant percentage of this cohort (Ugwu et al., 2019). Because university students are young and educated, they are regarded as safer blood donors by the country’s national and regional blood banks, as the residual risk of transfusion-transmissible illnesses is deemed to be lower in this demographic (Suen et al., 2020). However, some studies have found that more than two-thirds of university students around the world had donated blood in the past for various reasons, although many no longer do (Salaudeen et al., 2013, Elias et al., 2011, Baig et al., 2013).

All blood transfusion facilities prioritize increasing the level of knowledge, attitude, and practice toward blood donation among university students. The first step in achieving this aim is to conduct extensive research to assess the present state of intention (awareness, knowledge, motivation, and both positive and negative attitudes of the people about blood donation), as well as to determine the reasons for not donating blood. The current scenario of voluntary blood donation among Khulna university students has not been performed yet. So, our goal is to assess several aspects such as knowledge, attitude, and practices related to voluntary blood donation and the factors associated with those aspects among Khulna University students so that the number of safe blood donors can be increased at the university level by taking necessary steps according to our findings.

Materials and Methods

Data source and study design

We extracted data from Khulna University as all the students of this university were our target population. Here, the total number of students is known, so a simple random sampling technique has been applied for sample collection. A cross-sectional study was conducted in April 2022, and data were collected through face-to-face interviews with a well-structured questionnaire. Four hundred responses were recorded with their valuable information and hospitality. The records of 6 respondents were omitted from this study because some necessary variables were missing in those records. After removing the missing values, there were 394 records left as our primary data with a 98.25% response rate. These data were used to perform our further analysis.
Sample size determination

There are a total of 6965 students at Khulna University. We have used the Cochran formula for sample size calculation (Woolson et al., 1986)

We know,

\[ n_0 = \frac{z^2 pq}{d^2} \]

and

\[ n = \frac{n_0}{1 + \frac{n_0 - 1}{N}} \]

\( n = \) required sample size; \( p = 0.5 \); estimated proportion of the population; \( q = 1 - p \); \( z = 1.96 \); for 95% confidence level; \( d = 0.05 \); margin of error. So, our sample size would be

\[ n_0 = \frac{1.96^2 \times 0.5 \times (1 - 0.5)}{(0.05)^2} = 385 \]

\[ n = \frac{385}{1 + \frac{385 - 1}{6965}} = 365 \]

We need at least 365 respondents for the analysis, and but we have collected data from 400 respondents.

Dependent variables

The knowledge, attitudes, and practices about VBD were investigated in this study. The categories for knowledge are "knowledgeable" and "not knowledgeable," the categories for attitude are "favorable" and "unfavorable," and the categories for practice are "donated blood at least once" and "never donated blood."

Independent variables

Age of the respondent (years), gender, educational status, permanent residence, current residence, marital status, smoking status, district, academic pressure, parent's education, parent's occupation, family income, and expenditure, earning members, family members, personal income source, blood group, the reason to or not to donate blood and depression status (PHQ-2) are independent variables.

Statistical Analysis

Specifically, to interpret the terms: knowledge, attitude, and practice toward VBD, our study used primarily three forms of analysis, namely: Univariate analysis, Bivariate analysis, and Multivariate analysis, which are descriptive statistics (frequencies, percentages), chi-square and t-test, and binary logistic regression expressed as odds ratios (OR) with a 95% confidence interval. Microsoft Excel-2019 was used for data input, and analysis was done using STATA version 14.

Chi-square test \( (\chi^2) \)

The form chi-squared statistic is quite intuitive, which is given below:

\[ \chi^2 = \sum_{i=1}^{n} \frac{(O_i - E_i)^2}{E_i} \]  

(Pearson released a paper in 1990 on the Chi-square \( (\chi^2) \) test has since formed the foundation for statistical analysis that investigates the goodness of fit (Chi-Squared Test - Wikipedia, n.d.).

Binary logistic regression model

The link between a dependent discrete variable with two potential outcomes and one or more independent variables may be investigated using Logistic Regression analysis (maybe continuous, discrete, or a mixture of all types). (Pituch & Stevens, 2020).
The logit link has the form:

$$\log \left( \frac{p_i}{1 - p_i} \right) = \logit(p_i) = \beta_0 + \beta_1 x_i$$

**Odds ratio**

The odds of an event occurring is distinct as the probability of the event occurring as a proportion to the probability of the event not occurring.

$$Odds = \frac{Probability \ of \ event}{Probability \ of \ non-event}$$

OR >1 indicates the increased occurrence of an event; OR <1 indicates decreased occurrence of an event; OR=1 indicates no chance of occurrence of an event.

**Results**

**Univariate analysis**

The frequency of knowledge, attitude, and practice is shown in Table 1. Among 394 respondents, 237(60.15%) respondents were not knowledgeable, and 157(39.85%) respondents were knowledgeable. 79(20.05%) respondents had an unfavorable attitude, and the others 315(79.95%) had a favorable attitude toward VBD. 187(47.46%) respondents donated blood at least once, and 207(52.54%) never donated blood. The blood group of the respondents had categories 8(2.03%) respondents had not sure about the blood group, 109 (27.66%) persons had the blood group A+, 106(26.90%) had the blood group B+, 110(27.92) had the blood group O+, 39(9.90%) had the blood group AB+, 4(1.02%) had the blood group A-, 9(2.28%) had the blood group B- and no one had the blood group AB-.

Table 1. Frequency table of selected variables

| Variable                              | Category         | Frequency | Percent |
|---------------------------------------|------------------|-----------|---------|
| Respondents' knowledge about VBD      | Not Knowledgeable| 237       | 60.15   |
|                                       | Knowledgeable    | 157       | 39.85   |
| Respondents' attitude toward VBD      | Unfavorable Attitude | 79       | 20.05   |
|                                       | Favorable Attitude | 315     | 79.95   |
| Blood donation status of the respondents | Never donated blood | 207    | 52.54   |
|                                       | Donated blood at least once | 187     | 47.46   |
|                                       | Not sure         | 8         | 2.03    |
|                                       | A+               | 109       | 27.66   |
|                                       | B+               | 106       | 26.90   |
|                                       | O+               | 110       | 27.92   |
| The blood group of the respondents    | AB+              | 39        | 9.90    |
|                                       | A-               | 4         | 1.02    |
|                                       | B-               | 9         | 2.28    |
|                                       | O-               | 9         | 2.28    |
|                                       | AB-              | 0         | 0       |

The number of donors as a whole Table 2 shows that 108(57.75%) respondents donated blood regularly, and 79(42.25%) respondents did not donate blood regularly. 58(31.02%) respondents donated blood to their family members, and 129(68.98%) respondents did not. 68(36.36%) respondents donated their blood
to their friends, and 119(63.64%) respondents did not. 132(70.59%) respondents donated their blood to
others, and 45(29.41%) respondents did not donate their blood to others. Among the donors, 167(89.30%)
respondents did not take money for donating blood; on the other hand, 20(10.70%) respondents took
the money. When the donor went to donate blood, 94(50.27%) respondents did not get the travel cost,
81(43.32%) respondents sometimes got the travel cost, and 12(6.42%) respondents always got the travel
cost from the blood recipient. When the donors gave blood, 21(11.23) respondents did not get proper care,
76(40.64%) respondents often got the proper care, and 90(48.13%) respondents got proper care from the
blood recipient.

Table 2. Frequency table of donors (total 187 as 100%) on several covariates

| Questions toward donors | Category | Frequency | Percent (%) |
|-------------------------|----------|-----------|-------------|
| Do you donate blood regularly? | No | 79 | 42.25 |
| | Yes | 108 | 57.75 |
| Did you donate blood to family members? | No | 129 | 68.98 |
| | Yes | 58 | 31.02 |
| Did you donate blood to friends? | No | 119 | 63.64 |
| | Yes | 68 | 36.36 |
| Did you donate blood to others? | No | 45 | 29.41 |
| | Yes | 132 | 70.59 |
| Did you take money for donating blood? | No | 167 | 89.30 |
| | Yes | 20 | 10.70 |
| Have you got your travel cost from the blood recipient? | No | 94 | 50.27 |
| | Often | 81 | 43.32 |
| | Always | 12 | 6.42 |
| Have you got proper care from the blood recipient? | No | 21 | 11.23 |
| | Often | 76 | 40.64 |
| | Always | 90 | 48.13 |

Table 3 shows that the main reasons for donating blood accordingly to the donors were 137(73.26%) respondents donated their blood to save a life, 73(39.04%) respondents donated their blood for their physical benefits, 32(17.11%) respondents donated their blood for their free medical check-up, 98(52.41%) respondents donated their blood for social work, 31(16.58%) respondents donated their blood for other reasons.

Table 3. Frequency table of reasons behind practicing VBD (187 donors as 100%)

| Reasons for blood donation | Category | Frequency | Percent (%) |
|--------------------------|----------|-----------|-------------|
| To save life             | No | 50 | 26.74 |
| | Yes | 137 | 73.26 |
| For own physical benefits | No | 260 | 60.96 |
| | Yes | 73 | 39.04 |
| To get a free medical checkup | No | 155 | 82.89 |
| | Yes | 32 | 17.11 |
| Social work              | No | 89 | 47.59 |
| | Yes | 98 | 52.41 |
| Others                   | No | 156 | 83.42 |
| | Yes | 31 | 16.58 |
Assuming those who have never donated blood as a whole, Table 4 shows the main reasons for never donating blood. Accordingly, to the non-donors, there were 30(14.49%) respondents who did not know where to donate the blood, 24(11.59%) respondents did not know about the importance of blood donation, 58(28.02%) respondents had anemia, and 84(%) respondents had a fear of blood donation process. 4(1.93%) had different religious views, and 6(2.9%) thought there would be blood misuse. 39(18.84%) did not have enough knowledge about VBD, and 4(1.93%) thought blood donation was a waste of time.

Table 4. Frequency table of reasons behind not practicing VBD (207 non-donors as 100%)

| Reasons for not donating blood                                      | Category | Frequency | Percent (%) |
|---------------------------------------------------------------------|----------|-----------|-------------|
| Do not know where to donate                                        | No       | 177       | 85.91       |
|                                                                     | Yes      | 30        | 14.49       |
| Do not know about the importance of blood donation                  | No       | 183       | 88.41       |
|                                                                     | Yes      | 24        | 11.59       |
| Anemia                                                              | No       | 149       | 71.98       |
|                                                                     | Yes      | 58        | 28.02       |
| Fear of blood donation process                                      | No       | 123       | 59.42       |
|                                                                     | Yes      | 84        | 40.58       |
| Social/Religious issue                                              | No       | 203       | 98.07       |
|                                                                     | Yes      | 4         | 1.93        |
| Misuse of blood in hospitals                                        | No       | 201       | 97.1        |
|                                                                     | Yes      | 6         | 2.9         |
| Do not have enough knowledge about voluntary-blood donation         | No       | 168       | 81.16       |
|                                                                     | Yes      | 39        | 18.84       |
| Blood donation is a waste of time                                   | No       | 203       | 98.07       |
|                                                                     | Yes      | 4         | 1.93        |

**Bivariate analysis**

Table 5 shows the result of the bivariate analysis. Chi-square distribution is used for categorical variables and a t-test for numeric variables. For knowledge age, permanent residence, and division were statistically significant. For attitude toward VBD, gender, division, and social media time are statistically significant. Age, gender, current residence, education status, marriage, personal income, and smoking were significantly associated.

For knowledge, the average age of respondents is 21.76 years with an SD of 0.13 who are knowledgeable about VBD. About 66.24% of respondents had permanent residence in the urban area. More than half of the respondents were from the Khulna division (62.45%) who have VBD knowledge. Students in the 2nd year are more knowledgeable about VBD (42.04%). Students with 30k-50k family income have more knowledge (28.03%) than others.

For attitude, male students have a more favourable attitude (68.25%) toward VBD. Most of the respondents were from the Khulna division (57.78%) who have a favourable attitude toward VBD, and 32.06% spend 1-2 hours on social media.

For practice, the average age of respondents is 21.91 years with SD 0.14 who donated blood at least once. Most donors are male (83.42%) and currently living at home (46.52%). The majority of the donor is in the 2nd year (39.04%) and unmarried (93.05%). Most donors have no personal income (136%) and are a non-smoker (72.19%).

**Multivariate analysis**

**Knowledge:**

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The LR results of the different associated risk factors for knowledge about VBD are presented in Table 6. The table shows that personal residence and education are statistically significant for knowledge (p<0.05). The logistic regression reveals that respondents from the urban area are almost 1.6 times more knowledgeable than
Table 5. Cross-table for Knowledge, Attitude, and Practice with independent variables

| Variables                     | Knowledge |                      |                      | Attitude |                      |                      | Practice |                      |                      |
|-------------------------------|-----------|-----------------------|----------------------|----------|-----------------------|----------------------|----------|-----------------------|----------------------|
|                               | Not Knowledgeable | Knowledgeable | p-value | Not Knowledgeable | Knowledgeable | p-value | Unfavourable | Favourable | p-value | Never | At least once | p-value |
| Age                           | 21.24±0.12 | 21.76±0.13 | 0.002** | 21.24±0.15 | 21.50±0.10 | 0.12 | 21.03±0.11 | 21.91±0.14 | 0.000*** |
| Gender                        | Male      | 80(33.76) | 56(35.67) | 0.696 | 43(54.43) | 215(68.25) | 0.021* | 102(49.28) | 156(83.42) | 0.000*** |
|                               | Female    | 157(66.24) | 101(64.33) | 0.696 | 36(45.57) | 100(31.75) | 0.12 | 105(50.72) | 31(16.58) |
| Permanent residence           | Urban     | 121(51.05) | 104(66.24) | 0.003** | 50(63.29) | 175(55.56) | 0.214 | 115(55.56) | 110(58.82) | 0.513 |
|                               | Rural     | 116(48.95) | 53(33.76) | 29(36.71) | 140(44.44) | 92(44.44) | 77(41.18) |
| Division                      | Barisal   | 9(3.80) | 9(5.73) | 0.033* | 4(5.06) | 14(4.42) | 0.009** | 10(4.83) | 8(4.29) | 0.369 |
|                               | Chittagong | 5(2.11) | 9(5.73) | 1(1.27) | 13(4.13) | 8(3.86) | 6(3.21) |
|                               | Dhaka     | 39(16.46) | 34(21.66) | 18(22.78) | 55(17.46) | 32(50.46) | 41(21.93) |
|                               | Khulna    | 148(62.45) | 73(46.50) | 39(49.37) | 182(57.78) | 127(61.35) | 94(50.27) |
|                               | Mymensing | 2(0.84) | 3(1.91) | 4(5.06) | 1(0.32) | 2(0.97) | 3(1.60) |
|                               | Rajshahi  | 21(8.86) | 12(7.64) | 10(12.66) | 23(7.3) | 13(6.28) | 20(10.70) |
|                               | Rangpur   | 11(4.64) | 16(10.19) | 3(3.80) | 24(0.95) | 14(6.76) | 13(6.95) |
|                               | Sylhet    | 2(0.84) | 1(0.64) | 0(0) | 3(0.95) | 1(0.48) | 2(1.07) |
| Current residence             | Hall      | 82(34.60) | 58(36.94) | 0.803 | 34(43.04) | 106(33.65) | 0.296 | 61(29.47) | 79(42.25) | 0.007** |
|                               | Rent      | 40(16.88) | 23(14.65) | 11(13.92) | 52(16.51) | 42(20.29) | 21(11.23) |
|                               | House     | 115(48.52) | 76(48.41) | 34(43.04) | 157(49.84) | 104(50.24) | 87(46.52) |
|                               | Religion  | Muslim | 186(78.48) | 134(85.35) | 64(81.01) | 256(81.27) | 0.567 | 160(77.29) | 160(85.56) | 0.103 |
|                  | 2022 | 2023 | 2024 | 2025 | 2026 |
|------------------|------|------|------|------|------|
| **Hindu**        | 50(21.10) | 22(14.01) | 14(17.72) | 58(18.41) | 46(22.22) | 26(13.90) |
| **Christian**    | 0(0) | 0(0) | 0(0) | 0(0) | 0(0) | 0(0) |
| **Buddhist**     | 1(0.42) | 1(0.64) | 1(1.27) | 1(0.32) | 1(0.48) | 1(0.53) |
| **Education status** | 117(49.37) | 49(31.21) | 35(44.30) | 131(41.59) | 111(53.62) | 55(35.41) |
| **First year**   |       | 0.004*** |       |       |       |       |
| **Second Year**  | 67(28.27) | 66(42.04) | 30(37.97) | 103(32.70) | 60(28.99) | 73(39.04) |
| **Third Year**   | 31(13.08) | 19(12.1) | 11(13.92) | 39(12.38) | 22(10.63) | 28(14.97) |
| **Fourth Year**  | 15(6.33) | 16(10.19) | 3(3.80) | 28(8.89) | 11(5.31) | 20(10.70) |
| **Masters**      | 7(2.95) | 7(4.46) | 0(0) | 14(4.44) | 3(1.45) | 11(5.88) |
| **Academic pressure** | 21(8.86) | 15(9.55) | 10(12.66) | 26(8.25) | 0.471 | 19(9.18) | 17(9.09) | 0.999 |
| **Mild**         |       |       |       |       |       |       |
| **Moderate**     | 111(46.84) | 74(47.13) | 35(44.23) | 150(47.62) | 97(46.86) | 88(47.06) |
| **Severe**       | 105(44.30) | 68(43.31) | 34(43.04) | 139(44.13) | 91(43.96) | 82(43.85) |
| **Father's education** | 46(19.41) | 25(15.92) | 0.123 | 13(16.46) | 58(18.41) | 31(14.98) | 40(21.39) | 0.103 |
| **Primary**      |       |       |       |       |       |       |
| **Secondary**    | 47(19.83) | 25(15.92) | 10(12.66) | 65(20.65) | 39(18.84) | 36(19.25) |
| **Higher**       | 48(20.25) | 22(14.01) | 15(18.99) | 55(17.46) | 45(21.74) | 25(13.37) |
| **Secondary**    | 96(40.51) | 82(52.23) | 41(51.90) | 137(43.49) | 92(44.44) | 86(45.99) |
| **Above**        | 48(20.25) | 49(31.21) | 0.054 | 22(27.85) | 75(23.81) | 0.901 | 48(23.19) | 49(26.20) | 0.898 |
| **Father's occupation** |      |       |       |       |       |       |
| **Gov.Job**      | 50(21.10) | 36(22.93) | 16(20.25) | 70(22.22) | 47(22.71) | 39(20.86) |
| **Private job**  | 92(38.82) | 47(29.94) | 27(34.18) | 112(35.56) | 73(35.27) | 66(35.29) |
|                      | Unemployed | 25(15.92) | 14(17.72) | 58(18.41) | 39(18.84) | 33(17.65) |
|----------------------|------------|-----------|-----------|-----------|-----------|-----------|
| **Mother's education** |            |           |           |           |           |           |
| Primary              | 50(21.10)  | 33(21.02) | 0.058     | 11(13.92) | 72(22.86) | 0.170     | 40(19.32) | 43(22.99) | 0.574 |
| Secondary            | 83(35.02)  | 36(22.93) |           | 26(32.91) | 93(29.52) | 63(30.43) | 56(29.95) |
| Higher Secondary     | 50(21.10)  | 41(26.11) |           | 16(20.25) | 75(23.88) | 53(25.60) | 38(20.32) |
| Above                | 54(22.78)  | 47(29.94) |           | 26(32.91) | 75(23.81) | 51(24.64) | 50(26.74) |
| **Mother's occupation** |            |           |           |           |           |           |
| Gov. job             | 21(8.86)   | 21(8.86)  | 0.913     | 10(12.66) | 23(7.30)  | 0.095     | 11(5.31)  | 22(11.76) | 0.121 |
| Private job          | 9(3.80)    | 7(4.47)   |           | 2(2.53)   | 14(4.44)  | 10(4.83)  | 6(3.21)   |
| Business             | 3(1.27)    | 3(1.27)   |           | 3(3.80)   | 3(0.95)   | 3(1.45)   | 3(1.60)   |
| Housewife            | 204(86.08) | 135(85.99)|           | 64(81.01) | 275(87.30)| 183(88.41)| 156(83.42)|
| **Family income**    |            |           |           |           |           |           |
| Below 20k            | 96(40.51)  | 38(24.20) | 0.002**   | 24(30.38) | 110(34.92)| 0.814     | 79(38.16) | 55(29.41) | 0.311 |
| 20k-30k              | 62(26.16)  | 40(25.48) |           | 23(29.11) | 79(25.09) | 50(24.15) | 52(27.81) |
| 30k-50k              | 40(16.88)  | 44(28.03) |           | 16(20.25) | 68(21.59) | 40(19.32) | 44(23.53) |
| Above 50k            | 39(16.46)  | 35(22.29) |           | 16(20.25) | 58(18.41) | 38(18.36) | 36(19.25) |
| **Family expenditure** |           |           |           |           |           |           |
| Below 20k            | 82(34.60)  | 35(22.29) | 0.061     | 24(30.38) | 93(29.52) | 0.976     | 65(31.40) | 52(27.81) | 0.716 |
| 20k-30k              | 93(39.24)  | 68(43.31) |           | 31(39.24) | 130(41.27)| 86(41.55) | 75(40.11) |
| 30k-50k              | 45(18.99)  | 39(24.84) |           | 18(22.78) | 66(20.95) | 41(19.81) | 43(22.99) |
| Above 50k            | 17(7.17)   | 15(9.55)  |           | 6(7.59)   | 26(8.25)  | 15(7.25)  | 17(9.09)  |
| **Earning members**  |            |           |           |           |           |           |
| More than one        | 60(25.32)  | 46(29.30) | 0.383     | 16(20.25) | 90(28.57) | 0.136     | 49(23.67) | 57(30.48) | 0.128 |
| Category            | One          | >3            | ≤3            | Only child  No | Only child  Yes | Marriage Married | Marriage Unmarried | Marriage Divorced | Marriage Widowed | Personal income No | Personal income Yes | Smoking Non-smoker | Smoking Occasional smoker | Smoking Smoker | Social media time Less than 1 hour | Social media time 1-2 hours | Social media time 2-3 hours | Social media time More than 3 hours | Sleep hours Less than 4 | Sleep hours | 168 |
|---------------------|--------------|---------------|---------------|---------------|---------------|----------------|------------------|------------------|----------------|-------------------|--------------------|---------------------|------------------------|----------------|-----------------------------|--------------------------|-----------------------|--------------------------|----------------------|-------------|-----|
| Family members      | 177(74.68)   | 111(70.70)    | 63(79.75)     | 225(71.43)    | 158(76.33)    | 130(69.52)     | 209(88.19)       | 139(88.54)       | 7(2.95)       | 229(96.62)         | 149(94.90)         | 0.0056               | 0.040*                 | 0.000***              | 0.129                     | 0.131                  | 5(6.33)     | 13(4.113) | 0.326 | 11(5.31) | 14(7.49) | 0.326 |
Islam, K. N. et al. (2022). Knowledge, attitude, and practice towards voluntary blood donation and associate factors among Khulna university students. *Khulna University Studies*, Special Issue (ICSTEM4IR): 158-174.

| Hours          | 4-6 hours | 7-9 hours | More than 9 hours | Depression |
|---------------|-----------|-----------|-------------------|------------|
| 4-6 hours     | 115(48.52)| 67(42.68) | 36(45.57)         | 146(46.35) |
| 7-9 hours     | 92(38.82) | 77(39.04) | 30(37.97)         | 139(44.13) |
| More than 9 hours | 19(8.02) | 6(3.82)   | 8(10.13)          | 17(5.40)   |
| Depression    | Not       |           |                   |            |
| Not depressed | 78(32.91) | 49(31.21) | 0.724             | 26(32.91)  |
| Depressed     | 159(67.09)| 108(68.79)| 53(67.09)         | 214(67.94) |

(*** indicates p<0.001, (**) for p<0.01, (*) for p<0.05)

respondents from a rural area (OR: 1.651; 95% C.I: 1.028, 2.650). Students from the 2nd year are almost 1.7 times more likely to know about VBD than 1st year students (OR: 1.746; 95% C.I: 1.012,3.014).
Table 6. List of covariates adjusted for knowledge about VBD.

| Variable          | Category     | OR   | p-value | 95% CI Lower | 95% CI Upper |
|-------------------|--------------|------|---------|--------------|--------------|
| Personal Residence| Rural (ref)  |      |         |              |              |
|                   | Urban        | 1.651| 0.038*  | 1.028        | 2.650        |
| Division          | Barisal (ref)|      |         |              |              |
|                   | Chittagong   | 2.061| 0.344   | 0.460        | 9.221        |
|                   | Dhaka        | 0.686| 0.491   | 0.235        | 2.000        |
|                   | Khulna       | 0.543| 0.236   | 0.198        | 1.488        |
|                   | Mymensingh   | 1.397| 0.756   | 0.170        | 11.467       |
|                   | Rajshahi     | 0.553| 0.339   | 0.164        | 1.862        |
|                   | Rangpur      | 1.282| 0.699   | 0.363        | 4.518        |
|                   | Sylhet       | 0.571| 0.680   | 0.040        | 8.167        |
| Education         | 1st year (ref)|     |         |              |              |
|                   | 2nd Year     | 1.746| 0.045*  | 1.012        | 3.014        |
|                   | 3rd Year     | 1.080| 0.845   | 0.498        | 2.343        |
|                   | 4th Year     | 1.447| 0.467   | 0.534        | 3.917        |
|                   | Masters      | 1.238| 0.770   | 0.295        | 5.195        |
| Family income     | Below 20k (ref)|     |         |              |              |
|                   | 20k-30k      | 1.286| 0.403   | 0.713        | 2.319        |
|                   | 30k-50k      | 1.852| 0.052   | 0.993        | 3.451        |
|                   | Above 50k    | 1.479| 0.254   | 0.754        | 2.898        |
| Age               |              | 1.117| 0.189   | 0.946        | 1.320        |

(*) for p<0.05

**Attitude:**

The LR results of the different associated risk factors for attitude toward VBD are presented in Table 7. Male students are almost 1.8 times more likely to have a favorable attitude toward VBD than female students (OR: 1.818; 95% C.I: 1.073, 3.079). Students from the Mymensingh division are 0.06 times less likely to have a favorable attitude toward VBD than students from the Barisal division (OR: 0.068; 95% C.I:0.001, 0.876). Students who spend 1-2 hours on social media are almost three times more likely to have favorable output toward VBD than students who spend less than one hour on social media (OR: 3.058; 95% C.I:1.241, 7.535).

**Practice:**

The factors of blood donation practice are presented in Table 8. Male students are almost five times (OR: 5.375; 95% C.I:3.115, 9.273) more likely to be donors than female students. Students living at home are 0.397 times (OR: 0.0397; 95% C.I:0.181, 0.869) less likely to be donors than students in the hall. Every 1-year increase in age increases the chance of being a donor by 1.2 times.
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Table 7. List of covariates adjusted attitude toward VBD

| Variable     | Category          | OR   | P-value | 95% CI Lower | 95% CI Upper |
|--------------|-------------------|------|---------|--------------|--------------|
| Gender       | Female (ref)      |      |         |              |              |
|              | Male              | 1.818| 0.026*  | 1.073        | 3.079        |
| Division     | Barisal (ref)     |      |         |              |              |
|              | Chittagong        | 2.888| 0.377   | 0.275        | 30.320       |
|              | Dhaka             | 0.762| 0.676   | 0.214        | 2.708        |
|              | Khulna            | 1.296| 0.669   | 0.394        | 4.260        |
|              | Mymensingh        | 0.068| 0.039*  | 0.001        | 0.876        |
|              | Rajshahi          | 0.639| 0.522   | 0.162        | 2.516        |
|              | Rangpur           | 1.980| 0.423   | 0.372        | 10.522       |
|              | Sylhet            |      |         |              |              |
| Social media time | Less than 1 hour (ref) |      |         |              |              |
|              | 1-2 hours         | 3.058| 0.015*  | 1.241        | 7.535        |
|              | 2-3 hours         | 1.436| 0.388   | 0.631        | 3.264        |
|              | Above 3 hours     | 1.231| 0.614   | 0.547        | 2.768        |

(* for p<0.05)

Table 8. List of covariates adjusted for the practice of VBD

| Variable     | Category          | OR   | P-value | 95% CI Lower | 95% CI Upper |
|--------------|-------------------|------|---------|--------------|--------------|
| Gender       | Female (ref)      |      |         |              |              |
|              | Male              | 5.375| 0.000***| 3.115        | 9.273        |
| Current residence | Hall (ref)        |      |         |              |              |
|              | Home              | 0.397| 0.021*  | 0.181        | 0.869        |
|              | Rent House        | 0.557| 0.061   | 0.302        | 1.027        |
| Education    | 1st year (ref)    |      |         |              |              |
|              | 2nd Year          | 1.440| 0.204   | 0.819        | 2.529        |
|              | 3rd Year          | 0.559| 0.221   | 0.220        | 1.417        |
|              | 4th Year          | 0.590| 0.396   | 0.175        | 1.992        |
|              | Masters           | 1.332| 0.739   | 0.245        | 7.231        |
| Marriage     | Married (ref)     |      |         |              |              |
|              | Divorced          | 1    |         |              |              |
|              | Unmarried         | 0.385| 0.272   | 0.070176     | 2.115        |
|              | Widowed           | 0.643| 0.839   | 0.00915      | 45.19        |
| Personal income | No (ref)          |      |         |              |              |
|              | Yes               | 1.223| 0.493   | 0.687376     | 2.176        |
| Smoking      | Non-smoker (ref)  |      |         |              |              |
|              | Occasionally Smoker| 1.889| 0.171   | 0.760759     | 4.692        |
|              | Smoker            | 1.391| 0.405   | 0.639132     | 3.028        |
| Age          |                   |      |         |              |              |
|              | 1.210             | 0.049*|         | 1.000965     | 1.463        |

(***) indicates p<0.001, (*) for p<0.05
Discussion

In this study, we tried to see the knowledge, attitude, and practice of VBD among the people of Khulna University. The binary logistic model, a multivariate model for the binary response of the dependent variable, determined the behavior of the Khulna University student on blood donation by the settings of KAP model exposure. According to our study, KAP on blood donation is associated with age, gender, permanent address, educational status, division, and time spent on social media. This study found that education was substantially and positively linked with blood donation knowledge, corroborating a study done in Sikkim, India (Shenga et al., 2019) and (Jemberu et al., 2016). This might be because education might put us better positioned to explore the world and social media more consciously. Higher education might widen our gaze, and gathering knowledge becomes more effortless.

According to our study, students from the urban area are more knowledgeable in VBD. Similar results were found by (Gebresilase et al., 2017). People from urban areas are more connected to social media, which lets them know about VBD. Again, blood donation is rare in rural Bangladesh areas, so it is hard to gather knowledge about VBD in rural areas. This study found that male students have a more positive attitude towards VBD. A similar study was found by (Limaye et al., 2018). This may have occurred because women are not that much practicing blood donation. On the other hand, Male are more active in blood donation. Our study found that division and time spent on social media are significantly associated with attitude. That may be because exploring more social media can help us improve our knowledge about blood donation. Further, the importance of blood donation can also be known from social media. In our study, age is significantly associated with blood donation practice. This is similar to findings from Ethiopia (Jemberu et al., 2016). In a developing country, age is a factor that could influence blood donation (Diongue et al., 2021). Young people are crucial in the voluntary, non-remunerated blood donation process. This could be because youth and physically healthy students are the potential sources of blood donation.

According to this research, the current residence is significantly associated with blood donation practice. The study shows that students living at home are fewer active donors than students living in the hall. This could be because students living in the hall are more active in any blood donation campaign. It is easy for them to go anywhere at any moment compared to the students who live in their homes with family. Students living at home might have to obey some family restrictions. This study shows that men donated blood more than women. This tendency toward masculinization of blood donation is not new. (Shahshahani et al., 2004) found parallel results, with women in Yazd donating blood fewer than men (Mousavi et al., 2011) in a fitted model. Women are unable to donate blood owing to their physiological makeup and the fact that they are pregnant. Many women also stop giving after they become pregnant and never return. Challenges with anemia, more acute physical reactions to blood donation, problems with minimum weight limitations, end of pregnancy, and nursing are the primary reasons listed for women's relative absence from blood donation practice. Also, the place of donation and safety for women is now a big issue for not donating blood.

Conclusion

Shortage in the supply of safe blood is a global problem nowadays. The foundation of a safe, sustainable blood supply is the voluntary non-remunerated blood donors. Our study aimed to identify the knowledge, attitude, and practice of VBD among Khulna University students concerning different demographic attributes. According to this study, age, gender, division, current and permanent residence, and social media time are significantly associated with KAP. Moreover, we have to target those who are not knowledgeable or have an unfavorable attitude toward VBD so that we can increase their knowledge about VBD and inspire them to practice VBD. For this, we can
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proceed through the attributes which were found significantly associated with KAP toward VBD in this study conducted for the students of Khulna University.

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