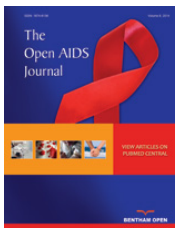

The Open AIDS Journal

Content list available at: https://openaidsjournal.com

LETTER

Knowledge and Awareness about HIV and AIDS among Iraqi College Students

Hassan Mohammad Naif[1,*], Asmaa H. Hwaid[2], Abdul-Razak S.H. Hasan[3], Rafal M. Khalifa[4] and Ashwak T. Humadi[4]

[1]*Molecular Virology Laboratory, Department of Molecular and Medical Biotechnology, College of Biotechnology, Al-Nahrain University, Baghdad, Aljadriya POBox 64030, Iraq*
[2]*Department of Biology, College of Education for Pure Science, Diyala University, Diyala, Iraq*
[3]*Department of Microbiology, College of Medicine, Diyala University, Diyala, Iraq*
[4]*Department of Biology, College of Education for Pure Science, Diyala University, Diyala, Iraq*

Abstract:

Background:

Human Immunodeficiency Virus (HIV) and Acquired Immunodeficiency Syndrome (AIDS) are the major global public health problems since their discovery in 1983. Knowledge and awareness about the transmission of the virus play an important role toward prevention and the control of the disease. This study aimed to assess the knowledge and awareness about HIV and AIDS among university students of two Iraqi Universities (Diyala and Al-Nahrain) by using a constructed self-administered questionnaire.

Methods:

This cross-sectional study was conducted on 506 students from two Iraqi Universities using a constructed self-administered questionnaire in 2010 and 2017 for Diyala University and in 2017 for Al-Nahrain University. Data obtained from the students' responses were collected and statistically analysed. The level of knowledge and awareness was measured according to Bloom's cut-off point.

Results:

The study comprised 506 students from the two universities, 341 were females with a mean age of 22.38±4.99 years and 165 were males with a mean age of 22.38±4.99 years. Data revealed that participants, regardless of their gender, on specific questions had different levels (high, moderate and low) of knowledge and awareness about HIV and AIDS. A high level was seen with the causative agent of AIDS and its transmission through blood transfusion, unprotected sexual contact, and sharing needle injection. However, a moderate level was observed regarding antenatal vertical transmission of HIV, shared use of a toothbrush or a razor. While there was inadequate or low knowledge and awareness about HIV spread through breast feeding, during birth, needle sharing and the availability of vaccines. The levels of knowledge and awareness among female students were significantly higher than males in most studied parameters (P=0.03-0.006). The general knowledge and awareness among Diyala's students declined during the second survey scheduled in 2017 compared with that done in 2010 (P=0.004) for undefined reasons.

Conclusion:

The general knowledge and awareness about HIV and AIDS was fair among Iraqi students. With the increasing number of HIV cases in Iraq, the inadequacy in knowledge and awareness about spread and prevention of HIV must be considered in the public health strategy and education programs that should comply with Islamic rules and values.

Keywords: AIDS, Awareness, College students, HIV, Iraq, Knowledge, Sexual transmission.

Article History	Received: November 02, 2018	Revised: February 08, 2019	Accepted: February 18, 2019

1. BACKGROUND

Human Immunodeficiency Virus (HIV) is the etiologic agent of Acquired Immunodeficiency Syndrome (AIDS). It was first described as a new disease in 1981 and since then it has been considered as a major global health problem worldwide [1]. AIDS represents the final stage manifestation of HIV infection and the earlier stages of the infection are asymptomatic [2]. Transmission of HIV occurs in multiple ways namely: through infected blood and blood derivatives, by sexual contact, and vertically through transmission of the virus from infected mother to baby either across the placenta (*in*

* Address correspondence to this author at the Molecular Virology Laboratory, Department of Molecular and Medical Biotechnology, College of Biotechnology, Al-Nahrain University, Baghdad, Aljadriya POBox 64030, Iraq;
Tel: +964-780283-1101; Email: drnaifhassan@gmail.com

utero), during the birth process or via breast feeding [3, 4]. In addition, it is distinguished by different clinical features and further complications in the long term that lack effective and durable vaccine. The total estimated global HIV-infected population in 2030 is exceeding to 36·9 million people, with about 1.2 million AIDS-related deaths having occurred in 2016 [5].

In the Middle East and North Africa (MENA) region, the HIV epidemic has been on the rise since 2001. Although the overall HIV prevalence in the region is still low, the increase in new infections has put MENA among the top two regions in the world with the fastest growing HIV epidemic, nearly 222,000 people are living with HIV in the MENA region mainly in Pakistan and Sudan [6 - 10] and around 20,000 were newly infected cases with an increase of 12% of those reported in 2010 (UNAIDS, 2017). At the end of 2003, the number of HIV patients among Saudi and non-Saudi residents was 1,743 and 6,064, respectively [11]. In Yemen, the number of people who are living with HIV or AIDS has also increased between 2002 and 2008 from 1122 to 2075 [12]. In Iraq, the number of HIV cases did not exceed more than 124 cases in 2001, with a cumulative number of 247 cases for the period between 1986 and 2005 [13]. Eighty four per cent of these cases were attributed to infection via imported blood products, 11.3% by sexual route and 5% from the mother to child. A non-official data was provided for 2017 - 2019 which indicated that an estimated 200 people are living with HIV/AIDS in Iraq (CDC, Baghdad 2019). Interestingly, no cases clearly indicated that transmission was due to needle injections or unprotected sexual contact among homosexuals [14]. This latter may be due to social stigma associated with AIDS in Muslim cultural and moral values. However, there was almost no formal education about HIV/AIDS, and thus a high degree of ignorance and fear surrounds the disease pandemic.

Until now, there is no cure or effective vaccine for HIV infection, however, antiretroviral therapy is offering an important relief for those living with the disease. HIV is a behavior related disease in which knowledge and awareness could influence the course of its spread particularly among young vulnerable university students [10, 15]. Therefore, this study was planned to assess the knowledge and awareness levels about HIV/AIDS among Diyala's and Al-Nahrain Iraqi University students.

2. METHODS

2.1. Subjects And Ethical Clearance

Using the simple random sampling technique, this study included 506 university students, as estimated by epi-info version 7.2 (CDC, USA), who were in their third and fourth year of study from different colleges of Diyala and Al-Nahrain Universities. This cross sectional study comprised of 334 students from Diyala's University in Diyala governorate of Iraq, conducted in two rounds in 2010 and 2017 to assess the consistency of knowledge and awareness level between the two surveys. The second period 2017 survey was concurrently carried out at Al-Nahrain University in Baghdad with a sample size of 172 students. Ethical clearance was obtained from the scientific committees of Diyala and Al-Nahrain Universities. The study participants were informed about the purpose of the study in Arabic and only those who signed the informed consent were included.

2.2. Survey Measures

A structured questionnaire was designed to assess the knowledge and awareness about HIV and AIDS, which was based on previous published studies [16 - 18]. Data was collected from the first section of the questionnaire which included the demographic information related to age, gender and the year of the education. The second section was about the risk factors of modes of transmission, sexual and vertical transmission, vaccine availability and prevention. The assessment was based on closed-ended questions: "yes/ no/ don't know". The questionnaire was written in Arabic and English when it was presented to the students. The questionnaire was handed to students and collected in the same meeting room. For each of the ten HIV-related questions, a score of one was assigned for each "yes" answer for positive knowledge and awareness and zero for both "no" or "don't know" answers.

2.3. Data Analysis

Data were checked for completeness and analysed using SAS version -9.1. (Inst. Inc, Cary, NC, USA). For descriptive statistics, frequency, percentage, mean and standard deviation were used. While for categorical analysis, Chi-square test was used to compare between different variables according to the reported answers by students to each question. P value of <0.05 was considered significant for comparison. The overall knowledge and awareness of the study participants were assessed using the sum score of each outcome based on Bloom's cut-off point (60-80%). Having a score above the cut-off point was scaled into three levels, where high level scored 80-100%, moderate level ranged between 60-79%, and poor or inadequate level was <60%.

3. RESULTS

A total of 506 participants were enrolled from Diyala and Al-Nahrain Universities. Among them, there were 341 females and 165 males with a very similar age range of 19-30 years with a mean age of 22.58±1.53 years. The quantitative baseline data of the gender and age of participants are shown in Table **1**.

3.1. Diyala University Students' Survey

The result of Diyala students' answers of the questionnaire carried out in 2010 and 2017 is presented in Tables **2** and **3**. Results of the two survey periods were almost comparable whereas the majority of students, regardless of gender, knew that HIV or AIDS is a viral disease (88.3%), and can be transmitted through unprotected sexual intercourse (92.5%) (Table **2**). For the rest of the studied parameters, the level of knowledge and awareness differed but systematically it can be

Table 1. Gender and age characteristics of participants from Diyala and Al-Nahrain University students.

Variable	Diyala		Al-Nahrain	Total (%)	Mean age ±SD
	No. 2010	No. 2017	No. 2017		
Male	64	65	36	165 (32.6)	22.58±1.53
Female	102	103	136	341 (67.4)	23.38±4.99
Total	166	168	172	506 (100)	NA

No., number of students in surveys conducted in 2010 and 2017. NA= not applicable.

Table 2. Knowledge and awareness levels students about HIV/AIDS among Diyala University students over two surveys conducted in 2010 and 2017.

Is HIV/AIDS a viral disease?			
Year	**Yes (%)**	**No (%)**	**I don't know (%)**
2010	150 (89.8)	9 (5.4)	8 (4.8)
2017	145 (86.8)	11 (6.6)	11 (6.6)
Total	295 (88.3)	20 (6.0)	19 (5.7)
Chi-square 0.936 P-value = 0.849 [NS]			
Is HIV/AIDS transmitted through unprotected sexual contact?			
2010	155 (92.8)	8 (4.8)	4 (2.4)
2017	154 (92.2)	6 (3.6)	7 (4.2)
Total	(309 (92.5	14 (4.2)	11 (3.3)
Chi-square 0.418 P-value =0.566 [NS]			
Is HIV/AIDS transmitted by blood transfusion, blood products such as plasma?			
2010	154 (92.2)	4 (2.4)	9 (5.4)
2017	118 (70.7)	17 (10.2)	32 (19.2)
Total	272 (81.4)	21 (6.3)	41 (12.3)
*Chi-square 7.82** P-value =0.0063 [S]*			
Is HIV/AIDS transmitted during pregnancy from mother to fetus inside the uterus?			
2010	132 (79.0)	14 (8.4)	21 (12.6)
2017	100 (59.9)	17 (10.2)	50 (29.9)
Total	232 (69.5)	31 (9.3)	71 (21.3)
*Chi-square 7.24** P-value =0.0074 [S]*			
Is HIV/AIDS transmitted from mother to child through breast feeding?			
2010	64 (38.3)	63 (37.7)	40 (24.0)
2017	66 (39.5)	26 (15.6)	72 (43.1)
Total	130 (38.9)	89 (26.6)	112 (33.5)
Chi-square 0.392 P-value = 0.285 [NS]			
Is HIV/AIDS transmitted from mother to child during birth?			
2010	92 (55.1)	26 (15.6)	49 (29.3)
2017	63 (37.7)	34 (20.4)	70 (41.9)
Total	155 (46.4)	60 (18.0)	119 (35.6)
*Chi-square 7.95** P-value = 0.0061 [S]*			
Is HIV/AIDS transmitted through sharing needles injection?			
2010	148 (88.6)	11 (6.5)	8 (4.8)
2017	123 (73.7)	21 (12.6)	23 (13.8)
Total	271 (81.1)	32 (9.6)	31 (9.3)
*Chi-square 6.35** P-value = 0.0084 [S]*			
Is HIV/AIDS transmitted through the common use of toothbrush and razors?			
2010	115 (68.9)	34 (20.4)	18 (10.8)
2017	103 (61.7)	37 (22.2)	27 (16.2)
Total	218 (35.3)	71 (21.3)	45 (13.5)
Chi-square 3.216 P-value = 0.064 [NS]			
Does drug abuse increase HIV infection rates?			
2010	110 (65.9)	22 (13.2)	35 (21.0)

(Table 2) contd.....

Is HIV/AIDS a viral disease?			
Year	**Yes (%)**	**No (%)**	**I don't know (%)**
2017	75 (44.9)	39 (23.4)	53 (31.7)
Total	185 (55.4)	61 (18.3)	88 (26.3)
*Chi-square 7.84** P-value = 0.0061 [S]*			
Is a vaccine available for HIV/AIDS?			
2010	104 (62.3)	31 (18.7)	32 (19.2)
2017	58 (34.7)	65 (38.9)	44 (34.7)
Total	162 (48.5)	96 (28.7)	76 (22.8)
*Chi-square 8.923** P-value = 0.0046 [S]*			

*(P<0.05); **(P<0.01); [S]: Significant; [NS]: Non-Significant.

divided into three categories: high, moderate or low. The higher levels of knowledge and awareness remained consistently high for blood transfusion (81.4%), and shared needle injection (81.1%), but declined to a moderate level for in utero infection (69.5%), and shared tooth brushing or razor shaving (65.3%). The knowledge and awareness levels for the rest of the studied risk factors of infection were inadequate/low for breast feeding (38.9%), during birth (46.4%), drug abuse (55.4%), and vaccine availability (48.5%).

In 2017 survey, there was a general decline in respondents' knowledge and awareness levels in all studied factors compared to the outcomes of the first survey conducted in 2010 Table **2**. This decline was significant for HIV transmission through blood and blood products (92.2% *vs* 70.7%, *P*=0.006), in utero (79.0% *vs* 59.9%, *P*=0.007), during birth (55.1% *vs* 37.7%, *P*=0.006), sharing needles (88.6% *vs* 73.6%, *P*=0.008), drug abuse (65.9% *vs* 44.9%, *P*=0.006), and in vaccine availability (62.3% *vs* 34.7%, *P*=0.004). Moreover, the decline in respondents' knowledge and awareness levels was insignificant for breast feeding (38.3% *vs* 39.5%, *P*=0.285), tooth brushing and razor use (68.9% *vs* 61.7%, *P*=0.064).

3.2. Gender Frequency

The gender distribution of respondents to the questionnaire showed that the majority of males and females (in that order) had almost similar high/moderate knowledge and awareness about HIV and AIDS as a viral agent (84.5% *vs* 90.7%, *P*=0.095), and unprotected sexual intercourse (93.0% *vs* 92.2%, *P*=0.292) (Table **3**). However, females had significantly higher knowledge and awareness levels about the routes of blood transfusion and blood products (71.31% *vs* 87.80%, *P*=0.007), *in utero* transmission (64.3% *vs* 73.7%, *P*=0.039), sharing needle injection (71.3% *vs* 87.3%, *P*=0.006), tooth brushing and razor use (58.1% *vs* 69.8%, *P*=0.020), drug abuse (44.2% *vs* 62.4.3%, *P*=0.008), and vaccine availability (54.3% *vs* 44.9%, *P*=0.038). However, no significant knowledge and awareness levels were observed between both genders on breast feeding (37.2% *vs* 40.0%, *P*=0.108) and during birth transmission (45.0% *vs* 47.3%, *P*=0.602).

3.3. Al-Nahrain University Students' Survey

The levels of knowledge and awareness were compared between Diyala and Al-Nahrain students in a survey conducted at the same time in 2017 on similar age range and education grade. The cohort of Al-Nahrain students involved a larger number of females (79%) than males (21%). There was an elevation of knowledge and awareness levels among Al-Nahrain students on HIV transmission routes through blood/products (30%, *P*=0.009), in utero (32%, *P*=0.008), and sharing needle injection by 24% (*P*=0.009). On the other hand, there was a significant decline in knowledge and awareness level among Al-Nahrain students of the viral spread via drug abuse by 21.6% (*P*=0.008) and vaccine availability by 23% (*P*=0.008). Otherwise, there were no noticeable changes in other studied parameters (Table **4**). Extrapolating from the 2010 Diyala students' survey (Table **2**) there were no significant differences between the two sets of data, except a significant decline in knowledge and awareness level among Al-Nahrain students about the risk from drug abuse (42.6%) and lack of vaccine availability (50.7%). These latter findings were well understood, however, the majority of students reside in Baghdad, the capital city of Iraq.

4. DISCUSSION

This study was designed to recruit university undergraduate students from two Iraqi public universities to assess their general knowledge and awareness about HIV and AIDS. This sample choice was used as university students represent an average intelligent young community, most have outreached extended family and they are considered the future responsible leaders of the society. HIV and AIDS are considered a sensitive global community health issue, so an understanding is must in our young community that they are not immune to HIV and furthermore that there is no reason for this community to become sensational or panicked about its severe consequences. Therefore, the main message to the young generations is to realistically understand the disease transmission and to avoid infection. In accordance with the original Bloom's cut-off points [19, 20], university student participants were comprised of 32.6% males and 67.4% females with high levels of knowledge and awareness about the etiology of HIV and AIDS, modes of sexual transmission, risks from transfusion of blood or blood products and sharing of needles. Nevertheless, moderate levels of knowledge and awareness were observed for the risks form vertical transmission and shared use of a toothbrush or a razor with the rest of parameters having a low or inadequate level of knowledge

Table 3. Knowledge and awareness about HIV/AIDS transmission among students of Diyala University according to gender frequency.

Is AIDS a viral disease?			
Gender	**Yes (%)**	**No (%)**	**I don't know (%)**
Male	109 (84.5)	12 (9.3)	8 (6.2)
Female	186 (90.7)	8 (3.9)	11 (5.4)
Chi-square 1.79 P-value = 0.095 [NS]			
Is HIV/AIDS is transmitted through sexual contact?			
Male	120 (93.0)	4 (3.1)	5 (3.9)
Female	189 (92.2)	10 (4.9)	6 (2.9)
Chi-square 0.274 P-value = 0.292 [NS]			
Is HIV/AIDS transmitted by blood transfusion or blood products such as plasma?			
Male	92 (71.3)	16 (12.4)	21 (16.3)
Female	180 (87.8)	5 (2.4)	20 (9.8)
*Chi-square 6.73** P-value = 0.0077 [S]*			
Is HIV/AIDS transmitted during pregnancy from mother to fetus inside the uterus?			
Male	83 (64.3)	17 (13.2)	29 (22.5)
Female	149 (73.7)	14 (6.8)	42 (20.5)
Chi-square 4.64 P-value = 0.039 [S]*			
Is HIV/AIDS transmitted from mother to child through breast-feeding?			
Male	48 (37.2)	46 (35.7)	35 (27.1)
Female	82 (40.0)	46 (22.4)	77 (37.6)
Chi-square 1.03 P-value = 0.108 [NS]			
Is HIV/AIDS transmitted from mother to child during birth?			
Male	58 (45.0)	28 (21.7)	43 (33.3)
Female	97 (47.31	32 (15.6)	76 (37.1)
Chi-square 0.472 P-value = 0.602 [NS]			
Is HIV/AIDS transmitted through sharing of needles (injection)?			
Male	92 (71.3)	20 (15.5)	17 (13.2)
Female	179 (87.3)	12 (5.9)	14 (6.8)
*Chi-square 6.83 ** P-value = 0.0068 [S]*			
Is HIV/AIDS transmitted through the sharing of tooth brush and razors?			
Male	75 (58.1)	38 (29.5)	16 (12.4)
Female	143 (69.8)	33 (16.1)	29 (14.1)
*Chi-square 5.09 * P-value = 0.0207 [S]*			
Does drug abuse increase HIV infection rates?			
Male	57 (44.2)	33 (25.6)	39 (30.2)
Female	128 (62.4)	28 (13.7)	49 (23.9)
*Chi-square 6.93 ** P-value = 0.0086 [S]*			
Is the vaccine for the prevention of AIDS available?			
Male	70 (54.3)	35 (27.1)	24 (18.6)
Female	92 (44.9)	61 (29.8)	52 (25.4)
*Chi-square 4.63 * P – value = 0.0381 [S]*			

*(P<0.05); ** (P<0.01); [S]: Significant; [NS]: Non-Significant.

and awareness, such as spread via breast feeding, during birth, needle sharing and availability of a vaccine.

Results of high knowledge and awareness levels about these parameters were consistent irrespective of the period of survey, a university campus, or a gender difference. These findings were consistent with a similar study conducted in Sudan [10], but varied considerably with those conducted on Taif University students in Saudi Arabia [21], as well as poor knowledge and awareness among medical and non-medical undergraduate students in Oman [22]. Khan *et al*. [8], in a study conducted on colleges in Peshawar, Pakistan found that only a small numbers of students could positively answer that HIV or ADIS can be transmitted by a contaminated blood transfusion (28%) and unsterilized syringes (10%). Moreover, students from Qatar University and the University of Saskatchewan in Canada had higher levels of knowledge and awareness about the route of transmission of HIV through sexual contact (100% for both), and blood transfusion (92.0%

Table 4. Comparison of the knowledge and awareness levels about HIV/AIDS between Diyala (DU) and Al-Nahrain (NU) University students in the second survey conducted in 2017.

Is HIV/AIDS a viral disease?			
Students	**Yes (%)**	**No (%)**	**I don't know (%)**
NU	155 (90.1)	8 (4.7)	9 (5.2)
DU	145 (86.8)	11 (6.6)	11 (6.6)
Total	300 (88.4)	19 (5.6)	20 (5.9)
Chi-square =1.093 P-value = 0.1783 [NS]			
Is HIV/AIDS transmitted through sexual contact?			
NU	155 (90.1)	6 (3.5)	11 (6.4)
DU	154 (92.2)	6 (3.6)	7 (4.2)
Total	309 (91.1)	12 (3.5)	17 (5.3)
Chi-square = 0.672 P-value = 0.538 [NS]			
Is HIV/AIDS transmitted by blood transfusion or blood products such as plasma?			
NU	152 (88.4)	4 (2.3)	16 (9.3)
DU	118 (70.7)	17 (10.2)	32 (19.2)
Total	270 (79.5)	21 (12.5)	48 (14.2)
*Chi-square =6.76 ** P-value= 0.0094 [S]*			
Is HIV/AIDS transmitted during pregnancy from mother to fetus inside the uterus?			
NU	132 (76.7)	12 (7.0)	28 (16.3)
DU	100 (59.9)	17 (10.2)	50 (29.9)
Total	232 (68.3)	29 (8.6)	78 (23.1)
*Chi-square =6.58 ** P-value =0.0087 [S]*			
Is HIV/AIDS transmitted from mother to child through breast feeding?			
NU	60 (34.8)	40 (23.3)	72 (41.9)
DU	66 (39.5)	26 (15.6)	72 (43.1)
Total	126 (37.1)	66 (19.4)	144 (42.5)
Chi-square =1.27 P-value =0.092 [NS]			
Is HIV/AIDS transmitted from mother to child during birth?			
NU	56 (32.5)	52 (30.3)	64 (37.2)
DU	63 (37.7)	34 (20.4)	70 (41.9)
Total	119 (35.1)	86 (25.3)	134(39.5)
Chi-square =2.08 P-value= 0.077 [NS]			
Is HIV/AIDS transmitted through sharing needles injection?			
NU	168 (97.7)	4 (2.3)	0 (0)
DU	123 (73.7)	21 (12.6)	23 (13.8)
Total	291 (85.7)	25 (7.5)	23 (6.9)
*Chi-square =7.92 ** P-value = 0.0098 [S]*			
Is HIV/AIDS transmitted through the common use of toothbrush and razors?			
NU	104 (60.5)	36 (20.9)	32 (18.6)
DU	103 (61.7)	37 (22.2)	27 (16.2)
Total	207 (60.8)	73 (21.5)	59 (17.4)
Chi-square =0.183 P-value = 0.769 [NS]			
Does drug abuse increase HIV infection rates?			
NU	40 (23.3)	32 (18.6)	100 (58.1)
DU	75 (44.9)	39 (23.4)	53 (31.7)
Total	115 (33.9)	71 (21.0)	153 (44.9)
*Chi-square =7.63 ** P-value =0.0086 [S]*			
Is a vaccine available for HIV/AIDS?			
NU	20 (11.6)	116 (67.5)	36 (20.9)
DU	58 (34.7)	65 (38.9)	44 (34.7)
Total	78 (23.1)	181 (53.2)	80 (27.8)
*Chi-square = 8.02 ** P-value = 0.0087 [S]*			

*(P<0.05); ** (P<0.01); [S], Significant; [NS], Non-Significant; DU, Diyala University; NU, Al-Nahrain University.

and 95.9%, respectively) [23], but in Yemen, these levels dropped to 87.5% and 71.8% for both routes of transmission [24].

The moderate levels of knowledge and awareness about sharing tooth brushes and the risk of vertical transmission, were similar to those reported in another study conducted in Saudi Arabia [16]. On the other hand, the low levels of knowledge and awareness of parameters in this study about viral spread by breast feeding, during birth, drug abuse and vaccine availability were compatible with those reported by others who found that poor levels of knowledge about breast feeding as a route of transmission [26, 27, 16, 28]. Although, others observed higher knowledge and awareness ratios in Saudi Arabia (82.4%) and China (96%) [16, 25]. Moreover, a lack of knowledge about drug abuse has been observed, of only 38.8% [26] and 58% in another study [29] in India. These differences in knowledge could be attributed to lack of awareness or availability of education programs by health authorities, insufficient public information about the disease, societal ignorance because of the social stigma associated with homosexuality, absence of sex education in schools, and social attitude toward sex outside marriage in Muslim countries, leaving young students to think that they are immune to HIV infection.

Regarding the gender effect, females had higher levels (90.73%) of awareness than males (84.49%) of the Diyala and Al-Nahrain (data not shown) students surveyed. These results were similar to previous reports from Sudan [10] and China [25] and other Asian studies [30, 31]. This variability was statistically evident with the HIV and AIDS awareness markers such as blood transfusion, vertical transmission, sharing needles, razor use, and tooth brushes. The concordance in results was only a report from Saudi Arabia [16] where they observed strongly negative attitudes about discussing AIDS topics publically. It could also be due to gender segregation in university education. Moreover, different results may reflect the social equity for both genders in different societies, freedom of expression, or family religious values and social cultures. However, in this study both genders had almost the same poor levels of knowledge about the infection routes of breast feeding, during child birth, and vaccine availability. However, knowledge and awareness of these markers were shown to be higher in females than in males in Taiwan [30].

In this study, it was observed that there was a decline in the levels of knowledge and awareness about HIV and AIDS in the second survey period in 2017 conducted in Diyala University where a significant drop was observed only in two factors in the Al-Nahrain survey in 2017. This may be explained by the lack of knowledge about sexually transmitted diseases in the education curricula. Additionally, during the 2017 survey period, Diyala governorate was markedly affected by civil unrest and fear attack by ISIS jihadis and militias which had put much stressful pressure on students and their parents. As far as Al-Nahrain data is concerned, due to the lack of familiarity with a vaccine availability and drug abuse, students might misinterpret the phrase as an effective protective vaccine rather than just availability, while a misconception between drugs as medicine may contribute to the confusion of proper responses, therefore, both parameters would be considered of less grounded outcomes.

CONCLUSION

In general, the knowledge and awareness of Diyala and Al-Nahrain university students about HIV and AIDS common markers in Iraq were fair in many aspects of surveyed risk factors, however, strong attention needs to be given to protected sex and health education programs as well as strengthening public awareness about HIV and AIDS and other sexually transmitted diseases by a systematic way of educating people through brochures, posters and social media. These data will be forwarded to the AIDS Center, Ministry of Health to be included in their strategy for HIV and AIDS education and control policy.

LIST OF ABBREVIATIONS

HIV	=	Human Immunodeficiency Virus
AIDS	=	Acquired Immunodeficiency Syndrome
K&A	=	Knowledge and Awareness
SAS	=	Statistical Analysis Software

AVAILABILITY OF DATA AND MATERIALS

All data pertaining to this study are contained and presented in this document. Authors have further information to disclose.

AUTHORS' CONTRIBUTIONS

HMN and AHH: contributed to study conception and design, administering the surveys, data extraction and analysis and drafting the manuscript. ASHH contributed to study design, questionnaire and data acquisition. SFF involved in clinical data acquisition and medical consultation. RMK and ATH involved in conducting the survey, participants sampling, and data collection. All authors have read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical clearance was obtained from the scientific committees of Diyala and Al-Nahrain Universities.

HUMAN AND ANIMAL RIGHTS

No Animals were used in this research. All human research procedures followed were in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki Declaration of 1975, as revised in 2013.

CONSENT FOR PUBLICATION

Written and informed consent was obtained from the participants prior to the study.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

ACKNOWLEDGEMENTS

Authors would like to express their sincere thanks to the invaluable contribution of all participants of the study. We are

grateful to authorities of Diyala and Al-Nahrain Universities for their support for this project.

REFFERENCES

[1] De Lay PR, Ernberg G, Stanecki K. HIV/AIDS prevention and care on resource-constrained settings A handbook for the design and management of programs Lamptey PR. USA: Family Health International 2001; p. 7.

[2] Brooks GF, Carrol KC, Butel JS, Mores SA. AIDS and Lentrivirus.In: Medical microbiology Brooks GF, Carrol KC, Butel JS, Mores SA (eds) 24th Ed The McGraw-Hill Companies, Inc 2007; 604-18.

[3] Levinson W. Human Immunodeficiency Virus. 2008.

[4] Aśjö B. Human immunodeficiency virus (HIV). In: A particle guide to clinical virology Haahem LR; Pattion JR and Whitley RJ ed 2nd Ed John Wiley and sons, Ltd 2002; 2013-8.

[5] Editorial. The death of AIDS- expected or exaggerated? Lancet 2015; 386: 2228. [http://dx.doi.org/10.1016/S0140-6736(15)01161-7]

[6] UNAIDS Middle East and North Africa report on AIDS 2011.http://www.unaids.org/sites/default/files/media_asset/JC2257_UNAIDS-MENA-report-2011_en_1.pdf

[7] UNAIDS HIV and AIDS Estimates 2009.http://www.unaids.org/en /regionscountries/countries/Pakistan

[8] Khan S, Fatima S, Afridi NK, Salhotra VS, Jha KK. Awareness regarding HIV/ AIDS among college students in Khyber Pakhtunkhwa. SAARC J Tuberc Lung Dis HIV/AIDS 2011; VIII(2): 37-41. [http://dx.doi.org/10.3126/saarctb.v8i2.5900]

[9] Report Global. UNAIDS report on the global AIDS epidemic 2017.unaids.org/sites/default/files/media_asset/20170720_Data_book_2017_en.pdf

[10] Khalid FA, Mohammed AA, Farah A. Knowledge and awareness of AIDS among university of Kassala students, Sudan. J Community Med Health Educ 2013; 3(2): 1-3. [http://dx.doi.org/10.4172/2161-0711.1000201]

[11] Madant T, Al-Mazroue Y, Al-Jeffri M, Al-Huzaim N. Epidemiology of the human immunodeficiency virus in Saudi Arabia: 18-year surveillance results and prevention from an Islamic perspective. BMC Infect Dis 2004; 4: 25-32. [http://dx.doi.org/10.1186/1471-2334-4-25]

[12] Badahdah AM, Sayem N. HIV-related knowledge and AIDS stigma among college students in Yemen. East Mediterr Health J 2010; 16: 901-6. [http://dx.doi.org/10.26719/2010.16.8.901]

[13] World Health Organization. Global HIV/AIDS response-epidemic update and health sector progress towards universal access: progress report summary 2004. Available from: http://www.who.int/hiv /pub/progress_ report2004/en/

[14] Al-Ibadi AK, Jaleel UA. Epidemiological aspects of HIV/AIDS in Iraq. Qadisiya Med J 2007; 1(3): 80-90.

[15] Islam MT, Mostafa G, Bhuiy A, Hawkes S, Francisco A. Knowledge on, and attitude toward HIV/AIDS among staff of international organization in Bangladesh. J Health Popul Nutr 2002; 20: 271-8.

[16] Al-Mazrou YY, Abouzeid MS, Al-Jeffri MH. Knowledge and attitudes of paramedical students in Saudi Arabia toward HIV/AIDS. Saudi Med J 2005; 26(8): 1183-9.

[17] Hussain SA. Knowledge, attitude and beliefs of college students in Baghdad and Mousel, Iraq about AIDS. Medical J Babylon 2009; 6(3-4): 501-6.

[18] Tahir SS, Kadir MA, Akbar HS, Amin AM. Knowledge of secondary school students on HIV/AIDS in Kirkuk province, Iraq. J Fac Med Baghdad 2009; 51(2): 174-7.

[19] John J. The knowledge and attitudes, practice and perceived barriers towards screening for premalignant cervical lesions among women aged 18 years and above, Songea Urban, Ruvuma Thesis Muhimbili University of Health and Ahied Science 2011.

[20] Aggarwal A, Panat S. Knowledge, attitudes and behavior in managing patients with HIV/AIDS among a group of Indian dental students. J Dent Educ 2013; 77(9): 1209-17.

[21] Zaini RG, Anju F. Awareness of HIV/AIDS among female students attending college of applied medical science at Taif University. Int Lab Med Res 2015; 2: 1-5.

[22] Al-Jabri AA, Al-Abri JH. Knowledge and attitudes of undergraduate medical and non-medical students in Sultan Qaboos University towards acquired immune deficiency syndrome. Saudi Med J 2003; 24: 273-7.

[23] Black E, Wilby K, Perepelkin J. A survey of HIV knowledge and attitudes of pharmacy students in Canada and Qatar. Saudi J Health Science 2015; 2(3): 146-50. [http://dx.doi.org/10.4103/2278-0521.127038]

[24] Al-Rabeei NA, Dallak AM, Al-Awadi FG. Knowledge, attitudes and beliefs towards HIV/AIDS among of health institutes in Sana'a city. East Meditt Health J 2012; 8(3): 221-6. [http://dx.doi.org/10.26719/2012.18.3.221]

[25] Li X, Lin G, Gao Z, *et al.* HIV/AIDS knowledge and implication for health promotion programs among Chinese college students: Geographic, gender, and age differences. Health Promot Int 2004; 19(3): 345-6. [http://dx.doi.org/10.1093/heapro/dah308]

[26] Farid R, Choudhy AJ. Knowledge about HIV/AIDS among female college students. Coll Physicians Surg Pak 2003; 13(3): 135-7.

[27] Grover N, Prakash A, Singh S, Singh N, Singh P, Nazeer J. Attitudes and knowledge of dental students of Capital Region regarding HIV and AIDS. J Oral Maxillofac Pathol 2014; 18(1): 9-13. [http://dx.doi.org/10.4103/0973-029X.131882]

[28] Jindal S. Awareness about HIV/AIDS in selected pre University College in Moundbird: A cross-sectional study. Asia N J Pharm Clin Res 2013; 1(Suppl. 1): 208-10.

[29] Sharma SK, Kaur K, Kaur M. Awareness about HIV/AIDS among newly admitted nursing students. Nursing and Midwifery Research J 2006; 2(1): 32-8.

[30] Tung WC, Cook DM, Lu M, Ding KA. Comparison of HIV knowledge, attitudes and sources of STI information between female and male college students in Taiwan. Health Care Women Int 2015; 30(8): 870-82. [http://dx.doi.org/10.1080/07399332.2014.962136]

[31] Lou C, Cheng Y, Gao E, Zuo X, Emerson MR, Zabin LS. Medias' contribution to sexual knowledge, attitudes and behaviors for adolescents and young adults in three Asian cities. J Adolesc Health 2010; 50(3): 26-36. [http://dx.doi.org/10.1016/j.jadohealth.2011.12.009]