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RESEARCH ARTICLE

The Assessment of Misconceptions of HIV/AIDS, Stigma to HIV and Perceived Susceptibility to HIV/AIDS in Iranian University Students

Katayon Vakilian^{1,*}

¹Medical School, Traditional and Complementary Medicine Research Center (TCMRC), Arak University of Medical Sciences, Arak, Iran

Abstract:

Background:

AIDS is a sexually transmitted disease that can expose a person at risk with the onset of unprotected sexual behavior from adolescence. This study aimed to assess the misconceptions of HIV/AIDS, stigma in adolescents infected with AIDS and the perceived threats of HIV/AIDS in the Iranian college students.

Methods:

This cross sectional study was performed in Shahroud city, Iran. 1500 female and male students in the age bracket of 18-24 were included in the study. Multistage sampling was employed. After obtaining permission from the universities and stating the objective of the study, the questionnaires (HIV misconception, Stigma to HIV and Perceived Susceptibility to HIV/AIDS) were distributed to students during the end of lecture time upon the agreement of the education officials and were then collected after 15 minutes. To ensure that the information provided remain confidential, students were asked not to write down their names and fields of study. Data were analyzed using SPSS software, version 20 and descriptive-analytical statistics, such as percentage, mean scores, t-test Spearman, and chi-squared and Pearson tests.

Results:

The results showed that 919 students (61.2%) were female and 539 students (36.1%) were male. The results of the present study indicated that there is false information and beliefs on AIDS among the Iranian adolescents and 592 students (40.7%) answered correctly. Considering the perceived threat of AIDS, the results indicated that in response to the item "unprotected sex put the adolescents at risk of sexual transmitted diseases" 416 (45.8%) female students and 321 (60.5%) male students answered totally opposite, indicating significant difference between the two genders ($P=0.00$).

Conclusion:

It is suggested to provide students with more information through mass media and discussions between students, teachers and parents. Training should increase the youth sensitivity to AIDS, as well as promoting sexual relationships until marriage or healthy and safe sex.

Keywords: Reproductive health, HIV, Education, Adolescent, Student, AIDS.

Article History

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1. INTRODUCTION

AIDS is a sexually transmitted disease that can expose a person at risk with the onset of unprotected sexual behavior from adolescence.

In 2016, an estimated 2.1 million adolescents, with the great majority in the WHO African Region [1], suffered from HIV. Among total registered cases until September 21st, 2014, about 45.7% of the HIV infected cases were, in Iran, at the age

range of 25-34 years [2]. And obviously, a large percentage of infection with the virus occurs during adolescence, due to the long incubation period of the disease [3]. Iran with the largest epidemic of HIV in the Middle East has a concentrated epidemic [4]. In 2005, the prevalence of this disease in the general population for the age range of 15-49 years old was 0.1% while the estimate for 2014 was 0.14%. Yet, the figure was expected to rise to 0.16% by 2020 [2]. Higher frequency of engaging in high-risk sexual acts such as multiple partnerships, unprotected sex, alcohol use, or unsafe drug injections with multiple injecting partners can explain the higher incidence of HIV among younger population. Also, younger people may

* Address correspondence to this author at the Medical School, Traditional and Complementary Medicine Research Center (TCMRC), Arak University of Medical Sciences, Arak, Iran; E-mail: dr.kvakilian@arakmu.ac.ir

have contacts with those in older groups who have a higher HIV prevalence; therefore, they are more likely to be at risk of acquiring HIV infection [5 - 7]. During adolescence, the teenagers establish patterns of behavior— for instance, the patterns related to diet, physical activity, substance use, and sexual activity— which can play protective role in their health and that of those around them, or put their health at risk now and in the future [8]. Adolescents need information, such as age-appropriate comprehensive sexuality education, opportunities to develop life skills, health services that are acceptable, equitable, appropriate and effective, as well as safe and supportive environments to grow and develop in good health [6, 9]. Currently, about one-third of the Iranian population is young at the age range of 15-29 years old. From a demographic standpoint, this stage of life as compared to other stages in life course is of great and special importance [6, 10].

It is a need for the young people to know how to protect themselves from HIV infection and they must be provided with the means to do so, including condoms to prevent sexual transmission of the virus, and sterile needles and syringes for those who inject drugs, as well as easier access to HIV testing and counselling, and stronger subsequent links to HIV treatment services for those with positive HIV test [11, 12]. In addition, the awareness of people in the society and their knowledge about HIV/AIDS and their attitudes toward infected people play a very crucial role in controlling the disease. Currently, information, communication and education on HIV/AIDS targeting the young people are the major steps to prevent HIV infection. This study aimed to assess the misconceptions of HIV/AIDS, stigma in adolescents infected to AIDS and the perceived threats of HIV/AIDS in the Iranian college students.

2. METHODS

This cross sectional study was done in Shahroud city, Iran. 1500 female and male students in the age bracket of 18-24 were included in the study. Multistage sampling was employed. Each university and class was initially considered a single stratum and cluster, respectively. The number of clusters per university was assigned based on the number of students in each university in proportion to the total number of students in the University of Shahroud. After obtaining permission from the universities and stating the objective of the study, the questionnaires were distributed to students during the end of lecture time upon the agreement of the education officials and were then collected after 15 minutes. To ensure that the information provided were confidential, students were asked not to write down their names and fields of study. Data were analyzed using SPSS software, version 20 and descriptive-analytical statistics such as percentage, mean scores, t-test Spearman, and chi-squared test. The questionnaire was administered in one of the universities in Shahroud by one of the researchers. This questionnaire, consisted of demographic characteristic knowledge of AIDS, attitude toward adolescent and young people infected to HIV and evaluation of the stigma in the society, and perceived threatened to HIV/AIDS.

For data gathering, the CDC questionnaire was employed for the knowledge of AIDS (one score to correct and zero score

for wrong or I don't know) with a total score of 14. Regarding attitude towards adolescent and young people infected to HIV and evaluation of the stigma in the society, and perceived threatened to HIV/AIDS. The CDC questionnaire was also used to assess adolescents' perceived threat of AIDS. There were 5 questions in this domain which were answered using a 5-point Likert scale with a total score of 25 [13, 14]. The reliability of the questionnaire was verified employing the test-retest technique. The Spearman's correlation coefficients for knowledge of HIV, perceived threat of AIDS and attitude to people infected to HIV/AIDS were $r=0.72$, $r=0.94$ and, $r=0.65$ respectively. Internal validity was assessed using Cronbach's alpha with the following coefficients for the knowledge of AIDS ($\alpha=0.60$), perceived threat of AIDS ($\alpha=0.62$), attitude to people infected to HIV/AIDS $\alpha=0.62$. Data were analyzed using descriptive-analytical statistics such as percentage, mean scores, t-test Spearman, and chi-squared and Pearson tests.

3. RESULTS

The results showed that 919 students (61.2%) were female and 539 students (36.1%) were male. The mean age of female and male students was 20.26 ± 1.49 and 20.32 ± 1.57 years old, respectively ($P=0.437$). The results showed that 771 female students (84.8%) and 498 male students (94.5%) were single, this difference of which was significant ($P=0.000$). 404 female students (53.1%) and 199 male students (45.6%) received information about HIV and ADIS from the domestic media, the difference of which between the two genders was significant ($P=0.017$). 22.1% of female students and 15.9% of male students have not been exposed to lustful media, the difference of which was significant between the two genders ($P=0.001$).

The results of the present study indicated that there is false information and beliefs on AIDS among the Iranian adolescents and 592 students (40.7%) answered correctly. In response to the item "a person can be infected with HIV despite of negative AIDS test", 44.4% (232) of male students and 48.8% (434) of female students answered correctly ($P=0.05$). Other results are presented in Table 1. Regarding the attitudes of those infected with AIDS, the results showed that in response to the item "I have no problem to be in the same class with the person infected with AIDS" 35.6% (323) of female students and 38.0% (199) of male students answered totally opposite, the difference of which between the male and female students was not significant ($P=0.092$). In response to the item "a person with AIDS should not be allowed to eat at the university buffet" 49 (5.4%) female students and 38 (7.3%) male students answered totally agree, indicating significant difference between the male and female students ($P=0.02$). Table 2 shows the other results. Considering the perceived threat of AIDS, the results indicated that in response to the item "unprotected sex put the adolescents at risk of sexual transmitted diseases" 416 (45.8%) female students and 321 (60.5%) male students answered totally disagree, indicating significant difference between the two genders ($P=0.00$). In response to the item "there is nothing wrong with unprotected sex since the risk of transmitting AIDS is very low", 243 (35.9%) female students and 128 (36.1%) male students answered totally disagree, which the difference between the two genders was significant ($P=0.00$). Table 3 presents other

results. Also, considering the correlation between HIV/AIDS knowledge and perceived threat of AIDS, the Pearson test indicated that there is a significant and positive correlation

between two variables ($r=0.13, p=0.001$). This means that the more knowledge boys had, the more understand they are at risk for HIV. This finding in girls was positive and significant too ($r=0.13, p=0.001$).

Table 1. The Mean of total awareness and questions about misconceptions of HIV/AIDS in girls and boys.

HIV awareness		Wrong	Correct	P value
		N(%)	N(%)	
You cannot get AIDS if you have sex only once or twice without a condom	Boys	291(55.6)	232(44.4)	0.059
	Girls	455(51.2)	434(48.8)	
Condom is 100% effective in preventing HIV	Boys	386(75.7)	124(24.3)	0.169
	Girls	650(73.2)	238(26.8)	
A person can pass HIV (antibody) test negative) but still be infected with HIV	Boys	366(72.9)	136(27.1)	0.001
	Girls	566(64.2)	315(35.8)	
You can get HIV by setting on the seat of the toilet that the person with HIV has used	Boys	451(89.1)	55(10.9)	0.001
	Girls	844(95.6)	39(4.4)	
Abstinence from sex is the best way to teenagers to avoid getting HIV	Boys	230(44.4)	288(55.6)	0.001
	Girls	495(55.3)	400(44.7)	
You can get HIV by setting on the seat of the toilet that the person with HIV has used	Boys	286(55.4)	230(44.6)	0.001
	Girls	588(65.5)	310(34.5)	
Abstinence from sex and drugs is the best way to teenagers to avoid getting HIV	Boys	162(31.2)	358(68.8)	0.003
	Girls	217(24.3)	676(75.7)	
HIV can be found in semen, vaginal fluid and blood	Boys	504(96.0)	21(4.0)	0.015
	Girls	882(98.1)	17(1.9)	
HIV can be found in breast milk	Boys	507(97.5)	13(2.5)	0.150
	Girls	881(98.4)	14(1.6)	
A person can get HIV by sharing drug needle	Boys	449(87.4)	65(12.6)	0.003
	Girls	821(92.0)	71(8.0)	
Once you can get infected with HIV you are infected for life	Boys	472(91.5)	44(8.5)	0.394
	Girls	819(92.0)	71(8.0)	
People infected with HIV are usually very thin and sickly	Boys	384(74.0)	135(26.0)	0.202
	Girls	676(76.1)	212(23.9)	
Some people have gotten HIV by swimming in the same pool as someone with AIDS	Boys	223(43.0)	296(57.0)	0.001
	Girls	543(60.6)	353(39.4)	
You can get HIV from a mosquito bite	Boys	332(63.2)	193(36.8)	0.013
	Girls	515(57.1)	387(42.9)	
Total awareness(Mean ±SD)	Boys	38.75±5.05		0.001
	Girls	37.69±4.85		

T-student test

Table 2. The Mean of total Stigma and questions about stigma of HIV/AIDS infected people in girls and boys.

-	-	Completely disagree	Disagree	Not Sure	Agree	Completely Disagree	
		N	N	N	N	N	P value
I wouldn't mind being in the same classroom with someone who has AIDS	Boys	199(38.0)	125(23.9)	112(21.4)	50(9.5)	38(7.3)	0.088
	Girls	323(35.6)	245(27.0)	227(25.0)	64(7.0)	49(5.4)	

(Table 2) contd.....

-	-	Completely disagree	Disagree	Not Sure	Agree	Completely Disagree	
Someone who has AIDS shouldn't be allowed to eat lunch in the school cafeteria	Boys	38(7.3)	41(7.8)	95(18.1)	38(7.3)	41(7.8)	0.020
	Girls	49(5.4)	58(6.4)	119(13.1)	49(5.4)	58(6.4)	
I would feel comfortable hugging a close friend who has AIDS	Boys	141(26.7)	128(24.2)	127(24.0)	141(26.7)	128(24.2)	0.008
	Girls	202(22.1)	242(26.5)	282(30.9)	202(22.1)	242(26.5)	
I wouldn't mind swimming in the same pool as someone who has AIDS	Boys	86(16.4)	98(18.7)	165(31.4)	86(16.4)	98(18.7)	0.001
	Girls	74(8.2)	61(6.7)	331(36.6)	74(8.2)	61(6.7)	
A person who has AIDS should stay away from public places	Boys	34(6.6)	31(6.0)	91(17.6)	34(6.6)	31(6.0)	0.001
	Girls	46(5.1)	39(4.3)	87(9.7)	46(5.1)	39(4.3)	
I wouldn't mind playing sports with someone who has AIDS	Boys	176(33.5)	137(26.1)	111(21.1)	176(33.5)	137(26.1)	0.015
	Girls	289(32.0)	296(32.8)	196(21.7)	289(32.0)	296(32.8)	
I would avoid a classmate who I heard had AIDS	Boys	39(7.5)	68(13.1)	119(22.8)	39(7.5)	68(13.1)	0.154
	Girls	49(5.5)	88(9.8)	226(25.3)	49(5.5)	88(9.8)	
People who have AIDS should be allowed to work in restaurant and cafeteria	Boys	55(10.5)	36(6.9)	138(26.3)	55(10.5)	36(6.9)	0.676
	Girls	86(9.5)	77(8.5)	240(26.4)	86(9.5)	77(8.5)	
Total Stigma (Mean ±SD)	Boys	535±3.96					0.001
	Girls	920±3.60					

T-student test

Table 3. The Mean of total Perceived Susceptibility to HIV/AIDS and questions about itin girls and boys.

		Completely disagree	Disagree	Not Sure	Agree	Completely Agree	-
		N	N	N	N	N	P value
Teenagers are at risk of getting infected with HIV if they engage in sex without a condom	Boys	321(60.5)	145(27.3)	41(7.7)	15(2.8)	9	0.001
	Girls	416(45.8)	291(32.0)	153(16.9)	39(4.3)	9	
It's okay to have sex without a condom because your chance of getting infected with HIV is very low	Boys	30(5.7)	60(11.4)	118(22.4)	128(24.3)	190(36.1)	0.001
	Girls	31(3.4)	52(5.8)	250(27.8)	243(27.0)	324(36.0)	
Teenagers should realize that if they're not careful they could get infected with HIV	Boys	321(60.7)	154(29.1)	39(7.4)	10(1.9)	5(0.9)	0.753
	Girls	545(60.2)	280(30.9)	54(6.0)	15(1.7)	12(1.3)	
If teenagers are careful about choosing sexual partners they won't get infected with HIV	Boys	136(25.8)	161(30.6)	121(23.0)	60(11.4)	49(9.3)	0.027
	Girls	223(24.7)	250(27.7)	229(25.3)	145(16.0)	57(6.3)	
HIV is something that teenagers should think about when they date	Boys	174(33.0)	178(33.7)	80(15.2)	59(11.2)	37(7.0)	0.142
	Girls	286(31.5)	296(32.6)	185(20.4)	84(9.3)	56(6.2)	
Total PerceivedSusceptibility to HIV/AIDS(Mean ±SD)	Boys	11.56±2.64					0.001
	Girls	11.96±2.45					

*T-student test

4. DISCUSSION

The results indicated that the Iranian students' knowledge of AIDS is at low level and wrong beliefs put them at risk for being infected with this disease. Moreover, their attitude towards infection with AIDS was low; therefore, stigma to AIDS could be observed among the Iranian students. They also believed that they are less likely to be infected with HIV, decreasing their desire for condom use in their sexual relationships.

A cross-sectional study was conducted for two months on 128 undergraduate female students studying the laboratory science, physical therapy, radiology and general nursing in the College of Applied Medical Sciences at Taif University. The results of this survey indicated low knowledge of more than half of the participants about the association between AIDS and HIV, as well as low awareness level towards the modes of HIV transmission. In addition, the majority of them had negative attitude towards the individuals infected with HIV/AIDS [15]. Another study was conducted on 102 students

selected from six high schools in Shiraz, Iran, in 2015. In this study, 55% of the participants were male with majority at the age range of 17-18 years old. It was revealed that the participants' general knowledge about HIV was at moderate level. However, their awareness of the associated transmission routes and major causes of this disease was at an insufficient level. In addition, the majority of the students had highly positive attitudes towards the AIDS patients, confirming their right to live and use all facilities. Nonetheless, a large proportion of the students refused to share a location or personal items with these patients [16]. The present study showed that the participants had the same attitude towards the infected patients with AIDS. The comparison between the males and females demonstrated that the males' knowledge was high about the misconceptions of AIDS and its transmission routes, as compared to the female participants. Furthermore, the negative attitudes towards the HIV patients were higher in males than females. Also, it was indicated that the males were less likely to be exposed to the threat of AIDS.

A quasi experimental study showed that training the health belief model improved the students' awareness about the risks of AIDS transmission and prevention of it. The results showed significant difference between the subjects in the experimental and control groups in terms of perceived susceptibility, severity, benefits and self-efficacy prevention of AIDS [12]. The present study showed that they avoided presence in the shared locations with ADIS young patients, indicating stigma in this age range.

The results of a study conducted in China showed that the children with better AIDS knowledge had less personal stigma towards people infected with HIV/AIDS. The findings revealed the need of appropriate training strategies to provide knowledge of AIDS to children, particularly for HIV-affected children living in communities with high rate of AIDS [17].

Another study on 6137 Portuguese adolescents at national level based on 14 focus groups discussions showed that the participants presented high levels of knowledge about HIV transmission. However, a high proportion of young people had misperceptions as well. The focus groups showed that the adolescents believed that the people infected with AIDS experience discrimination and social exclusion. The adolescents also had positive attitudes towards HIV-infected persons though some adolescents showed different attitudes and undefined fears. Adolescents living with HIV make efforts to hide their disease and conditions from friends, family, doctors, and even themselves basically as a way to manage HIV-related stigma [18]. The finding of this study showed relationship of high knowledge HIV to increase of perceived susceptibility to HIV in boys and girls. Therefore, with supporting educational program in universities, policy makers could improve protective behaviors in academic adolescents.

CONCLUSION

Considering the students' insufficient knowledge about AIDS, and stigma to this disease among young people and the need for attracting their attention to the risk for infections with HIV, it is suggested to provide students with more information through mass media and discussions between students, teachers and parents. Training should increase youth's sensitivity to AIDS, as well as promoting sexual relationships until marriage or healthy and safe sex. The educational system in Iran provides no training on safe sex and a lot of young women in Iran are unaware of the preventive role of condom in transmitting HIV/AIDS. The Iranian boys and girls are ashamed to buy condom [11]. The need for training sexual behavior to the Iranian adolescents in school or university seems necessary, due to increased sexual behavior in this age group.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The present study has been done in Shahroud University of Medical Sciences, Iran under the ethics code of (cod 890/08),

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

Informed consent was obtained prior to data collectons.

AVAILABILITY OF DATA AND MATERIALS

Not applicable

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CONFLICT OF INTEREST

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

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REFERENCES

- [1] Adolescent and young adult health Available from: <https://www.who.int/news-room/fact-sheets/detail/adolescents-health-risks-and-solutions>
- [2] Secretariat NAC. Islamic republic of iran aids progress report. Ministry of Health and Medical Education Tehran 2015.
- [3] Panjalipour S, Bostani Khalesi Z, Mirhaghjoo SN. Iranian female adolescents' reproductive health needs: A systematic review. *IJWHR* 2018; 6: 226-32.
- [4] Gökengin D, Madani N. Response to letter to the editor re 'hiv trends: Defining "the middle east' *Int J Infect Dis* 2016; 48: 124.
- [5] Shokoohi M, Karamouzian M, Khajekazemi R, *et al*. Correlates of hiv testing among female sex workers in iran: Findings of a national bio-behavioural surveillance survey. *PLoS One* 2016; 11(1)e0147587 [<http://dx.doi.org/10.1371/journal.pone.0147587>] [PMID: 26807584]
- [6] Vakilian K, Mousavi SA, Keramat A. Estimation of sexual behavior in the 18-to-24-years-old Iranian youth based on a crosswise model study. *BMC Res Notes* 2014; 7(1): 28. [<http://dx.doi.org/10.1186/1756-0500-7-28>] [PMID: 24410965]
- [7] Mousavi SA, Keramat A, Vakilian K, Chaman R. Interpretation of opposite-sex friendship based on social ecology model in Iranian females. *Iran J Psychiatry Behav Sci* 2012; 6(2): 69-78. [PMID: 24644485]
- [8] Vakilian K, Keramat A, Seyyed Abbas M. The necessity of developing aids and reproductive health indicators for iranian adolescents in the national health system; the evaluation of indicators among 18-24 year old university students of shahroud, iran: A cross-sectional study. *Open Public Health J* 2018; 11(1) [<http://dx.doi.org/10.2174/1874944501811010339>]
- [9] Vakilian K, Keramat A, Mousavi SA, Chaman R. Experience assessment of tobacco smoking, alcohol drinking, and substance use among shahroud university students by crosswise model estimation—the alarm to families. *Open Public Health J* 2019; 12(1) [<http://dx.doi.org/10.2174/1874944501912010033>]
- [10] Abbasi-Shavazi MJ, Sadeghi R, Hosseini-Chavoshi M, Torabi F, Mahmoudiani S, Torkashvand M. Demographic and socio-economic status of youth in ir iran. United Nations Population Fund, University of Tehran and Statistical Research and Training Center 2013.
- [11] Vakilian K, Abbas Mousavi S, Keramat A, Chaman R. Knowledge, attitude, self-efficacy and estimation of frequency of condom use among Iranian students based on a crosswise model. *Int J Adolesc Med Health* 2016; 30(1): [/ijamh.2018.30.issue-1/ijamh-2016-0010/ijamh-2016-0010.xml](http://ijamh.2018.30.issue-1/ijamh-2016-0010/ijamh-2016-0010.xml). [<http://dx.doi.org/10.1515/ijamh-2016-0010>] [PMID: 27176740]
- [12] Khani Jeihooni A, Arameshfard S, Hatami M, *et al*. The effect of educational program based on health belief model about hiv/aids among high school students. *Int J Pediatr* 2018; 6(3): 7285-96.
- [13] Mousavi A, Keramat A, Vakilian K, Esmaeili Vardanjani SA.

- Development and adaptation of Iranian youth reproductive health questionnaire. *ISRN Obstet Gynecol* 2013; 2013950278 [http://dx.doi.org/10.1155/2013/950278] [PMID: 23984084]
- [14] Pophan JW, Hall EA, Tonk DS. Assesment instrument for measuring student outcomes (grade 7-12). *Cdc* 1999.
- [15] Zaini RG, Anjum F. Awareness of hiv/aids among female students attending college of applied medical sciences at taif university. *Int J Lab Med & Res* 2015; 2015
- [16] Dehghani A, Dehghani P, Dehghani B. Hiv/aids knowledge and attitude among high school students in shiraz, iran in 2015. *J Midwif Reprod Health* 2017; 5(2): 897-903.
- [17] Zhao Q, Li X, Zhao G, *et al.* AIDS knowledge and HIV stigma among children affected by HIV/AIDS in rural China. *AIDS Educ Prev* 2011; 23(4): 341-50. [http://dx.doi.org/10.1521/aeap.2011.23.4.341] [PMID: 21861608]
- [18] Rao D, Kekwaletswe TC, Hosek S, Martinez J, Rodriguez F. Stigma and social barriers to medication adherence with urban youth living with HIV. *AIDS Care* 2007; 19(1): 28-33. [http://dx.doi.org/10.1080/09540120600652303] [PMID: 17129855]

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