

Knowledge, Attitude and Practice Related to HIV/AIDS Among Students in a Local University (2007)

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ABSTRACT

Introduction: HIV/AIDS has emerged as a threat causing significant morbidity and mortality in human societies. The aim of this study was to determine knowledge, attitude and practice (KAP) and factors associated with HIV/AIDS among students in Universiti Putra Malaysia (UPM). **Methods:** A cross-sectional study was carried out in UPM. A two-stage proportionate to size random sampling technique was used. A standardised pre-tested questionnaire was used to collect the data. The data were analysed using SPSS. **Results:** The response rate was 92.3%. The majority (57.3%) of the students were female. The overall mean age of the respondents was 22.5 years (95% CI 22.27 – 22.70), ranging from 18 years to 52 years. The results show that 91% of the respondents did not know that HIV virus can be killed by bleach; 93.9% stated that a pregnant woman with HIV virus can give the virus to her unborn baby; 90.2% believed a woman can get HIV if she has unprotected sex with a man; and 93.5% considered that having sex with more than one partner can increase a person's chance of being infected with HIV virus. The majority (53%) were not willing to care for an HIV infected person in their own house. Only 19.5% of all the students claimed that they will inform their partners or family if diagnosed positive for HIV infection. The majority (93%) approved screening for HIV as a prerequisite for marriage. Only 2.2% of the respondents had multiple sexual partners and 5.4% of the respondents have had sexual intercourse before marriage. About 82.3% of the respondents believed in the use of condom as a means to prevent transmission of HIV. However, of those who were experiencing sexual intercourse with an unmarried partner, only 29.8% used condoms. **Conclusions:** The level of knowledge related to HIV/AIDS was not satisfactory. It is recommended that a peer educational programme on HIV/AIDS prevention be implemented.

Keywords: HIV/AIDS, KAP, university students

INTRODUCTION

Acquired Immunodeficiency Syndrome (AIDS) is one of the most complex global health problems in the 21st century.^[1] The disease has emerged as a threat to society over the last three decades. It causes significant morbidity and mortality in human societies throughout the world,^[2] reduces life expectancy of infected persons, increases the number of orphaned children, creates turbulence in health care systems, and contributes to economic insecurity, potentially leading to political instability.^[3] More than 33 million people had been infected

with HIV/AIDS worldwide by 2007 and more than 6,000 people become infected with HIV every day in the world. In 2007, an estimated 2.1 million people died from AIDS, including 1.7 million adults and 330,000 children less than 15 years of age. Around two and a half million adults and children have become infected with HIV.^[4] Young people are vulnerable to HIV infection^[5] and those aged 15-24 years accounted for half of all new HIV infections worldwide. Around 5000-6000 young people become infected daily.^[6]

In 2006, Ross *et al.*^[5] reported that the second decade of life is a period of experimentation and risk, and many factors increase young persons' vulnerability to HIV during these years of rapid physical and psychosocial development. These factors include a lack of knowledge about HIV/AIDS, lack of education and life skills, poor access to health services and commodities, early sexual debut, early marriage, sexual coercion and violence, human trafficking and growing up without parents or other forms of protection from exploitation and abuse. Youth are particularly vulnerable due to risky behaviours such as unprotected sex, injecting drugs, commercial sex, and limited empowerment.

The association between knowledge and sexual behaviour has been reported by several researchers.^[7,8] Shapiro *et al.*^[9] suggest that education alone cannot prevent the spread of HIV/AIDS but other factors such as personal motivation may play a role in preventive behaviours. Motivation to engage in HIV preventive acts influences whether or not well informed individuals will act on their knowledge of prevention. Reducing the spread of HIV rests with individual choices and decisions to modify behaviours such as practising safer sex and precautions with drug use.^[10] Modifying behaviours also may rely on skills or the know-how to implement behaviour change. Behavioural skills might determine whether or not well-informed and well-motivated individuals practise HIV prevention.^[9]

In Malaysia, the incidence of HIV infection increased from 3 in 1986 to 80,938 in June 2007. The cumulative AIDS deaths was 11,539, while there were 13,635 AIDS cases as of end of 2007.^[11] For planning and implementation of HIV/AIDS education programme among youth, it is essential to know the current status of knowledge, attitude and practice (KAP) related to HIV/AIDS among the youth. The objective of this study was to determine the level of knowledge, attitude, practice and associated factors related to HIV/AIDS among students in Universiti Putra Malaysia.

METHODS

A cross-sectional study was carried out in Universiti Putra Malaysia (UPM). In 2007 there was total of 23,202 students, 18,820 (81.11%) were undergraduates and 4,382 (18.89%) postgraduate students. The majority (93.76%) of the students were Malaysians with 6.24% being international students. A two-stage simple random sampling technique proportionate to size was used to select the sample. The sample size was 1920. Four faculties and two institutes were selected from the 15 faculties and 7 institutes using simple random sampling. A standardised pre-tested questionnaire was used to collect the data. It consisted of questions related to demographic factors and KAP on HIV/AIDS. The demographic section consisted of 12 questions with variables such as gender, age, residence, nationality, ethnicity, religion, marital status, educational level, faculty/institute, employment status and family economic status. Following the pre-testing of the questionnaire, the content validity was

evaluated by the supervisory committee to examine each item for congruence. The standardised Cronbach's alpha reliability coefficient ranged from 0.607 to 0.817. A written consent was obtained from all the respondents before conducting the interview. Knowledge was determined using 34 factual questions on HIV/AIDS using 'True' or 'False' or 'Don't Know' response. A correct answer was scored 1, an incorrect answer and 'Don't Know' responses were scored 0 for questions related to knowledge. The minimum and maximum scores for total knowledge scores were 0 and 34 respectively. Attitude was measured by a composite score of 7 items using the five-point Likert-scale from 1 for strongly agree to 5 for strongly disagree. The higher attitude score indicated higher positive attitudes towards HIV/AIDS. For practice questions, a single appropriate response of 'Yes' or 'No' for each of the seven questions was expected with good practice being scored 1 and poor practice scored 0. Total respondent's KAP on HIV/AIDS were computed with SPSS. Quartiles and percentiles were computed for KAP scores. The data were analysed using Statistical Package for Social Sciences (SPSS) version 15.0. First, the normality of the raw data was checked, using Kolmogorov-Smirnov test and it showed that the data had normal distribution. Independent sample *t*-test (for two groups) and ANOVA (for more than two groups) were used to compare means between two groups and between more than two groups respectively. Post-hoc tests were used to identify the significant differences. Pearson correlation was used to determine the correlation between KAP of the respondents. The level of significance was set at 0.05.

RESULTS

Response Rate

Out of the total of 1920 students, 1773 agreed to participate in the study, giving a response rate of 92.3 %.

Demographic Characteristics of Respondents

Table 1 shows the demographic characteristics of the respondents. The Kolmogorov-Smirnov test showed that the data had normal distribution. Out of the 1773 respondents, the majority (57.3 %) were female. The overall mean age of the respondents was 22.5 years (95% CI 22.27 – 22.70), ranging from 18 years to 52 years. The mean age and standard deviation of the male respondents (23.19 ± 5.4 years) was significantly different compared to (21.96 ± 3.7 years) the females ($T = 5.5$, $df = 1732$ and $p = 0.001$). Out of the 1773 respondents, 93.6% were Malaysians. The majority (52.5%) were Malays, followed by Chinese (34.9 %), Indians (4.6 %) and Bumiputras of Sabah and Sarawak (1.9 %). Foreign students 6.1 % consisted of the sample.

Knowledge on HIV/AIDS

Table 2 shows the distribution of the respondents' knowledge related to HIV/AIDS. The overall mean and standard deviation of knowledge score was 20.11 (± 5.48) with a median of 20. For total knowledge score, the first quartile (25%) was equal to 16, the second (50%) to 20 and the third (75%) was 24. In this study 91 % did not know that HIV virus is killed by bleach and 16.7 % perceived a person can get HIV virus by giving blood.

Table 1. Demographic characteristics of respondents

Characteristics	Frequency	Percent
Gender		
Male	756	42.7
Female	1016	57.3
Total	1772	100.0
Age Group (years)		
<20	578	33.3
20 – 21.99	360	20.8
22 – 23.99	532	29.0
24 – 25.99	100	2.8
26 – 27.99	44	2.5
28 – 29.99	33	1.9
>30	117	6.7
Total	1764	100.0
Nationality		
Malaysian	1657	93.6
Foreigners	114	6.4
Total	1771	100.0
Residence		
Urban	1188	67.4
Rural	574	32.6
Total	1762	100.0
Ethnicity		
Malay	929	52.5
Chinese	618	34.9
Indian	82	4.6
Bumiputra Sabah and Sarawak	34	1.9
Foreigner	108	6.1
Total	1771	100.0
Religion		
Islam	1032	58.2
Buddhism	532	30.0
Christianity	111	6.3
Hinduism	69	3.9
Others	1	0.1
No religion	27	1.5
Total	1772	100.0
Marital Status		
Single	1644	92.7
Married	128	7.2
Widowed	1	0.1
Total	1773	100.0

Table 1.continued

Educational level of students		
Diploma	28	1.6
Bachelor	1500	84.6
Master	158	8.9
PhD	85	4.8
Others	2	0.1
Total	1773	100.0
Faculties and Institute		
Bioscience	36	2.0
Social Science	16	0.9
Architecture	131	7.4
Medicine & Health Science	397	22.4
Agriculture	420	23.7
Engineering	773	43.6
Total	1773	100.0
Monthly family income (RM)		
<1000	437	24.8
1000 – 1999	463	26.3
2000 – 2999	302	17.1
3000 – 3999	168	9.5
4000 – 5000	109	6.2
>5000	137	7.8
Information not available	146	8.3
Total	1762	100.0

However, 93.9 % believed that a pregnant woman with HIV virus can give the virus to her unborn baby; 90.2 % believed a woman can get HIV if she has unprotected sex with a man and 93.5 % considered that having sex with more than one partner can increase a person's chance of being infected with HIV virus.

Attitude towards HIV/AIDS

Table 3 shows the distribution of the respondents' attitude on HIV/AIDS related items. The overall mean and standard deviation of attitude score was 24.09 (\pm 3.092) with a median of 24 and ranging from 11-34. For total attitude score, the first quartile (25%) was equal to 22, second (50%) to 24 and third (75%) was 26. In this study, only 43 % would be willing to care for HIV infected persons in their own house. About 42.3 % of the respondents believed that an infected teacher should not be allowed to continue teaching in school. However, 73.7 % of the respondents agreed that a child who is infected with HIV can go to a normal school and 81.8 % of the respondents believed that there should be employment opportunities for

Table 2a. Item analysis of respondents' knowledge towards HIV/AIDS

Knowledge on HIV/AIDS	Correct (%)	Incorrect (%)
HIV and AIDS are the same things	1242(70.1)	529(29.9)
There is a cure for AIDS.	1349(76.3)	418(23.7)
A person can get HIV virus from toilet seats.	1488(84.2)	280(15.8)
Coughing and sneezing do not spread HIV virus.	1132(63.9)	639(36.1)
HIV virus can be spread by mosquitoes.	1087(61.3)	685(38.7)
A person can get HIV virus by sharing a meal with someone who has HIV virus.	1425(80.4)	347(19.6)
HIV virus is killed by bleach.	158 (9.0)	1592(91.0)
A pregnant woman with HIV virus can spread the virus to her unborn baby.	1663(93.9)	108(6.1)
A woman with HIV/AIDS can transmit the virus to her newborn child through breastfeeding.	943(53.2)	828(46.8)
Pulling out the penis before a man's ejaculation keeps a woman from getting HIV virus during sex.	732(41.4)	1038(58.6)
A woman can get HIV if she has unprotected sex with a man.	1596(90.2)	173(9.8)
Using condom can lower a person's chance of getting HIV virus.	1456(82.3)	313(17.7)
A person with HIV virus may look healthy.	1168(66.1)	599(33.9)
A person who has been infected with HIV virus quickly shows serious signs of being infected.	1119(63.2)	651(36.8)
A person can be infected with HIV virus for 5 years or more without getting AIDS.	941(53.1)	830(46.9)
There is a vaccine that can stop adults from getting HIV virus.	1073(60.7)	696(39.3)
Women are always tested for HIV virus during "pap smears" (a screening test for cervical cancer).	376(21.2)	1394(78.8)

HIV infected people. Only 19.5 % of all the students claimed that they will inform their partners or family if they were diagnosed positive for HIV infection. The majority (93 %) approved screening for HIV as a prerequisite for marriage and agreed it be made compulsory before marriage and 91.6 % believed that pre-marital testing for HIV can protect men and women from HIV infection.

It is worth noting that about 82.3 % of the respondents believed in the use of the condom as a means of preventing transmission of HIV.

Practices Regarding HIV/AIDS

Table 4 shows the distribution of the respondents' practices on HIV/AIDS related items. The overall mean and standard deviation of practice score of the respondents was 4.14

Table 2b. Analysis of respondents' knowledge towards HIV/AIDS

Knowledge on HIV/AIDS	Correct (%)	Incorrect (%)
A person cannot get HIV virus by having oral sex with a person who has HIV virus.	724(40.9)	1045(59.1)
A person can get HIV virus even if she or he has sex with another person only once.	1500(84.9)	267(15.1)
A person is likely to get HIV virus by deep kissing, putting their tongue in their partner's mouth, if his/her partner has HIV virus.	851(48.1)	919(51.9)
A person can get HIV virus by giving blood.	295(16.7)	1475(83.3)
A woman cannot get HIV virus if she has sex during her period.	1140(64.4)	629(35.6)
There is a female condom that can help decrease a woman's chance of getting HIV virus.	656(37.1)	1114(62.9)
A person will not get HIV virus if she or he is taking antibiotics.	1175(66.5)	593(33.5)
Having sex with more than one partner can increase a person's chance of being infected with HIV virus.	1653(93.5)	115(6.5)
Taking a test for HIV virus one week after having sex will tell a person if she or he has HIV virus.	493(27.9)	1275(72.1)
A person can get HIV virus by sitting in a hot tub or a swimming pool with a person who has HIV virus.	1300(73.5)	469(26.5)
A person can get HIV virus through contact with body fluids like saliva, tears, sweat, or urine.	1037(58.6)	732(41.4)
A person can get HIV virus from a woman's vaginal secretions/wetness from her vagina.	860(48.6)	910(51.4)
If a person tests positive for HIV virus, then the test center will have to tell all of his or her partners.	362(20.5)	1407(79.5)
Using Vaseline or baby oil with condoms lowers the chance of getting HIV virus.	537(30.3)	1233(69.7)
A woman can get HIV if she has vaginal sex with a man who has HIV virus.	1524(86.1)	246(13.9)
Athletes who share needles when using steroids can get HIV virus from the needles.	1502(84.9)	267(15.1)
Cleaning after sex will keep a woman from getting HIV virus.	1014(57.3)	756(42.7)

Table 3. Attitude towards HIV/AIDS

Item	Frequency (%)				
	Strongly disagree	Disagree	Undecided	Agree	Strongly agree
If a relative of yours became sick with HIV, you would be willing to care for him/her in your own house.	57(3.2)	126(7.2)	823(46.7)	637(36.2)	119(6.8)
If a teacher has HIV, he/she should be allowed to continue teaching in school	133(7.5)	256(14.5)	357(20.2)	827(46.9)	190(10.8)
A child who is infected with HIV can go to a normal school	58(3.3)	164(9.3)	241(13.7)	893(50.7)	406(23.0)
If a member of your family is infected with HIV, you would keep it secret.	86(4.9)	257(14.6)	572(32.5)	595(33.8)	252(14.3)
Pre-marital testing for HIV should be compulsory before getting married.	27(1.5)	18(1.0)	77(4.4)	416(23.6)	1223(69.4)
Pre-marital testing for HIV can protect men and women from HIV infection.	33(1.9)	38(2.2)	77(4.4)	459(26.1)	1153(65.5)
There should be employment opportunities for HIV infected people	20(1.1)	44(2.5)	256(14.5)	913(51.9)	527(29.9)

(± 1.43) with a median and mode of 4, ranging from 0 to 7. For the total practice scores, the first quartile (25%) was equal to 3, the second quartile (50%) to 4 and the third quartile (75%) was 5. In this study, though 2.2% of the respondents had multiple sexual partners, condoms were used only by about 29.8% of those who were experiencing sexual intercourse with their unmarried partners; 5.4% of the respondents were having sexual intercourse before marriage. The study showed that Malaysian students had significantly better practice scores than international students.

Table 4. Practice regarding HIV/AIDS

Item	Frequency (%)		
	Yes	No	Not Applicable
If you are not currently married, have you ever had sex?	96(5.5)	1479(84.1)	183(10.4)
If you are currently married, do you have sex only with your spouse?	890(52.0)	112(6.5)	708(41.4)
If you are currently divorced or separated, do you currently have sex with somebody?	63(3.7)	472(27.8)	1163(68.5)
Have you ever had sex before marriage?	94(5.4)	1138(65.4)	507(29.2)
If you had sex with unmarried partner[s], would you use condom?	481(29.8)	236(14.6)	897(55.6)
Have you ever had sex with multiple partners?	38(2.2)	1675(97.8)	—
Do you know anybody among your friends or colleagues who have sex with unmarried partner?	721(41.3)	1023(58.7)	—

Knowledge, Attitude and Practice Related to HIV/AIDS and Socio-Demographic Factors
 Knowledge related to HIV/AIDS is closely associated with some demographic factors. Table 5 shows the result of some demographic variables associated with knowledge related to HIV/AIDS. There was a significant association between age, place of residence, ethnic group, marital status, educational level, faculty or institute, religion and family income with knowledge related to HIV/AIDS among students. Post-hoc comparisons indicate that the total knowledge scores for those 28 to 30 years of age were significantly different compared to those less than 20 years of age, Chinese compared to Malays, urban compared to rural, Christians compared to Muslim, married compared to single, Institute of Bioscience compared to Faculty of Agriculture. With regard to attitude, the results showed a significant association between age group, place of residence and faculty or institute and attitude towards HIV/AIDS among the students. The mean of the total attitude scores was significantly different for respondents of 28 - 30 years of age compared to less than 20 years age, urban compared to rural, Faculty of Medicine and Health Sciences compared to Institute of Social Science. For practice, the results showed a significant association between sex, nationality of respondents, place of residence, ethnic group, religion, educational level and family income with practice towards HIV/AIDS among students. The mean of the total practice scores was significantly different for females compared to males, rural compared to urban and Malays compared to Chinese and Indians.

Correlation between Knowledge, Attitude and Practice Score

The correlation between knowledge score and attitude score was examined using Pearson correlation coefficient test (r). The results show a significant but weak and positive

Table 5. Results of bivariate analysis of knowledge, attitude and practice towards HIV/AIDS

Factors Associated with Knowledge towards HIV/AIDS		
Variables	ANOVA/t-test	p
Gender	t = 0.911	0.363
Age Group	F = 3.217	0.004*
Nationality	t = 0.775	0.438
Residence	t = 3.029	0.002*
Ethnicity	F = 18.904	0.001*
Religion	F = 19.616	0.001*
Marital Status	F = 3.169	0.042*
Educational Level	F = 4.949	0.001*
Faculty & Institute	F = 30.816	0.001*
Monthly Family Income (RM)	F = 3.714	0.001*
Factors Associated with Attitude towards HIV/AIDS		
Gender	t = -0.785	0.433
Age Group	F = 2.141	0.04*
Nationality	t = 0.328	0.744
Residence	t = 2.522	0.012*
Ethnicity	F = 1.439	0.219
Religion	F = 1.379	0.229
Marital Status	F = 0.492	0.612
Educational Level	F = 1.577	0.178
Faculty & Institute	F = 5.738	0.001*
Monthly Family Income (RM)	F = 0.367	0.9
Factors Associated with Practice towards HIV/AIDS		
Gender	t = -3.3	0.001*
Age Group	F = 1.97	0.067
Nationality	t = 3.718	0.001*
Residence	t = -2.201	0.028*
Ethnicity	F = 8.852	0.001*
Religion	F = 2.735	0.018*
Marital Status	F = 2.721	0.066
Educational Level	F = 3.325	0.019*
Faculty & Institute	F = 2.062	0.068
Monthly Family Income (RM)	F = 5.239	0.001*

Level of significance ($P < 0.05$)

relationship between the total knowledge score and the total attitude score of the respondents ($r = 0.242$ and $p = 0.001$). Only 6% of the total variation in the attitude could be explained by knowledge ($r^2 = 0.06$).

DISCUSSION

Accurate knowledge is not only critical for decreasing infection rate, it also important to dispel persistent myths; partial knowledge can further perpetuate the risk of infection.^[12,13] Lack of knowledge and misconception about HIV/AIDS are key factors in the lack of preventive efforts by individuals. It has been shown that people need a good and accurate understanding of HIV and its transmission, access to relevant services, and the confidence and social power to initiate and sustain behaviour change in order to prevent the spread of HIV/AIDS.^[14,15] Knowledge alone does not change behaviour. However, having knowledge of HIV transmission may increase the likelihood of safer sex.^[16,17,18] But poor knowledge and low risk perception among groups with high-risk behaviours, may lead to increased risk of HIV/AIDS in the community.^[19]

In this study, the overall mean knowledge score among the respondents was 20.11 out of 34. Similar findings have been observed elsewhere among different university students^[20,21,22,23]; our study produced considerable results in terms of mean knowledge score compared to studies conducted among university students in United Arab Emirates^[24] and high school students in Nepal.^[25] Misinformation concerning a cure for AIDS is one of the risk factors for contracting the disease.^[27] Thomson *et al.* state that students may have been poorly informed about a cure or vaccine for HIV/AIDS because it is not of immediate consequence to their daily lives and lack of knowledge could have resulted from conflicting media coverage of AIDS research and the complexity of information on treatments and cures may confuse young people.^[26] In this study, 23.7% did not know that there is no vaccine or cure for AIDS.

Although, students today live in an era of mass information and have easier access to HIV information compared to decades ago, this study shows that there is still a lack of knowledge and misconception in terms of prevention of HIV/AIDS. Almost 40% of the students still believed mosquitoes are vectors of HIV and 26.5 % thought sharing swimming pools with infected people was risky and 36.1% thought coughing and sneezing spread HIV virus. These findings were consistent with those of other studies.^[28,29,30] Only 40.9 % knew that HIV could be transmitted through oral sex with HIV infected persons. It is probably so because mass media education is not thorough enough and the coverage of such content remains low.

In this study, only 43 % would be willing to care for an HIV infected person in their own house. About 42.3 % of the respondents believed that an infected teacher should not be allowed to continue teaching in school and 73.7% of the respondents agreed that a child who is infected with HIV can go to a normal school. The majority (81.8%) of the respondents believed that there should be employment opportunities for HIV infected people. Similar findings were obtained by a study carried out by Tan *et al.*^[20]

It is interesting to note that only 19.5 % of all the students claimed that they will inform their partners or family if diagnosed positive for HIV infection for fear of stigmatisation and social pressure that might contribute to circulation of the virus in the community. Such groups could pose a serious threat and should be educated to change their attitude. The respondents had a favourable attitude to prevention of the disease as the majority (93 %) approved screening for HIV as a prerequisite for marriage and they agreed it be made

compulsory before marriage. The majority (91.6 %) believed that pre-marital testing for HIV can protect men and women from HIV infection. These findings are comparable to the findings from a community-based study conducted by Negash *et al.*^[31] (2003) and another study by Andargie *et al.* in Ethiopia.^[32] Lee *et al.* reported that the percentage of premarital sexual activity seems to have increased in Malaysia over the years. This can be due to rapid modernisation and social changes in the country.^[33]

It is worth noting that about 1456 (82.3%) of the respondents believed in the use of the condom as a means of preventing transmission of HIV. In line with this, relationship between risky sexual behaviours among students with condom utilisation has been reported.^[33] Although, the attitude concerning AIDS probably cannot be improved immediately, it could be effective to initiate and sustain mass media campaigns aimed at attitude modification.

It was noted that 38 (2.2%) of the respondents had multiple sexual partners which indicate risky behaviour is low among the students compared to 16% in the United States.^[34] Condoms were used only by about 481 (29.8%) of those who were experiencing sexual intercourse with an unmarried partner. The causal relationship between having sex and HIV/AIDS knowledge or whether knowledge precedes or follows sexual experience is unclear from data. In this study only 5.4% reported having sexual intercourse before marriage, much lower than other countries, like 48% in the United States in 1997.^[34] This figure may be an underestimation of sexual behaviour, because data were self-reported by students, and this was compounded by cultural and practical barriers, for example, low perceived risk of HIV infection, or differential access to condoms that prevent HIV among students. Although 82.3 % were aware that condom use during sexual intercourse is an essential component of HIV/AIDS prevention, the rate of condom use among students having sexual intercourse was 29.8%. Therefore, in future HIV prevention campaigns, it would be important to focus not only on HIV knowledge but also on developing and maintaining safe sexual behaviour.

Pearson correlation analysis revealed that there was a significant but weak and positive correlation between the total knowledge score and the total attitude score of the respondents ($r = 0.242$ and $p = 0.001$). These positive correlations indicate that an increase in knowledge would lead to a more positive attitude towards HIV/AIDS. This finding is similar to other studies by Meundi *et al.*^[35] (2008) but differs from a study conducted by Gan'czak *et al.* among Arab university students.^[24]

Furthermore, it can also be mentioned that the questionnaire as a measurement tool is not an adequate measure of practice in terms of HIV/AIDS and future studies should look at different measurement designs such as focus group discussion (FGD).

This study has several methodological strengths. The sample is relatively large, and was drawn from four faculties and two institutes of UPM by using the two stage random sampling method that represents the overall knowledge, attitude and practice among students in UPM.

A key challenge for HIV/AIDS prevention education programmes will be to apply methods that result in rapid enhancement in knowledge and attitudes regarding basic practices such as condom use and limiting sexual partners. However, it is necessary to take a more in-depth view in facing the cultural factors that affect young people and their ability to adjust what they know about safer sex with their cultural beliefs about gender and power.

In relation to greater effectiveness in prevention, this depends less on the content of educational messages than on the process which is used to motivate young adults in changing their culture. Fortunately, the studies on peer counseling shows that peers have a powerful influence.^[36]

In conclusion, this study showed that the level of knowledge about HIV/AIDS among UPM university students is not satisfactory. It is recommended that a peer educational programme on HIV/AIDS prevention be implemented to remove some weaknesses observed such as low level of knowledge, low level of condom use and voluntary HIV testing.

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