

A Cross Sectional Study on Knowledge and Attitude Regarding HIV/AIDS Among Students of Manipal University College Malaysia

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Abstract

Human Immunodeficiency Virus (HIV) has been the most dreaded and life threatening disease for the past decade. The aim of this study was to investigate the knowledge and attitude regarding HIV/AIDS among students of Melaka Manipal Medical College. This cross-sectional study was conducted among all MBBS students of Manipal University College Malaysia (n=146) from April 2021 to May 2021. An online questionnaire was distributed and a total of 152 responses were received. The questionnaire consists of 22 items, asking about the knowledge of common routes of transmission, and any possible treatment for the disease, the next part consists of 33 questions which will be about the attitudes of participants toward HIV/AIDS. Statistical tests (Unpaired t-test and ANOVA test) were done using Epi Info software (version 7.2.4.0). High knowledge score (≥ 80) was seen among 3.29% of the students, moderate knowledge score (60-80) was found among 32.23% of the students and low knowledge score (≤ 55) was found among 64.47% of the students. Findings revealed that there was significant association between age and knowledge of HIV/AIDS ($P=0.009$), academic year and knowledge of HIV/AIDS ($P=0.002$), age and attitude towards HIV/AIDS ($P=0.015$) as well as religion and attitude towards HIV/AIDS ($P=0.017$), academic year and attitude towards HIV/AIDS ($P=0.009$) and lastly, parent's occupation and attitude towards HIV/AIDS ($P=0.004$).

Keywords

Human Immunodeficiency Virus (HIV), Knowledge and Attitude Regarding HIV/AIDS, Undergraduate Medical Students, Cross-Sectional Study, Malaysia

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1. Introduction

Human immunodeficiency virus (HIV) infection is a major public health, a pandemic worldwide, which has resulted in more than 35 million deaths up until 2017 with about 37 million people were living with HIV (PLHIV) at the end of 2017. [7] The disease started first among young homosexuals in the west coast of America. Soon this myth was removed; it was detected not only in homosexuals but was also detected among female sex workers of New York who were taking addictive illicit drugs through unsterilised needles. To this day, its spread has yet to be contained but people more often than not choose to put a blind eye towards such sensitive

subjects. Around the world, studies have been done to measure the level of knowledge and attitudes toward HIV/PLHIV among medical students. A study was done in Fiji, where it was reported that medical students showed a high level of HIV Knowledge and a positive attitude towards it. Nevertheless, a large proportion of participants admitted to having a fear of dealing with HIV patients in a clinical setting. [16] Therefore, it is highly important that medical students be armed and equipped with the knowledge about HIV/AIDS and having positive attitudes towards People Living With HIV/AIDS (PLWHA), not only so that they can become better physicians but also so that they can be better human beings with both the knowledge to treat and the

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compassion to care for these people [1]. In a previous study conducted it was found that the higher the level of HIV knowledge (HK), the lower the level of intolerance and anxiety among medical personnel. [11-15].

In a previous study done on the assessment of the knowledge and attitudes regarding HIV/AIDS among pre-clinical medical students in Israel, 5 factors were identified to have an effect on the knowledge and awareness of students on the subject matter of HIV/AIDS. It was reported that the occupation of the parents of a student can play a role on the exposure of the subject of HIV/AIDS to a student, whether or not the parent is working in the healthcare industry will have a profound impact on whether or not the student is made aware to a certain subject. [1] In previous literature, the prevalence of the disease in the family of a student can have a significant impact on the awareness, knowledge and attitude of the student towards the disease. A student who has a family member who is a PLWHA has a higher likelihood of being more aware and empathetic towards PLWHA as compared to a student who does not. [1]. Studies have shown that more than 90% of the students had received satisfactory education on HIV/AIDS. [6] In a previous study done, it was identified that most students listed their most common sources of HIV/AIDS information were, newspapers (80.3%), TV/radio (77.7%) and publications such as ads and flyers on the subject (63.5%). [1] Researchers from Brazil, South Africa, Jordan and India have reported about the knowledge and attitudes of dental students toward HIV/AIDS; all the results showed good knowledge of students, but their attitude with the persons who are infected with HIV is very bad. [2-5] It is also found that the attitude of a health-care provider toward a patient plays an important role in determining the patient's medical outcomes and health-related behaviours. [8, 9] This is an important factor because it has been reported that negative attitudes or prejudice, as perceived by patients, are associated with a lower quality of care. [9, 10] In addition, a study done in Malaysia reported negative beliefs regarding disclosure, confidentiality, and environment of care toward PLHIV. But at the same time, the attitudes towards giving care to PLHIV were largely positive. [17].

The objective of this survey will be to attempt to answer the following questions: 1) What is the HIV/AIDS knowledge among preclinical medical students? 2) What are the current attitudes regarding PLWHA among pre-clinical medical students in MUCM. 3) What is the relationship between parent occupation, family history of the disease, exposure of the subject from school, books/movies, social media and the knowledge and attitudes of the undergraduate medical students of Manipal University College Malaysia students on HIV/AIDS and the PLWHA.

2. Methods

2.1. Study Design, Study Setting, Study Time and Study Population

A cross sectional analytical study was conducted from April 2021 to May 2021 in Manipal University College Malaysia (MUCM). MUCM is a private institute which has two campuses located in Muar, Johor and Bukit Baru, Melaka, both in Malaysia. MUCM offers 3 courses which include Foundation in Science (FIS), Bachelor of Medicine and Bachelor of Surgery (MBBS) and Bachelor of Dental Surgery (BDS). FIS has 2 batches which consist of around 200 students and BDS has a total of 5 academic years which consists of around 375 students. MBBS students can be divided into preclinical and clinical in which there will be 4 semesters of preclinical and 6 semesters of clinical which totals up to 10 semesters, consisting of around 1300 students.

2.2. Sample Size

A previous cross-sectional study, which was done on the assessment of the knowledge and attitudes regarding HIV/AIDS among preclinical medical students from four medical schools in Israel. The study has a response rate of 62.24 percent and knowledge among preclinical medical students was generally high and showed a statistically significant improvement as the student progresses through their studies. Sample size (n) was calculated using Microsoft Excel Sample Size Calculator which leads us to a minimum of 130 number of people needed for the survey. The population size for this study is 1300, the study estimate is 36.6%, and the precision is 8%. With 95% confidence interval (CI) and 10% of non-response, the final number of samples we took is 145 of MBBS students from pre-clinical and clinical years.

Calculation of sample size via Microsoft Excel Sample Size Calculator:

Infinite population:

Study estimate (%) = 36.6%

Precision (%) = 8%

95% confidence interval (CI)

Finite population:

N = 1300

Sample size = 131

$$\begin{aligned} n(\text{final}) &= n(\text{calculated}) / (1 - \text{non-response}) \\ &= 131 / (1 - 0.1) \\ &= 146 \end{aligned}$$

2.3. Sampling

One of the non-probability sampling methods, purposive sampling was used to enroll students for this study. This method was chosen after considering the study objectives and the feasibility with the study population. The inclusion criterias of this study are preclinical and clinical students of MUCM which are 18 years old and above, students that signed the informed consent and agreed voluntarily to participate in the study and first response will be taken if there is duplication. The exclusion criteria of this study are FIS students, BDS students, students who did not give consent, incomplete questionnaire and duplication of data by the same student.

2.4. Data Collection

Data was collected by distribution of online google form questionnaires to MUCM students through whatsapp. The independent variables included were parent's occupation, family history, exposure of particular subject in school, exposure of particular subject from media (books and movies) and exposure of particular subject from social media. The dependent variable were the knowledge and attitudes regarding HIV/ AIDs. The questionnaire will include 3 parts.

The first part was about the informed consent (a brief note on the study with the participant's willingness to participate in the study and the knowledge of the participants right) and also about socio demographic data (age, gender, ethnicity, nationality, programme and academic year, current residency, parental education level, and etc.)

The second part was about the background of the participants. It consists of six items, which are any personal acquaintance with a HIV/AID patient, the sources that

participants get about the information of HIV/AIDS (newspaper, book, magazines etc), any academic exposure to it, any personal chance to meet a HIV/AIDS, and lastly any social media exposure to HIV/AIDS.

The third part was about the knowledge of participants about HIV/AIDS. It consists of 22 items, asking about the knowledge of common routes of transmission, and any possible treatment for the disease, by giving multiple answers to select. When the participant answers the question correctly, one mark will be given; if it's wrong, no marks will be given. The total score of this section will be ranged from 0 to 22 marks, with no negative statement.

The last part will be about the attitudes of participants toward HIV/AIDS. It consists of 33 questions, and participants responded to the questions based on Highly agree, which is 4 points; Agree, which is 3 points; Disagree, which is 2 points and lastly highly disagree which is one point. There will be 10 questions which can be scored directly while 23 items will have reverse scoring. The total score of this attitude scale will be ranged from 33 to 165 which will be obtained by adding all the points of 10 items and reverse scoring 23 items.

2.5. Data Processing and Data Analysis

The data obtained from the Google Forms was processed with Microsoft Excel. Duplicated responses were removed and the data was analyzed using Epi Info version 7.2.4.0. In the study, the frequency and percentage of qualitative variables such as gender, age, nationality, religion, academic year, parent's occupation and family income were calculated. Statistical tests used for hypothesis testing were decided based on the independent and dependent variables that are shown in Table 2 below. Level of significance was 0.05.

Table 1. Statistical Test used for hypothesis testing.

Independent variables	Dependent variables	Statistical Test
Parent occupation	Knowledge and attitude regarding HIV/AIDS	Unpaired T Test
Family history	Knowledge and attitude regarding HIV/AIDS	Unpaired T Test
Exposure to particular subject in school	Knowledge and attitude regarding HIV/AIDS	Unpaired T Test
Exposure to particular subject in media	Knowledge and attitude regarding HIV/AIDS	ANOVA
Exposure to particular subject in social media	Knowledge and attitude regarding HIV/AIDS	Unpaired T Test

2.6. Ethical Consideration

The participants were informed that participation is completely voluntary and a written informed consent was collected. Simultaneously, the participants were assured that the responses are confidential throughout and being used only for research purposes. Given the applicability, the participants were encouraged to answer the questionnaire on the spot. The research will be approved by the Research Ethics Committee, Faculty of Medicine of Manipal

University College Malaysia, Malaysia.

3. Results

A total of 152 responses were received by our side. Table 2 shows the frequency and percentage of sociodemographic characteristics such as gender, age, nationality, religion, academic year, healthcare professionals among family members and family income. In our study, 43.42% of the participants are male and

56.58% are female, 54.61% of the participants are below 22 years old and 45.40% are equal or older than 22 years old, minimum age is 18 and maximum is 26 with mean of 21.52. 96.05% of the participants are Malaysian and the other 3.95% are Non-Malaysians. Among our study sample, 36.18% are Hindu, 33.55% are Buddhist, 17.11% are Christians, 9.87% are Muslims and 3.3% others. 53.95% of our sample are preclinical students and the other 46.05% are clinical students. Majority of the sample which is 60.53% does not have any parents that are healthcare professionals while the other 39.47% has parents that are healthcare professionals. For family income in the sociodemographic characteristics, 20.39% has family income of less than RM4000, 48.68 between RM4000 to RM10000 and 30.92% has family income more than RM10000.

Table 2. Sociodemographic characteristics.

Variables	Frequency (%)
Gender	
Male	66 (43.42)
Female	86 (56.58)
Age	
<22	83 (54.61)
≥22	69 (45.40)
Mean (SD)	21.52 (1.84)
Minimum - Maximum	18.0-26.0
Nationality	
Malaysian	146 (96.05)
Non-Malaysian	6 (3.95)
Religion	
Buddhist	51 (33.55)
Hindu	55 (36.18)
Christian	26 (17.11)
Muslim	15 (9.87)
Others	5 (3.3)
Academic Year	
Pre-clinical	82 (53.95)
Clinical	70 (46.05)
Parent's occupation	
Healthcare worker	60 (39.47)
Other occupation	92 (60.53)
Family Income	
<RM4000	31 (20.39)
RM4000-RM10000	74 (48.68)
>RM10000	47 (30.92)

Table 3 shows the background of participants towards HIV. Based on the responses, 96.05% of the participants have no any personal acquaintances with HIV/AIDS and only 3.95% of them did. Most of the participants got the sources of information regarding HIV/AIDS from books, medical literatures and teachers, and the percentage is 76.97%, 76.3% and 73.68% each respectively; Some of them also get the information of it from newspaper (63.8%), radio/television (57.89%) and doctors (65.13%). Only 0.66% of them got the

information from campaign, youtube and internet. Most of the participants (91.45%) had been exposed to the information regarding HIV/AIDS in the course of studies and 8.55% of them were not exposed. 92.11% of them had been exposed to information regarding HIV/AIDS on social media and 7.89 were not exposed. Lastly, most of the participants (74.34%) did not have a chance to meet a HIV/AIDS patient and 25.66% of them had a chance.

Table 3. Background.

Variables	Frequency (%)
Do you have any personal acquaintances with HIV/AIDS?	
Yes	6 (3.95)
No	146 (96.05)
Sources of information regarding HIV/AIDS *	
Newspapers	97 (63.8)
Magazines	45 (29.6)
Books	117 (76.97)
Medical literatures	116 (76.3)
Radio/Television	88 (57.89)
Friends	78 (51.3)
Parents	48 (31.58)
Teachers	112 (73.68)
Doctors	99 (65.13)
Publications on the matter	75 (49.34)
Campaign	1 (0.66)
YouTube	1 (0.66)
Internet	1 (0.66)
Exposure of information regarding HIV/AIDS in the course of studies	
Yes	139 (91.45)
No	13 (8.55)
Chance to meet person with HIV/AIDS	
Yes	39 (25.66)
No	113 (74.34)
Exposure of information regarding HIV/AIDS through social media	
Yes	140 (92.11)
No	12 (7.89)

* Multiple response answer.

Table 4 is about the knowledge of MUCM students towards HIV/AIDS and only the correct frequency and % is measured and calculated. 94.74% of them had answered the first question correctly, which is about the most common cause of HIV transmission in Malaysia. When the question is about route of transmission, the correct frequency for each route is: Sexual relation (100%), Infected syringe and needle (100%), Blood transfusion (100%), Mother to child during pregnancy and labour (94.74%), Breastfeeding (69.08%), Handshake (98.03%), Mosquito bites (83.55%), Toilets (92.76%), Hugging (98.03%), Saliva (61.84%), Using same tableware (84.21%) and lastly piercings and tattoos (72.37%). Regarding the possible treatments, 80.26 % for it is possible to prevent HIV transmission from mother to fetus; 53.95% for the chance of getting HIV could be lowered if treatment is given on time after conducting unprotected sexual intercourse; 55.92% for the chance of HIV infection after exposure could be lowered if treatment is given on time after a prick from an infected needle and lastly 83.55% for HIV

treatment prolongs the life expectancy.

Table 4. Knowledge.

Question	Correct Frequency (%)
In Malaysia, the most common cause for HIV transmission is Intravenous drugs users, Prostitutes, Heterosexual relations	144 (94.74)
HIV can be transmitted through: [Sexual relations]	152 (100)
HIV can be transmitted through: [Infected syringes and needles]	152 (100)
HIV can be transmitted through: [Blood transfusion]	152 (100)
HIV can be transmitted through: [Mother to child during pregnancy and labor]	144 (94.74)
HIV can be transmitted through: [Mother to child during breastfeeding]	105 (69.08)
HIV can be transmitted through: [Handshakes]	149 (98.03)
HIV can be transmitted through: [Mosquito bites]	127 (83.55)
HIV can be transmitted through: [Toilets]	141 (92.76)
HIV can be transmitted through: [Hugging a person with HIV/ AIDS]	149 (98.03)
HIV can be transmitted through: [Saliva of a person with HIV/ AIDS]	94 (61.84)
HIV can be transmitted through: [Using the same tableware used by a person with HIV/ AIDS]	128 (84.21)
HIV can be transmitted through: [Piercings & tattoos]	110 (72.37)
Possible treatments: [Nowadays, it is possible to prevent HIV transmission from mother to fetus]	122 (80.26)
Possible treatments: [The chance of HIV infection after exposure could be lowered if given on time after conducting unprotected sexual intercourse]	82 (53.95)
Possible treatments: [The chance of HIV infection after exposure could be lowered if given on time after a prick from an infected needle]	85 (55.92)
Possible treatments: [HIV treatment prolongs the life expectancy of people living with HIV/AIDS]	127 (83.55)

Table 5. Attitude.

Domain 1: Desire for knowledge regarding HIV/AIDS

Questions	Highly agree Frequency (%)	Agree Frequency (%)	Disagree Frequency (%)	Highly disagree Frequency (%)
4.1) Only homosexuals could get HIV/AIDS	3 (2.03)	9 (6.08)	59 (39.86)	77 (52.03)
4.2) People with HIV/AIDS got what they deserve	6 (4.05)	29 (19.59)	57 (38.51)	56 (37.84)
4.4) People with AIDS should be quarantined	3 (2.04)	40 (27.21)	49 (33.33)	55 (37.41)
4.7) I avoid being among certain people or certain place due to HIV/AIDS	7 (4.73)	19 (12.84)	55 (37.16)	67 (45.27)
4.8) I would like to know more about HIV/AIDS	59 (39.07)	75 (49.67)	15 (9.93)	2 (1.32)
4.14) I would refuse treating persons with HIV/AIDS	16 (10.96)	53 (36.30)	44 (30.13)	33 (22.60)
4.23) I would inform an employer about his employee's HIV status, even against the patient's request	10 (6.80)	33 (22.45)	62 (42.18)	42 (28.57)
4.31) The professional education I received gave me enough information to confidently work with people who have HIV/AIDS	45 (30.61)	54 (36.74)	34 (23.13)	14 (9.52)
4.33) The possibility of working with people who have HIV/AIDS will play a role in my choice of place of residence.	47 (32.41)	74 (51.03)	13 (8.97)	11 (7.59)

Domain 2: General stigma towards HIV/AIDS

Questions	Highly agree Frequency (%)	Agree Frequency (%)	Disagree Frequency (%)	Highly disagree Frequency (%)
4.3) It is hard for me to like people who exposed themselves and society to HIV/AIDS	5 (3.36)	35 (23.49)	68 (45.64)	41 (27.52)
4.5) Sexual relations should be prohibited for those with HIV/AIDS	43 (29.25)	63 (42.86)	27 (18.37)	14 (9.52)
4.11) I would have a friendship with people with HIV/AIDS	27 (18.24)	91 (61.49)	22 (14.86)	8 (5.41)
4.27) There should be routine screening of immigrants for HIV	18 (12.33)	65 (44.52)	52 (35.62)	11 (7.53)

Domain 3: Medicine & stigma towards HIV/AIDS

Questions	Highly agree Frequency (%)	Agree Frequency (%)	Disagree Frequency (%)	Highly disagree Frequency (%)
4.6) Students with HIV/AIDS should be expelled from medical studies	2 (1.32)	9 (5.96)	62 (45.03)	78 (51.66)
4.10) Other students should be notified if one of the medical students is HIV-positive	82 (55.41)	57 (38.51)	5 (3.38)	4 (2.70)
4.12) A physician who is HIV-positive should be allowed to work (with the appropriate precautions)	13 (8.82)	11 (7.38)	59 (39.60)	66 (44.30)
4.13) I believe I have the full right to refuse treating a person with HIV/AIDS	12 (8.22)	71 (48.63)	40 (27.40)	23 (15.75)
4.15) I wish not to treat persons with HIV/AIDS	6 (3.95)	34 (22.37)	71 (46.71)	41 (26.96)
4.24) If given a choice, I would prefer not to treat people with HIV/AIDS	7 (4.64)	18 (11.92)	70 (46.36)	56 (37.09)
4.26) Physicians have the right to refuse treating patients diagnosed with HIV/AIDS	24 (16.44)	55 (37.67)	45 (30.82)	22 (15.07)
4.32) The possibility of working with persons with HIV/AIDS will play a role in my choice of specialty	10 (6.90)	15 (10.34)	55 (37.93)	65 (44.83)

Domain 4: Emotions & fears regarding HIV/AIDS

Questions	Highly agree Frequency (%)	Agree Frequency (%)	Disagree Frequency (%)	Highly disagree Frequency (%)
4.9) If I would have had HIV/AIDS, I would be ashamed of it	40 (27.03)	77 (52.03)	24 (16.22)	7 (4.73)
4.17) I am concerned that in the future it would be found that HIV infection can be transmitted in ways now thought to be safe	21 (14.19)	68 (45.95)	41 (27.70)	18 (12.16)
4.25) Many of the health care workers in Malaysia are at a high risk of acquiring HIV at work	32 (22.22)	49 (34.03)	39 (27.08)	24 (16.67)
4.28) If, as intern, you had to care for a person with HIV/AIDS, would you feel anxious?	7 (4.64)	24 (15.89)	71 (47.02)	49 (32.45)
4.29) If as intern, you had to care for a person with HIV/AIDS, would you feel reluctant?	19 (13.01)	42 (28.77)	55 (37.67)	30 (20.55)
4.30) I am concerned that working with people who have HIV/AIDS may endanger my health	21 (14.09)	81 (54.36)	32 (21.48)	15 (10.07)

Domain 5: HIV/AIDS related medical protocol

Questions	Highly agree Frequency (%)	Agree Frequency (%)	Disagree Frequency (%)	Highly disagree Frequency (%)
4.16) All patients admitted to the hospital should be tested for HIV	43 (29.45)	83 (56.85)	12 (8.22)	8 (5.48)
4.17) I am concerned that in the future it would be found that HIV infection can be transmitted in ways now thought to be safe	21 (14.19)	68 (45.95)	41 (27.70)	18 (12.16)
4.19) All physicians should be HIV tested	13 (1.97)	31 (20.39)	63 (41.45)	45 (29.61)
4.20) Health care workers have the right to know their patients' HIV status	18 (12.08)	54 (36.24)	54 (36.24)	23 (15.44)
4.21) I would have informed the sexual partner of an HIV positive person about their partners HIV status, even against that patient's request	20 (13.79)	62 (42.76)	49 (33.79)	14 (9.66)
4.22) I would warn other medical staff about a patient's HIV status even against that patient's request	40 (27.21)	76 (51.70)	21 (14.29)	10 (6.80)

Table 5 is about the attitude of MUCM students towards HIV/AIDS, the frequency and percentage of each answer option has been calculated. To begin with, the first domain presents the desire for knowledge regarding HIV/AIDS in the population of MUCM students. The first question is only homosexuals could get HIV/AIDS for which 52.03% have answered highly disagree, 39.86% disagreed, 6.08% agreed and 2.03% highly agreed. Next, about 37.84% highly disagreed that people who got HIV/AIDS got what they deserved whereas 38.51%, 19.59% and 4.05% disagreed, agreed and highly agreed respectively. 37.41% and 33.33% students highly disagree and disagree respectively on people with AIDS should be quarantined. Nearly about 27.21% and 2.04% agree and highly agree on quarantining people with HIV/AIDS. The next question is whether students avoid being among certain people or certain places due to HIV/AIDS. The percentage of answers are 45.27%, 37.16%, 12.84%, 4.73% as highly disagree, disagree, agree and highly agree respectively. About 39.07% highly agree, 49.67% agree, 9.93% disagree and 1.32% highly disagree on wanting to know more about HIV/AIDS. Students have also answered the question about refusing to treat persons with HIV/AIDS. Answers given were highly agree, agree, disagree and highly disagree with percentages as 10.96%, 36.30%, 30.13% and 22.60% respectively. Next, whether or not students would inform an employer about his employee's HIV status, even against the patient's request. Answer percentages were 6.8%, 22.45% 42.18% and 28.57% for respective answers like highly agree, agree, disagree and highly disagree. Next, the students claim that the professional education they received

gave them enough information to confidently work with people who have HIV/AIDS to which about 30.61% highly agree, 36.74% agree, 23.23% disagree and 9.52% highly disagree. Next question answered was, the possibility of working with people who have HIV/AIDS will play a role in my choice of place of residence. To which 32.41% highly agree, 51.03% agree, 8.97% disagree and 7.59% highly disagree. Moving on to the next domain which is a general stigma towards HIV/AIDS. First question on this domain is, It is hard for me to like people who exposed themselves and society to HIV/AIDS. To which 3.36% and 23.49% highly agree and agree respectively but 45.64% and 27.52% disagree and highly disagree respectively. Next question is that sexual relations should be prohibited for those with HIV/AIDS to which about 29.25% highly agree, 42.86% agree, 18.37% disagree and 9.5% highly disagree. Third question in this domain is, I would have a friendship with people with HIV/AIDS, where 18.24% and 61.49% highly agree and agree whereas 14.86% and 5.41% disagree and highly disagree respectively. Lastly, in this domain, whether there should be routine screening of immigrants for HIV was asked. Students answered highly agree, agree, disagree and highly disagree with percentages as 12.33%, 44.52.5%, 35.62% and 7.53% respectively. The third domain has components on medicine & stigma towards HIV/AIDS. Firstly, whether students with HIV/AIDS should be expelled from medical studies was asked. The answers were 1.32 highly agree, 5.96% agree, 45.03% disagree and 51.66% highly disagree. They were also asked if other students should be notified if one of the medical students is HIV-positive, the response was 55.41%

highly agree, 38.51% agree, 3.38% disagree and 2.7% highly disagree. Next, the question was whether a physician who is HIV-positive should be allowed to work with the appropriate precautions, to which students' response was 8.82% highly agree, 7.38% agree, 39.6% disagree and 44.30% highly disagree. Students were also asked if they believe they have the full right to refuse treating a person with HIV/AIDS. The answer was 8.22% highly agree, 48.63% agree, 27.4% disagree and 15.75% highly disagree. Next question was if they wish not to treat persons with HIV/AIDS, to which they responded with 3.95% highly agree, 22.37% agree, 46.71% disagree and 26.96% highly disagree. The next question was If given a choice, they would prefer not to treat people with HIV/AIDS. Only 4.64% highly agree and 11.92% agree, the rest of 46.36% and 37.09% disagree and highly disagree respectively. Subsequently, they were asked if physicians have the right to refuse treating patients diagnosed with HIV/AIDS to which 16.44% highly agree, 37.67% agree, 30.82% disagree and 15.07% highly disagree. Following that they were asked if, The possibility of working with persons with HIV/AIDS will play a role in their choice of specialty and the response was 6.9% highly agree, 10.34% agree, 37.93% disagree and 44.83% highly disagree. The subsequent domain concerns emotions & fears regarding HIV/AIDS. The question was, "If I would have had HIV/AIDS, I would be ashamed" of it and the response was 27.03% highly agree, 52.03% agree, 16.22% disagree. 4.73% highly disagree. Next question was "I am concerned that in the future it would be found that HIV infection can be transmitted in ways now thought to be safe" to which the response was 14.9% highly agree, 45.95% agree, 27.7% disagree and 12.16% highly disagree. Following that, they were asked if many of the health care workers in Malaysia are at a high risk of acquiring HIV at work. The response was 22.22% highly agree, 34.03% agree, 27.08% disagree and 16.67% highly disagree. Next, they were asked if as an intern, they had to care for a person with HIV/AIDS, would you feel anxious, to which 4.64% highly agree, 15.68% agree, 47.02% disagree and 32.45% highly disagree. They were also asked If as an intern, they had to care for a person with HIV/AIDS, would they feel reluctant, to which the response was 13.01% highly agree, 28.77% agree, 37.67% disagree and 20.55% highly disagree. Lastly in this domain, they were asked if

they are concerned that working with people who have HIV/AIDS may endanger their health, and they answer with 14.09%, 54.36%, 21.48% and 10.07% with highly agree, agree, disagree and highly disagree respectively. The next domain covers the topic of HIV/AIDS related medical protocols. They students were asked if all patients admitted to the hospital should be tested for HIV. They responded with 29.45% highly agree, 56.85% agree, 8.22% disagree and 5.48% highly disagree. Next, they were asked about concerns that in the future it would be found that HIV infection can be transmitted in ways now thought to be safe to which response was like 14.19% highly agree, 45.95% agree, 27.70% disagree and 12.16% highly disagree. They were also asked if all physicians should be HIV tested, to which their response was 1.97% highly agree, 20.39% agree, 41.45% disagree and 29.61% highly disagree. They were also asked if health care workers have the right to know their patients' HIV status. They responded as 12.08% highly agree, 36.24% agree, 36.24% disagree and 15.44% highly disagree. Subsequently, they were asked if they would have informed the sexual partner of an HIV positive person about their partner's HIV status, even against that patient's request. They answered with 13.79% highly agree, 42.76% agree, 33.79% disagree and 9.66% highly disagree. Lastly, they were asked if they would warn other medical staff about a patient's HIV status even against that patient's request, the response was, 27.21% highly agree, 51.70% agree, 14.29% disagree and 6.80% highly disagree.

Table 6. Knowledge of HIV.

Variable	Frequency (%)
High (≥ 80)	5 (3.29)
Moderate (60-80)	49 (32.24)
Low (<60)	98 (64.47)
Mean (SD)	58.01 (11.25)
Minimum - Maximum	35.29-100.00

Table 6 shows the knowledge of HIV of pre-clinical and clinical MBBS students of Manipal University College Malaysia (MUCM) as well as the mean and standard deviation of the knowledge of HIV. Among the students, 3.29% has high knowledge regarding HIV, 32.24% has moderate knowledge regarding HIV and 64.47% has low knowledge regarding HIV. The mean (SD) of the knowledge of HIV is 58.01 (11.25) with a minimum of 35.25% and maximum of 100%.

Table 7. Attitude of HIV.

Variable	Mean (SD)	Minimum - Maximum
Domain 1: Desire for knowledge regarding HIV/AIDS	24.75 (4.71)	0-35
Domain 2: General stigma towards HIV/AIDS	10.88 (1.79)	4-15
Domain 3: Medicine & stigma towards HIV/AIDS	22.47 (3.61)	13-30
Domain 4: Emotions & fears regarding HIV/AIDS	13.44 (2.30)	5-20
Domain 5: HIV/AIDS related medical protocol	12.90 (2.89)	6-24
Total	84.60 (10.14)	41-106

Table 7 shows the mean score of MUCM students about the attitude of HIV in different domains. For Domain 1 (Desire for knowledge regarding HIV/AIDS), a mean score of 24.75 (SD=4.71) is obtained and the range is from 0 to 35. For Domain 2 (general stigma towards HIV/AIDS), a mean score of 10.88 (SD=1.79) was obtained and the range is between 4-15 for this domain. For domain 3 (medicine and stigma

towards HIV/AIDS), a mean score of 22.47 (SD=3.61) was obtained with range of 13-30. For domain 4 (Emotion and fears regarding HIV/AIDS), a mean score of 13.44 (SD= 2.30) was obtained and the range is 5-20. For domain 5 (HIV. AIDS related medical protocol), the mean score is 12.90 (SD=2.89) and the range is 6-24. The total for the mean (SD) among 5 domains is 84.60 (SD=10.14) and the total range is 41 to 106).

Table 8. Association between demographics & knowledge of HIV/AIDS.

Independent variables	Knowledge Percentage Mean (SD)	Mean Difference (95 CI)	P value
Gender			
Male	58.74 (10.75)	-1.28 (-4.92, 2.36)	0.489
Female	57.46 (11.65)		
Age			
< 22	55.85 (12.81)	-4.77 (-8.31, -1.22)	0.009
≥22	60.61 (8.40)		
Nationality			
Malaysian	58.14 (11.40)	3.24 (-6.04, 12.51)	0.492
Non - Malaysian	54.90 (6.08)		
Religion			
Muslim	63.14 (17.71)		0.478
Christian	57.24 (11.48)		
Hindu	57.75 (10.56)		
Buddhist	57.21 (9.85)		
Others	57.65 (4.92)		
Academic year			
Pre - clinical	55.38 (12.57)	5.71 (2.20, 9.22)	0.002
Clinical	61.09 (8.57)		
Parent's occupation			
Health care worker	57.49 (12.91)	0.76 (-2.93, 4.46)	0.684
Other occupation	58.31 (10.08)		
Family Income			
< 4000	58.44 (11.05)		0.528
4000 - 10000	56.99 (9.64)		
> 10000	59.32 (13.63)		

Table 8 shows the association of demographics and knowledge of HIV/AIDS. Demographics include gender, age, nationality, religion, academic year, parent's occupation and family income. Male students have a mean score (SD) of 58.74 (10.75) while female students have a mean score (SD) of 57.46 (11.65). The mean difference (95% CI) is -1.28 (-4.92, 2.36). The P value shows 0.489 which is more than 0.05 therefore shows that there is no significant association between gender and knowledge of HIV/AIDS. Students age less than 22 have a mean score (SD) of 55.85 (12.81) while students equal to or more than 22 years old have a mean score (SD) of 60.61 (8.40). The mean difference (95% CI) is -4.77 (-8.31, -1.22). The P value shows 0.009 which is less than 0.05 therefore shows that there is a significant association between age and knowledge of HIV/AIDS. Malaysian students show a mean score (SD) of 58.14 (11.40) while Non-Malaysian students show a mean score (SD) of 54.90 (6.08). The mean difference (95% CI) is 3.24 (-6.04, 12.51) with P value shows 0.492 which is more than 0.05 therefore shows that there is no significant association between nationality and knowledge of HIV/AIDS.

Next demographic characteristic is religion, muslim students have a mean score (SD) of 63.14 (17.71), students that are christians shows a mean score (SD) of 57.24 (11.48), students that are hindu shows a mean score (SD) of 57.75 (10.56), students that are buddhist shows a mean score (SD) of 57.21 (9.85), while the other students shows a mean score (SD) of 57.65 (4.92). The P value shows 0.478 which is more than 0.05 therefore shows that there is no significant association between religion and knowledge of HIV/AIDS. Coming on to the association of academic year and knowledge of HIV/AIDS, preclinical students show a mean score (SD) of 55.38 (12.57) while clinical students show a mean score (SD) of 61.09 (8.57). The mean difference (95% CI) is 5.71 (2.20, 9.22) with P value of 0.002. P value is less than 0.05, therefore rejecting the null hypothesis, showing that there is a significant association between academic year and knowledge of HIV/AIDS. For parent's occupation, those students that have parent's working as healthcare professionals show a mean score (SD) of 57.49 (12.91) while those with parents working in other fields show a mean score (SD) of 58.31 (10.08). The mean difference (95% CI) is 0.76

(-2.93, 4.46) with P value of 0.684 which is more than 0.05 therefore shows that there is no significant association between parent's occupation and knowledge of HIV/AIDS. Next is family income, students with family income less than RM4000 has a mean score (SD) of 58.44 (11.05), students with family income between RM4000 to RM10000 has a mean score (SD) of 56.99 (9.64) while students with family income more than RM10000 has mean score of 59.32 (13.63). The P value for association between family income and knowledge of HIV/AIDS is 0.528, which is more than 0.05 which means accepting null hypothesis, therefore there is no significant association between family income and knowledge of HIV/AIDS.

Table 9. Association between demographic & attitude towards HIV/AIDS.

Independent variables	Attitude Mean (SD)	Mean Difference (95 CI)	P value
Gender			
Male	86.39 (7.69)	-3.16 (-5.41, 0.09)	0.056
Female	83.23 (11.53)		
Age			
< 22	82.78 (10.95)	-4.01 (-7.22, -0.80)	0.015
≥22	86.79 (8.64)		
Nationality			
Malaysian	84.64 (10.22)	0.80 (-7.57, 9.17)	0.849
Non - Malaysian	83.83 (8.54)		
Religion			
Muslim	81.07 (10.35)	0.017	
Christian	80.31 (13.40)		
Hindu	87.03 (7.09)		
Buddhist	84.57 (10.41)		
Others	91.20 (6.71)		
Academic year			
Pre - clinical	82.62 (10.92)	4.31 (1.11, 7.50)	0.009
Clinical	86.93 (8.64)		
Parent's occupation			
Health care worker	81.68 (12.47)	4.83 (1.58, 8.07)	0.004
Other occupation	86.51 (7.77)		
Family Income			
< 4000	87.19 (6.92)	0.093	
4000 - 10000	82.85 (10.39)		
> 10000	85.66 (11.14)		

Table 9 shows the association of demographics and attitude towards HIV/AIDS. Demographics include gender, age, nationality, religion, academic year, parent's occupation and family income. Male students have a mean score (SD) of 86.39 (7.69) while female students have a mean score (SD) of 83.23 (11.53). The mean difference (95% CI) is -3.16 (-5.41, 0.09). The P value shows 0.056 which is more than 0.05 therefore shows that there is no significant association between gender and attitude towards HIV/AIDS. Students age less than 22 have a mean score (SD) of 82.78 (10.95) while students equal to or more than 22 years old have a mean score (SD) of 86.79 (8.64). The mean difference (95% CI) is -4.01 (-7.22, -0.80). The P value shows 0.015 which is less than 0.05 therefore shows that there is a significant association between age and attitude towards HIV/AIDS. Malaysian students show a mean score (SD) of 84.64 (10.22)

while Non-Malaysian students show a mean score (SD) of 83.83 (8.54). The mean difference (95% CI) is 0.80 (-7.57, 9.17) with P value shows 0.849 which is more than 0.05 therefore shows that there is no significant association between nationality and attitude towards HIV/AIDS. Next demographic characteristic is religion, muslim students have a mean score (SD) of 81.07 (10.35), students that are christians shows a mean score (SD) of 80.31 (13.40), students that are hindu shows a mean score (SD) of 87.03 (7.09), students that are buddhist shows a mean score (SD) of 84.57 (10.41), while the other students shows a mean score (SD) of 91.20 (6.71). The P value shows 0.017 which is less than 0.05 therefore shows that there is a significant association between religion and attitude towards HIV/AIDS. Coming on to the association of academic year and attitude towards HIV/AIDS, preclinical students show a mean score (SD) of 82.62 (10.92) while clinical students show a mean score (SD) of 86.93 (8.64). The mean difference (95% CI) is 4.31 (1.11, 7.50) with P value of 0.009. P value is less than 0.05, therefore rejecting the null hypothesis, showing that there is a significant association between academic year and attitude towards HIV/AIDS. For parent's occupation, those students that have parent's working as healthcare professionals show a mean score (SD) of 81.68 (12.47) while those with parents working in other fields show a mean score (SD) of 86.51 (7.77). The mean difference (95% CI) is 4.83 (1.58, 8.07) with P value of 0.004 which is less than 0.05 therefore shows that there is a significant association between parent's occupation and attitude towards HIV/AIDS. Next is family income, students with family income less than RM4000 has a mean score (SD) of 87.19 (6.92), students with family income between RM4000 to RM10000 has a mean score (SD) of 82.85 (10.39) while students with family income more than RM10000 has mean score of 85.66 (11.14). The P value for association between family income and knowledge of HIV/AIDS is 0.093, which is more than 0.05 which means accepting null hypothesis, therefore there is no significant association between family income and attitude towards HIV/AIDS.

4. Discussion

The objective of this cross sectional study was to identify the current knowledge about HIV/AIDS and attitudes towards People Living With HIV/AIDS amongst preclinical and clinical year medical students. The study also attempts to determine the relationship between parent occupation, family history of HIV/AIDS, exposure towards subjects from various sources and the knowledge and attitudes of undergraduate medical students of Manipal University College Malaysia on HIV/AIDS and PLWHA. According to our study, students, 3.29%, have high knowledge regarding

HIV, 32.24% have moderate knowledge regarding HIV and 64.47% have low knowledge regarding HIV. This shows that most of the undergraduate students have a low knowledge regarding HIV/AIDS. This finding is similar to a finding found in a study done by Baytner-Zamir *et al.* found that the Students' basic knowledge of HIV treatment showed substantial misconceptions with respect to the possibility of preventing HIV infection after exposure. More than 40% of students did not know that HIV infection can be prevented after unprotected sexual intercourse or after a prick from an infected needle. More than 50% of students did not know that prevention of HIV transmission from mother to child during pregnancy and labour was possible. [20] This highlights the need for medical ethics education to be integrated into the curriculum of universities. Many medical schools in the West have vigorously incorporated medical ethics into their curriculum. Similar vigor is often lacking in medical schools in other parts of the world including Malaysia. In one of the private medical schools surveyed in this study, medical ethics regarding HIV/AIDS were not taught exclusively as a topic in the curriculum. [17, 18, 19].

When observing the different sources of HIV/AIDS information selected by the students, from books, medical literatures and teachers, and the percentage is 76.97%, 76.3% and 73.68% each respectively; Some of them also get the information of it from newspaper (63.8%), radio/television (57.89%) and doctors (65.13%). The most popular choices were from books, medical literature and teachers. This data differs from the data gathered by a previous study conducted in Israel where they found that popular media (such as newspapers, TV and radio) was the most popular choice. [20] This finding is not surprising since the population we gathered the data from was from undergraduate medical students. [20] In Malaysia, the most common cause for HIV transmission is Intravenous drugs users, Prostitutes and heterosexual relations [45], 94.74% of participants in the study were able to identify that these were the most common caused for HIV transmission in Malaysia. These results are not surprising as there is a well known stigma towards the association of IVDUs, Prostitutuion, heterosexual relations and HIV/AIDS. [21-27] The overall knowledge of HIV transmission and non-transmission routes were generally high among all the students of MUCM. However, there were 3 misconceptions; Breastfeeding, Saliva, Tattoo & Piercings. 69.08% of students knew that breastfeeding was one of the routes of transmission. 61.84% of the students in MUCM knew that HIV could spread via saliva, this figure is the lowest amongst the knowledge of transmission routes of HIV. This result is also seen in a study by Chemtob and colleagues among Israeli adults where 29% thought HIV can be spread via saliva. [13] In view of a previous study done in Israel, it

was found that only 36.6% knew that breastfeeding was one of the routes of HIV transmission. [20] It was also reported in the study that knowledge of breastfeeding as a transmission route for HIV was even lower in a study among first-year nursing students in Turkey and that a study among Korean dentists, only 28% knew breast milk is a transmission route for HIV. [28] Although results among MUCM students were higher than those of their counterparts in other countries, it was relatively lower than the knowledge of other routes of transmission. 72.3% of students knew that tattooing and piercings were a route of transmission for HIV. This figure was surprisingly lower than expected because most of the students knew that IVDUs were a common method of transmission and that it was because of the sharing of contaminated needles which is a similar case for tattooing and piercing.

There was a significant gap in the students' basic knowledge of HIV treatment and prevention methods. 83% of students knew that HIV treatment could prolong the life expectancy of PLWHA. However, only 53.95% of participants knew that the chance of getting HIV could be lowered if treatment is given on time after conducting unprotected sexual intercourse and only 55.92% knew that the chance of HIV infection after exposure could be lowered if treatment is given on time after a prick from an infected needle. These figures are alarming as one would expect the knowledge of HIV/AIDS in medical students to be close to 100%, and this was not demonstrated in this study.

Important information like universal precautions, proper prevention methods like post-exposure prophylaxis should be at the fingertips of medical students when they come into contact with patients. Thus, it's important to provide this information to students early in their pre-clinical studies and repeated along their course in order to consolidate the information in the minds of students. A study by Najem and Okuzu concluded that because of misperceptions by a medical professional, there was an adverse impact on the willingness of students to have close contact with PLWHA which in turn will interfere with their ability to provide medical care for PLWHA. [30].

Findings revealed that 90% of students had a strong desire to gain knowledge about HIV/AIDS. It was also found that a majority (67%) of participants felt that the professional education they received gave them enough information to confidently work with people who have HIV/AIDS. This data contradicts the data gathered by previous studies. A study among final-year medical students and pharmacy students done by Ahmen and colleagues found that most students showed fear of incompetence in the treatment, care or even counselling of patients. [31] These findings were similar to findings found in studies among medical students

in other countries. [32-35] This could be because the syllabus taught in MUCM is different than that of the syllabus taught in other countries which give the students in MUCM confidence in their knowledge on HIV/AIDS. The data revealed that a large majority (83%) stated that the possibility of working with people who have HIV/AIDS would play a role in their choice of place of residence. This is a grossly high figure that shows that a large percentage of students would avoid working in a place known to have HIV/AIDS if given the chance.

Findings revealed that the majority of students did not have a positive attitude towards PLWHA. The presence of stigmatising attitudes towards PLWHA was not lost in MUCM students. In this study, it was demonstrated that 57% of students believed that there should be routine screening done on immigrants for HIV. This data is supported by a previous study done in Israel where it showed half the students believed that there should be routine screening done on immigrants. Furthermore, almost $\frac{3}{4}$ of the students (72%) agreed that people with HIV/AIDS should be prohibited from having sexual relations. This is nearly 4 times more than that of the results seen in the study done in Israel. [20] In this study, 84% of participants believed that all the other students should be informed if someone from their course has contracted HIV/AIDS. 84% of students believed that a physician who is HIV-positive should not be allowed to work even with the appropriate precautions. 57% of students believed that they have the right to refuse treating a patient with HIV/AIDS. 26% of students wished that they would not have to treat HIV/AIDS patients. 45% of students believed that physicians should have the right to refuse treatment of HIV/AIDS patients. This highly alarming finding demonstrates that there is a strong stigmatising and undeniable prejudiciary attitude towards PLWHA among the medical students in MUCM.

Perhaps this behavior stems from the association of shame and HIV as mentioned by Baytner-Zamir and colleagues where they find that because of the notion that there is an association of HIV with particular groups like IDUs, to immoral or promiscuous behavior and to a fear of the social rejection that might follow a positive HIV diagnosis. For example, a study among medical students in China concluded that the stigma of IDU and CSW was embedded within being HIV-positive. In a study among HIV-positive adults, individuals were seen as 'contaminated' and linked to the stereotypes of promiscuity, drug use and homosexuality. [36].

In this study, it revealed that medical students have a high level of fear towards HIV/AIDS. More than half (56%) of students felt that health care workers in Malaysia are at a higher risk of acquiring HIV infection. This perception of risk is highly exaggerated as the actual risk is quite small

when implementing the proper precautions. In actuality, the risk of healthcare workers of occupationally acquired HIV infection after percutaneous exposure to HIV infected blood is approximately 0.36% [27, 37]. With this being said, concerns and fears regarding the risk of acquiring HIV infections occupationally is well documented in medical literature. [30, 31] Close to $\frac{2}{3}$ of the students (65%) felt that working with HIV/AIDS would endanger their own health. This data is supported by Kopacz DR et al where they found that more than 60% of 2nd year medical students expressed concern that working with PLWHA might be hazardous. [33].

A very concerning finding is that students showed a nearly complete lack of awareness regarding HIV protocol in Malaysia. Findings show that 86% of students feel that all patients admitted into hospital should be tested for HIV with similar trends found in studies among medical students, pharmacology students and nurses. [33, 31, 38, 39] In the real world, there is no necessity to perform HIV screening for all patients admitted to hospital as it does not reduce the risk of occupational exposure. Even more so, routine HIV testing is not valid economically as compared to universal precautions as stated by Lawrence VA et al. [40]. 55% of students in this study believed that they had the right to inform the sexual partner of an HIV-positive patient against the wishes of the patient while 78% of the participants believed that they had the right to disclose this information of other medical staff. This trend is seen in the study done by Baytner Zamir et al. Mohsin and colleagues found that 77% of first and second year medical students would inform the spouse of PLWHA even if forbidden to do so by the patient [35]. This belief is directly contradictory to Malaysian law regarding medical confidentiality (Malaysian Medical Council (MMC) revised guidelines on Confidentiality October 2011), which states that patients have the right to expect that there will be no disclosure of any personal information, which is obtained during the course of a practitioner's professional duties, unless they give consent as well as the professional duty of confidentiality covers not only what a patient may reveal to the practitioner, but also what the practitioner may independently conclude or form an opinion about. It is also stated that the practitioner can disclose personal information if: (a) it is required by law; (b) the patient consents – either implicitly for the sake of their own care or expressly for other purposes; or (c) it is justified in the public interest. [46].

In our study, we found that there was no significant association between gender, nationality, religion, parents occupation, family income and knowledge towards HIV/AIDS. However, there was a significant association between age and knowledge, the students who are more than or equal to 22 years old had significantly higher knowledge than those of the younger students. The students who were in

clinical years had significantly higher knowledge than those in pre-clinical years. This finding was similarly found by Baytner *et al.* where they stated that, when comparing between the medical years, knowledge of the non-transmission route by mosquito bites statistically improved ($p < 0.001$) from first, second to third year (69.8%, 72.6% and 77.7%, respectively). A statistically significant improvement was found in all four items of basic knowledge of HIV/AIDS treatment. This substantiates the association found in our study where students in clinical years and are older had significantly better results on knowledge about HIV/AIDS than those of students in pre-clinical years and are younger. [20].

In our study, we also found that there was no significant association between gender, nationality, family income and attitudes towards HIV/AIDS. However, there was a significant association between age and attitudes, the older students had a significantly better attitude towards PLWHA than that of the younger students. A significant association was also found between religion and attitude towards HIV/AIDS. Religions categorised under "others" had the highest score followed by Hinduism, Buddhism, Muslim and finally Christianity. Among MUCM students, clinical year students had better attitudes towards HIV/AIDS as compared to the students in pre clinical years. It was also found that students whose parent's occupation who were not in health-care had higher attitude scores than those of students whose parents were working in health-care. In a study done by Baytner and colleagues, they stated that when comparing among students from the three medical years, only one of the items showed a statistically significant change. A statistically significant difference was found regarding the statement that 'if given a choice, I would prefer not to treat PLWHA': 20.4%, 16.8% and 26% of first-, second- and third-year students respectively agreed with this statement ($p = 0.036$). This once again points out that, as students become older, they're perception and attitude about HIV/AIDS improved as they no doubt matured as they became older and became more exposed as they transitioned from preclinical to clinical year students. [20].

Few limitations were encountered by us during the course of this study. Firstly, this study consists of a subset of 152 samples obtained by purposive sampling from the population of Manipal University College Melaka thus the results might not be representative, so has a reduced internal validity. Moreover, since our study was only conducted within the students of Manipal University College Melaka, the result of study may not be generalizable and in concordance with other institutions [21]. Next, this questionnaire was also done via google forms, which would give the participants a chance to find out the answers through the internet while answering

them, thus may provide answers which are desired by the researcher instead of answering with their own conviction [41]. Furthermore, the current research was cross-sectional, so the changes overtime in adequacy of knowledge and betterment of attitude will not be able to be observed. Lastly, students may have negligently answered the questionnaire due to attending clinical posting sessions which are time consuming.

Based on our research finding, only 3.29% of students had a high level of knowledge about HIV/AIDS, about 32.24% of students had moderate knowledge and unfortunately 64.47% of students had low knowledge about HIV/AIDS. To overcome the lack of knowledge regarding HIV/AIDS and the negative attitude seen in students towards people living with HIV/AIDS (PLWHA), the approach should be taken at multiple levels. To begin with, knowledge of HIV/AIDS should be provided beginning from secondary schools in Malaysia [42]. This will lead to a better understanding of the condition within students so that, when entering medical school, they will already have a foundation on the topic and the stigmatising notion towards the disease will be abolished. Only when such stigmatising attitude is put to an end, PLWHA will be able to receive better treatment without any discrimination from doctors. Next, HIV/AIDS information must be made spread out and given in depth so that the students' understanding towards HIV/AIDS becomes better over time [43]. At the level of the institution, in-depth interviews can be done to identify the reason medical students have negative attitudes and eradicate the reasons [21]. During this in depth interview, the interviewer may also provide an insight to HIV/AIDS and PLWHA which will expose the student and widen their horizon if view regarding the matter. The institution also needs to incorporate issues on HIV/AIDS, its stigma and discrimination into the curriculum to improve training of medical students [44]. Once in a while, the institution should arrange for an engaging talk on the clinical insight from a practising doctor about HIV/AIDS so that the students learn about the current advancement of treatment for HIV/AIDS. This will indirectly reduce stigma and fear of students to work with PLWHA in the future. Moving on, our study mainly consisted of knowledge and attitude components but there was no further information regarding perception components. As an example, we could have added a questionnaire perception of students of Melaka Manipal Medical towards HIV/AIDS. Through this we could have made an association on perception and knowledge which will manifest in the attitude of the students. Besides that, we could have also found out measures to make a positive perception towards HIV/AIDS and PLWH, which will alter and minimise or completely prevent any discrimination towards the patients by the future doctors.

Since our study only includes undergraduate medical study from only one campus, we suggest future researchers plan and construct a research on students from different institutions to get a more generalizable result.

5. Conclusion

To conclude, students mainly used resources like books, medical literature and teachers, and the percentage is 76.97%, 76.3% and 73.68% each respectively to gather information regarding HIV/AIDS. Most of the students had high knowledge on the most common route of transmission of HIV/AIDS in Malaysia but they had low knowledge on other transmission routes like breastfeeding and saliva. Next, students knew that HIV/AIDS vertical transmission from mother to fetus during pregnancy can be treated but they had low knowledge on treatment given after unprotected sex with HIV positive individual and on post exposure prophylaxis treatment after a needle prick injury. Moving on to the attitude of students, based on the results most students have shown increased desire for knowledge regarding HIV/AIDS. Which indicates that, although the students mostly may have low to moderate knowledge on HIV/AIDS BUT they are still willing to learn more to help themselves and the PLWHA community. Although there is a general sense of wanting to learn about the subject, there is a strong general stigmatising notion that is embedded in the minds of most medical students. Even though most of them would have a friendship with PLWHA but majority of the students have agreed that PLWHA should be prohibited from having any sexual relationships which still indicates that the attitude may have a positive reflection but the stigma is still imbedded. As for medicine and stigma towards HIV/AIDS is concerned, even if almost half the students have said that they have the right to refuse treating patients with HIV/AIDS, more than half the students have said they will treat them. This shows that the students do have empathy for PLWHA and wish to help despite the general

stigma. The study also yielded information about emotions and fears regarding HIV/AIDS that the students have. Most of them associated HIV/AIDS with shame but majority also stated that they would not be reluctant to treat PLWHA which means that the medical students have a sense of duty towards all patients with HIV/AIDS but at the same time will make sure to take adequate precautions not to get infected with the disease themselves. As far as medical protocols are concerned, most students want all the patients to get tested for HIV and they also want to be informed about the patient's HIV status if positive even if the patient is against it. This is possibly because the medical students that are warned would be extra cautious and careful when dealing with patients with HIV/AIDS. The results of this study has proven how significantly important it is for future doctors to have a strong medical knowledge on HIV/AIDS not only because it is needed to treat the patient but also it will help break stigmas which will prevent any discrimination towards the patient. Through knowledge many myths on HIV/AIDS will be destigmatized, hence more information needs to reach medical students on HIV/AIDS for the benefits of patients with HIV/AIDS.

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Appendix

A Cross Sectional Study on knowledge and attitude regarding HIV/AIDS among students of Melaka Manipal Medical College

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Dear participants,

You are invited to take part in a research project which aims to investigate the knowledge and attitude regarding HIV/AIDS among students of Melaka Manipal Medical College. This survey form includes demographic information and validated questionnaires to assess the following study. This survey will take approximately 5-10 minutes to complete. Participation in

this study is completely voluntary. You have the right to deny and/or withdraw from the study at any time without giving any reason, and this will not have a negative impact on you in any way. Your responses will be kept confidential and anonymous. Results of the study will be reported as a total picture and not individually.

If you have any questions about this form or any other study-related issue, kindly contact the investigator below:

Name: Lee Rane Meira

Contact number: +60112781163

Email: 171303521@scholar.manipal.edu.my

We would like to thank you for your time and participation.

Consent

I have read the above information. I am 18 years of age or older. I consent to participate in the study as titled above of my own free will. I further understand that I have the freedom to choose not to participate in the study. No reward or inducement has been offered to me to participate as a volunteer in the study.

Signature _____

Date _____

Thank you so much for your participation.

1) Demographic Information:

1.1) Gender: 1. Male 2. Female

1.2) Age: _____

1.3) Nationality: 1. Malaysian 2. Non- Malaysian

1.4) Religion

1. Muslim

2. Christian

3. Hindu

4. Buddhist

5. Other: _____

1.5) Academic year:

1. Preclinical

2. Clinical

1.6) Parent's occupation

1. Healthcare professional

2. Others: _____

1.7) Family Income

1. <RM 4000

2. RM 4000 - RM10000

3. > RM1000

2) Background:

2.1) Do you have any personal acquaintance with a person with HIV/AIDS:

1. Yes

2. No

2.2) The information I have regarding HIV/AIDS comes from the following sources (you may mark more than one answer):

1. Newspapers 2. Magazines 3. Books 4. Medical literature
5. Radio/TV 6. Friends 7. Parents 8. Teachers 9. Doctors
10. Publications on the matter (flyers, ads) 11. Other: _____

2.3) I was exposed to information regarding HIV/AIDS in the course of my studies:

1. Yes 2. No

2.4) I was given this information on year/years:

1. First 2. Second 3. Third

In the course of the following courses: _____

2.5) In the course of my studies, I got the chance to meet a person with HIV/AIDS:

1. Yes 2. No

2.6) I was exposed with information regarding HIV/AIDS in social media

1. Yes 2. No

3) Knowledge:

Mark the answer you believe to be most correct:

3.1) In Malaysia, the most common cause for HIV transmission is (mark only one answer):

1. Prostitutes 2. Intravenous drug users 3. Homosexual relations 4. Heterosexual relations
5. Tattoos and piercings 6. Dental treatments 7. Transmission from mother to fetus

HIV can be transmitted through:

	Yes	No
3.2) Sexual relations	1	0
3.3) Infected syringes and needles	1	0
3.4) Blood transfusion	1	0
3.5) Mother to child during pregnancy and labor	1	0
3.6) Mother to child via breastfeeding	1	0
3.7) Handshake	0	1
3.8) Mosquito bites	0	1
3.9) Toilets	0	1
3.10) Hugging a person with HIV	0	1
3.11) Saliva of a person with HIV/AIDS	0	1
3.12) Using the same tableware used by a person with HIV/AIDS	0	1
3.13) Piercings and tattoos	0	1

Possible treatments:

	Yes	No
3.14) Nowadays, it is possible to prevent HIV transmission from mother to fetus	1	0
3.15) The chance of HIV infection after exposure could be lowered if given on time after conducting unprotected sexual intercourse	1	0
3.16) The chance of HIV infection after exposure could be lowered if given on time after a prick from an infected needle	1	0
3.17) HIV treatment prolongs the life expectancy of people living with HIV/AIDS	1	0

Attitudes:

Mark the answer you find to be most correct according to your stances:

Questions	Highly agree	Agree	Disagree	Highly disagree
4.1) Only homosexuals could get HIV/AIDS	1	2	3	4
4.2) People with HIV/AIDS got what they deserve	1	2	3	4
4.3) It is hard for me to like people who exposed themselves and society to HIV/AIDS	1	2	3	4

Questions	Highly agree	Agree	Disagree	Highly disagree
4.4) People with AIDS should be quarantined	1	2	3	4
4.5) Sexual relations should be prohibited for those with HIV/AIDS	4	3	2	1
4.6) Students with HIV/AIDS should be expelled from medical studies	1	2	3	4
4.7) I avoid being among certain people or certain place due to HIV/AIDS	1	2	3	4
4.8) I would like to know more about HIV/AIDS	4	3	2	1
4.9) If I would have had HIV/AIDS, I would be ashamed of it	1	2	3	4
4.10) Other students should be notified if one of the medical students is HIV-positive	4	3	2	1
4.11) I would have a friendship with people with HIV/AIDS	4	3	2	1
4.12) A physician who is HIV-positive should be allowed to work (with the appropriate precautions)	4	3	2	1
4.13) I believe I have the full right to refuse treating a person with HIV/AIDS	1	2	3	4
4.14) I would refuse treating persons with HIV/AIDS	1	2	3	4
4.15) I wish not to treat persons with HIV/AIDS	1	2	3	4
4.16) All patients admitted to the hospital should be tested for HIV	1	2	3	4
4.17) I am concerned that in the future it would be found that HIV infection can be transmitted in ways now thought to be safe	4	3	2	1
4.18) Patients are entitled to know their physicians' HIV status	4	3	2	1
4.19) All physicians should be HIV tested	4	3	2	1
4.20) Health care workers have the right to know their patients' HIV status	4	3	2	1
4.21) I would have informed the sexual partner of an HIV positive person about their partners HIV status, even against that patient's request	1	2	3	4
4.22) I would warn other medical staff about a patient's HIV status even against that patient's request	1	2	3	4
4.23) I would inform an employer about his employee's HIV status, even against the patient's request	1	2	3	4
4.24) If given a choice, I would prefer not to treat people with HIV/AIDS	1	2	3	4
4.25) Many of the health care workers in Malaysia are at a high risk of acquiring HIV at work	1	2	3	4
4.26) Physicians have the right to refuse treating patients diagnosed with HIV/AIDS	1	2	3	4
4.27) There should be routine screening of immigrants for HIV	1	2	3	4
4.28) If, as intern, you had to care for a person with HIV/AIDS, would you feel anxious?	1	2	3	4
4.29) If as intern, you had to care for a person with HIV/AIDS, would you feel reluctant?	1	2	3	4
4.30) I am concerned that working with people who have HIV/AIDS may endanger my health	1	2	3	4
4.31) The professional education I received gave me enough information to confidently work with people who have HIV/AIDS	4	3	2	1
4.32) The possibility of working with persons with HIV/AIDS will play a role in my choice of specialty	1	2	3	4
4.33) The possibility of working with people who have HIV/AIDS will play a role in my choice of place of residence.	1	2	3	4

Thank you so much for your participation.

References

- [1] Baytner-Zamir R, Lorber M, Hermoni D. Assessment of the knowledge and attitudes regarding HIV/AIDS among pre-clinical medical students in Israel. *BMC research notes*. 2014 Dec; 7 (1): 1-2.
- [2] Morris RE, Turgut E. Human immunodeficiency virus: Quantifying the risk of transmission of HIV to dental health care workers. *Community Dent Oral Epidemiol*. 1990; 18: 294-8. [PubMed] [Google Scholar].
- [3] Erasmus S, Luiters S, Brijlal P. Oral Hygiene and dental student's knowledge, attitude and behaviour in managing HIV/AIDS patients. *Int J Dent Hyg*. 2005; 3: 213-7. [PubMed] [Google Scholar].
- [4] Oliveira E, Narendran S, Falcão A. Brazilian dental students' knowledge and attitudes towards HIV infection. *AIDS Care*. 2002; 14: 569-76. [PubMed] [Google Scholar].
- [5] Ryalat ST, Sawair FA, Shayyab MH, Amin WM. The knowledge and attitude about HIV/AIDS among Jordanian dental students: (Clinical versus pre clinical students) at the University of Jordan. *BMC Res Notes*. 2011; 4: 191. [PMC free article] [PubMed] [Google Scholar].

- [6] Tuchinda S, Chotpitayasunondh T, Teeraartkul A. Knowledge, attitudes, and practices of senior high school students regarding human immunodeficiency virus infection. *J Thai Med Assoc* 1998; 81: 130-5.
- [7] World Health Organization. *Fact Sheet HIV/AIDS*. [[Last accessed on 2018 Oct 26].
- [8] Trivedi AN, Ayanian JZ. Perceived discrimination and use of preventive health services. *J Gen Intern Med*. 2006; 21: 553-8.
- [9] Van Ryn M, Fu SS. Paved with good intentions: Do public health and human service providers contribute to racial/ethnic disparities in health? *Am J Public Health*. 2003; 93: 248-55.
- [10] Ding L, Landon BE, Wilson IB, Wong MD, Shapiro MF, Cleary PD, et al. Predictors and consequences of negative physician attitudes toward HIV-infected injection drug users. *Arch Intern Med*. 2005; 165: 618-23.
- [11] Royse D, Birge B. Homophobia and attitudes towards AIDS patients among medical, nursing, and paramedical students. *Psychol Rep*. 1987; 61: 867-70.
- [12] Gordin FM, Willoughby AD, Levine LA, Gurel L, Neill KM. Knowledge of AIDS among hospital workers: Behavioral correlates and consequences. *AIDS*. 1987; 1: 183-8.
- [13] Ficarrotto TJ, Grade M, Bliwise N, Irish T. Predictors of medical and nursing students' levels of HIV-AIDS knowledge and their resistance to working with AIDS patients. *Acad Med*. 1990; 65: 470-1.
- [14] Tesch BJ, Simpson DE, Kirby BD. Medical and nursing students' attitudes about AIDS issues. *Acad Med*. 1990; 65: 467-9.
- [15] Bektaş HA, Kulakaç O. Knowledge and attitudes of nursing students toward patients living with HIV/AIDS (PLHIV): A Turkish perspective. *AIDS Care*. 2007; 19: 888-94.
- [16] Lui PS, Sarangapany J, Begley K, Coote K, Kishore K. Medical and nursing students perceived knowledge, attitudes, and practices concerning human immunodeficiency virus. [[Last cited on 2018 Feb 11]]; *ISRN Public Health*. 2014 2014: 1-9.
- [17] Choy KK, Rene TJ, Khan SA. Beliefs and attitudes of medical students from public and private universities in Malaysia towards individuals with HIV/AIDS. *Scientific World Journal*. 2013; 2013: 462826.
- [18] World Health Organization Regional Office for South-East Asia New Delhi. *Teaching HIV/AIDS in Medical Schools*. World Health Organization, New Delhi, India, 1999.
- [19] Lehmann LS, Kasoff WS, Koch P, Federman DD. A survey of medical ethics education at U.S. and Canadian medical schools. *Academic Medicine*. 2004; 79 (7): 682-689.
- [20] Mattick K, Bligh J. Teaching and assessing medical ethics: where are we now? *Journal of Medical Ethics*. 2006; 32 (3): 181-185.
- [21] Baytner-Zamir, R., Lorber, M. & Hermoni, D. Assessment of the knowledge and attitudes regarding HIV/AIDS among pre-clinical medical students in Israel. *BMC Res Notes* 7, 168 (2014). <https://doi.org/10.1186/1756-0500-7-168>
- [22] Herek GM: AIDS and stigma. *Am Behav Sci*. 1999, 42: 1106-1116. 10.1177/00027649921954787.
- [23] Herek GM, Capitanio JP: AIDS stigma and sexual prejudice. *Am Behav Sci*. 1999, 42: 1130-1147. 10.1177/00027649921954804.
- [24] Mawar N, Sahay S, Pandit A, Mahajan U: The third phase of HIV pandemic: social consequences of HIV/AIDS stigma & discrimination & future needs. *Indian J Med Res*. 2005, 122: 471-484.
- [25] Reidpath DD, Chan KY: A method for the quantitative analysis of the layering of HIV-related stigma. *AIDS Care*. 2005, 17: 425-432. 10.1080/09540120412331319769.
- [26] Zukoski AP, Thorburn S: Experiences of stigma and discrimination among adults living with HIV in a low HIV-prevalence context: a qualitative analysis. *AIDS Patient Care STDS*. 2009, 23: 267-276. 10.1089/apc.2008.0168.
- [27] Chan KY, Yang Y, Zhang KL, Reidpath DD: Disentangling the stigma of HIV/AIDS from the stigmas of drugs use, commercial sex and commercial blood donation – a factorial survey of medical students in China. *BMC Public Health*. 2007, 7: 280-10.1186/1471-2458-7-280.
- [28] Chan KY, Stoové MA, Sringernyuang L, Reidpath DD: Stigmatization of AIDS patients: disentangling Thai nursing students' attitudes towards HIV/AIDS, drug use, and commercial sex. *AIDS Behav*. 2008, 12: 146-157. 10.1007/s10461-007-9222-y.
- [29] Park JC, Choi SH, Kim YT, Kim SJ, Kang HJ, Lee JH, Shin SC, Cha YJ: Knowledge and attitudes of Korean dentists towards human immunodeficiency virus/acquired immune deficiency syndrome. *J Periodontal Implant Sci*. 2011, 41: 3-9. 10.5051/jpis.2011.41.1.3.
- [30] Chemtob D, Damelin B, Bessudo-Manor N, Hassman R, Amikam Y, Zenilman JM, Tamir D: 'Getting AIDS: not in my back yard'. Results from a national knowledge, attitudes and practices survey. *Isr Med Assoc J*. 2006, 8: 610-614.
- [31] Najem GR, Okuzu EI: International comparison of medical students' perceptions of HIV infection and AIDS. *J Natl Med Assoc*. 1998, 90: 765-774.
- [32] Ahmed SI, Hassali MA, Bukhari NI, Sulaiman SA: A comparison of HIV/AIDS-related knowledge, attitudes and risk perceptions between final year medical and pharmacy students: a cross sectional study. *HealthMED*. 2011, 5: 317-325.
- [33] Amalraj E, Chandrasekaran N, Solomon S, Sumbandam R: First-year medical students' AIDS knowledge and attitude. *Indian J Community Med*. 1995, 20: 36-40.
- [34] Kopacz DR, Grossman LS, Klamen DL: Medical students and AIDS: knowledge, attitudes and implications for education. *Health Educ Res*. 1999, 14: 1-6. 10.1093/her/14.1.1.
- [35] vans JK, Bingham JS, Pratt K, Carne CA: Attitudes of medical students to HIV and AIDS. *Genitourin Med*. 1993, 69: 377-380.
- [36] Mohsin S, Nayak S, Mandaviya V: Medical students' knowledge and attitudes related to HIV/AIDS. *Natl J Community Med*. 2010, 1: 146-149. 10.1038/ncomms1145.
- [37] Tokars JI, Marcus R, Culver DH, Schable CA, McKibben PS, Bandea CI, Bell DM: Surveillance of HIV infection and zidovudine use among health-care workers after occupational exposure to HIV-infected blood. *Ann Intern Med*. 1993, 118: 913-919. 10.7326/0003-4819-118-12-199306150-00001.

- [38] Panlilio AL, Cardo DM, Grohskopf LA, Heneine W, Ross CS: Updated U.S. Public Health Service guidelines for the management of occupational exposures to HIV and recommendations for postexposure prophylaxis. *MMWR Recomm Rep.* 2005, 54: 1-17.
- [39] Chew BH, Cheong AT: Assessing HIV/AIDS knowledge and stigmatizing attitudes among medical students in Universiti Putra Malaysia. *Med J Malaysia* Feb. 2013, 68: 24-29.
- [40] Wissen KA, Siebers RW: Nurses' attitudes and concerns pertaining to HIV and AIDS. *J Adv Nurs.* 1993, 18: 912-917. 10.1046/j.1365-2648.1993.18060912.x.
- [41] Lawrence VA, Gafni A, Kroenke K: Presentation preoperative HIV testing: is it less expensive than universal precautions?. *J Clin Epidemiol.* 1993, 46: 1219-1227. 10.1016/0895-4356(93)90084-E.
- [42] Platten, M., Pham, H. N. & Nguyen, H. V. Knowledge of HIV and factors associated with attitudes towards HIV among final-year medical students at Hanoi medical university in Vietnam. *BMC Public Health* 14, 265 (2014). <https://doi.org/10.1186/1471-2458-14-265>
- [43] Li L, Lin C, Wu Z, Wu S, Rotheram-Borus MJ, Detels R, Jia M: Stigmatization and shame: consequences of caring for HIV/AIDS patients in China. *AIDS Care.* 2007, 19 (2): 258-63. 10.1080/09540120600828473.
- [44] Pham HN, Protsiv M, Larsson M, Ho HT, de Vries DH, Thorson A: Stigma, an important source of dissatisfaction of health workers in HIV response in Vietnam: a qualitative study. *BMC Health Serv Res.* 2012, 12: 474-10.1186/1472-6963-12-474.
- [45] National Committee for AIDS, Drug, and Prostitution prevention and control: National strategy HIV/AIDS prevention and control 2010–2020 (Fifth draft). 2011, Hanoi.
- [46] <https://mmc.gov.my/wp-content/uploads/2019/11/Confidentiality-guidelines.pdf>