



## Attitude of future healthcare professionals towards Ebola virus disease

Ahmed A Albassam<sup>1</sup>, Muhammad Zahid Iqbal<sup>2</sup>, Fahad I Al-Saikhan<sup>1</sup>, Salah-Ud-Din Khan<sup>3</sup>, Muhammad Shahid Iqbal<sup>1</sup>✉

<sup>1</sup>Department of Clinical Pharmacy, College of Pharmacy, Prince Sattam bin Abdulaziz University, Al-kharj, 11942, Saudi Arabia

<sup>2</sup>Department of Clinical Pharmacy and Pharmacy Practice, Faculty of Pharmacy, AIMST University, 08100, Bedong, Kedah Darul Aman, Malaysia

<sup>3</sup>Department of Biochemistry, College of Medicine, Al Imam Mohammad Ibn Saud Islamic University, Riyadh, Saudi Arabia

### ✉Corresponding author

Department of Clinical Pharmacy, College of Pharmacy, Prince Sattam bin Abdulaziz University, Al-kharj, 11942, Saudi Arabia.

Email: m.javed@psau.edu.sa

### Article History

Received: 20 September 2020

Reviewed & Revised: 21/September/2020 to 14/October/2020

Accepted: 15 October 2020

E-publication: 23 October 2020

P-Publication: November - December 2020

### Citation

Ahmed A Albassam, Muhammad Zahid Iqbal, Fahad I Al-Saikhan, Salah-Ud-Din Khan, Muhammad Shahid Iqbal. Attitude of future healthcare professionals towards Ebola virus disease. *Medical Science*, 2020, 24(106), 3901-3910

### Publication License



This work is licensed under a Creative Commons Attribution 4.0 International License.

### General Note



Article is recommended to print as color digital version in recycled paper.

### ABSTRACT

*Objective:* The objective of the study was to determine the attitude of future healthcare professionals regarding the Ebola virus disease (EVD) in a medical university. *Method:* A cross-sectional study was conducted using a convenience sampling method. A self-developed and pre-validated tool was used to collect data from students studying in three healthcare faculties of a university in

Malaysia. The Statistical Package for Social Science (SPSS) Version 24.0 was used to analyze the data. *Results:* More female students 170 (62.3%) participated in the present study than the male students 103 (37.7%), out of a total of 273 studied students. The majority of the students who had a positive attitude towards EVD were from the final years than the pre-final year students. *Conclusion:* Overall positive attitude observed among the studied future healthcare professionals. The present study concluded that pharmacy students had a more positive attitude than the two other faculties students i.e. dentistry and medicine.

**Keywords:** Ebola virus disease, EVD, attitude, healthcare students.

## 1. INTRODUCTION

Ebola virus is a type of negative-strand RNA virus that causes severe and acute illness and is often fatal if untreated (Baseler *et al.*, 2017). Ebola virus disease (EVD) first appeared in 1976 in two simultaneous outbreaks (Goss and Goss, 2015). The first outbreak was in Yambuku, Democratic Republic of Congo, and the second was in Nzara, Sudan (Laupland and Valiquette, 2014). The infected persons with the virus established symptoms of hemorrhagic fever together with muscle aches (Baseler *et al.*, 2017). This virus is being transmitted through close contact with the blood secretions, organs, and other body fluids from infected persons (Katz and Tobian, 2014). The sign and symptoms of this disease are the onset of fever, intense weakness, muscle pain, headache, sore throat, diarrhea, and vomiting (Liu *et al.*, 2015).

Healthcare workers are exposed to patients with EVD, should wear appropriate personal protective equipment (Fischer *et al.*, 2015). Health officials should be notified immediately to the concerned authorities if the healthcare personnel had direct contact with the blood or body fluids of a person sick with EVD (Osterholm *et al.*, 2015). They must practice proper infection control and sterilization measures. There is no FDA approved antiviral are found to treat this disease (Yuan, 2015). Some primary interventions are used and believed to improve the recovery, such as providing intravenous fluids, balancing electrolytes, oxygen level and blood pressure maintained are essentials to remember while treating this disease patient (O'Keefe, 2016).

Thus the proper knowledge and positive attitude are required from the healthcare providers to manage this disease in patients (Abebe *et al.*, 2016). The students of all healthcare programs should have a positive attitude about the recommendations to treat this virus disease (Bah *et al.*, 2015). Student attitude plays a crucial role in controlling this disease. A positive attitude can lead to the proper prevention of the disease in the future (Iqbal *et al.*, 2016). They have to be aware of pandemics that are occurring all over the globe. They must have a positive attitude to control any epidemics in the upcoming future as well. The present study was conducted to evaluate the attitude of future healthcare providers in medical, dental, and pharmacy students on EVD in a private medical university in Malaysia.

## 2. MATERIALS AND METHODS

A self-developed study tool was used in this cross-sectional study. The study protocol regarding the confidentiality of the data was strictly followed. Data were collected by convenience sampling from those students who signed the consent and those who refused to sign the consent were excluded from the study. The data were collected from September 2014 to April 2018. Stratified convenience sampling was done to recruit student participants. A total of 310 participants from medical, dental, and pharmacy faculties were targeted under the stratified convenience sampling method. All of the study participants were asked to fully understand and carefully choose the right answer based on their best understanding. The participants' response was recorded using a Likert scale consisting of 5 options (points) i.e. strongly disagrees, disagree, neutral, agree, and strongly agree.

The Medical Ethics Committee of the university approved the study protocol. The attitude scoring criterion was adapted from a similar previous study (Aziz *et al.*, 2019). The scoring was ranged from 1 to 5. The scoring cut-off point were i)  $\leq 59\%$  = negative attitude, ii) 60-79% = neutral attitude and iii) 80-100% = positive attitude. The obtained scores were interpreted as a percentage to ease the data presentation.

### Statistical analyses

Data analyses and calculations were carried out using Statistical Package for Social Science (SPSS) version 24.0. Frequencies with percentages were calculated for the categorical variables and means with standard deviations were calculated for the continuous variables.

### 3. RESULTS

A total of 273 future healthcare providers from three faculties participated in the current study. Out of the total studied students, medical students were 84 (30.7%), dentistry students were 90 (33%) and pharmacy students were 99 (36.3%). In the gender distribution of the study participants, more female students participated in the study. According to the obtained results, the males were 103 (37.7%) and females were 170 (62.3%). The other demographic variables are presented in table 1. Regarding the year of study, pre-final year students were 135 (49.5%) and final year students were 138 (50.5%).

**Table 1** Demographic information of the students (N=273)

Variables	N(%)
<i>Year of study</i>	
Pre-final	135(49.5)
Final	138(50.5)
<i>Age</i>	
20-25 years	267(97.8)
26-30 years	4(1.5)
31-35 years	2(0.7)
<i>Race</i>	
Malay	3(1.1)
Chinese	184(67.4)
Indian	85(31.1)
Others	1(0.4)
<i>Education background</i>	
A-level	0
STPM	14(5.1)
Diploma	18(6.6)
Foundation	228(83.5)
Others	13(4.8)
<i>Residency</i>	
Hosteller	200(73.3)
Non-Hosteller	73(26.7)

STPM = Malaysian Higher School Certificate

Table 2 represents the total questions included in the study tool regarding the attitude of future healthcare professionals. There were five diverse questions asked from the study participants to evaluate their overall attitude about EVD.

**Table 2** Attitude questions regarding EVD

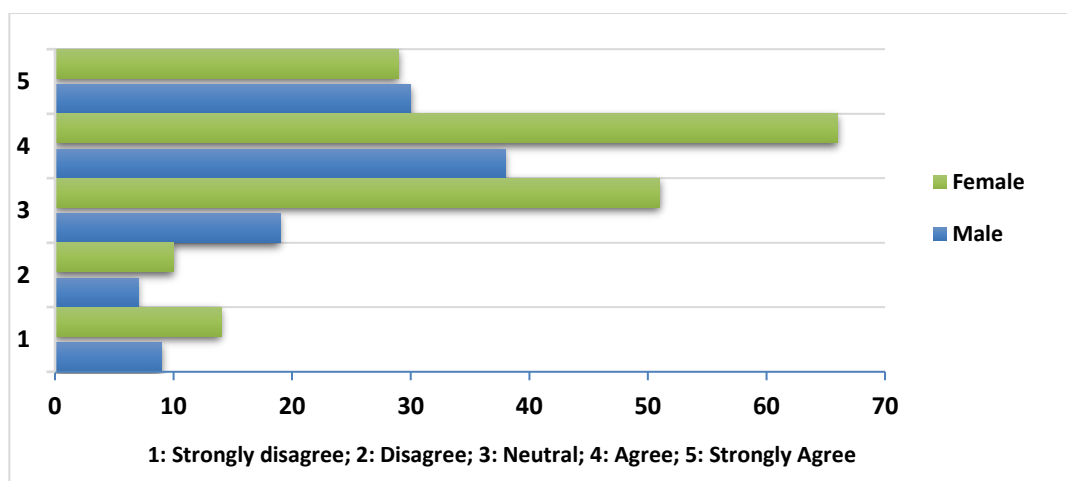
No.	Questions
1.	As a healthcare student, do you think you must know the epidemiology of EVD?
2.	In my opinion, if a person has been diagnosed with EVD, he/she must be admitted to an EVD treatment center.
3.	I believe, if a person has direct contact with an EVD patient, must be quarantined for 3 weeks.
4.	Would you like to be in contact with a patient who had earlier infected with EVD but has recovered and declared healthy?
5.	Do you agree that it is preferable to kill EVD patients by administering a lethal drug instead of letting them suffer entire life?

The demographic details and the responses of the students regarding the first question are presented in table 3 & figure 1.

**Table 3** Students' attitude towards question 1

Variables	Strongly disagree N (%)	Disagree N (%)	Neutral N (%)	Agree N (%)	Strongly agree N (%)	p-Value
Faculty						
Medicine	14(16.7)	8(9.5)	27(32.1)	22(26.2)	13(15.5)	0.054*
Dentistry	9(10.0)	5(5.6)	22(24.4)	32(35.6)	22(24.4)	
Pharmacy	-	4(4.0)	21(21.2)	50(50.5)	24(24.2)	
Year of study						
Pre-final	13(7.6)	7(5.2)	32(23.7)	52(38.5)	31(23.0)	0.761*
Final	10(7.2)	10(7.2)	38(27.5)	52(37.7)	28(20.3)	
Age						
20-25 years	23(8.6)	17(6.4)	70(26.2)	101(37.8)	56(21.0)	0.062*
26-30 years	-	-	-	2(50.0)	2(50.0)	
31-35 years	-	-	-	1(50.0)	1(50.0)	
Gender						
Male	9(8.7)	7(6.8)	19(18.4)	38(36.9)	30(29.1)	0.050*
Female	14(8.2)	10(5.9)	51(30.0)	66(38.8)	29(17.1)	
Race						
Malay	-	-	1(33.3)	1(33.3)	1(33.3)	0.085*
Chinese	14(7.6)	12(6.5)	50(27.2)	73(39.7)	35(19.0)	
Indian	9(10.6)	5(5.9)	19(22.4)	29(34.1)	23(27.1)	
Others	-	-	-	1(100.0)	-	
Education background						
A-level	-	-	-	-	-	0.372*
STPM	1(7.1)	2(14.3)	6(42.9)	2(14.3)	3(21.4)	
Diploma	-	1(5.6)	2(11.1)	10(55.6)	5(27.8)	
Foundation	22(9.6)	14(6.1)	61(26.8)	85(37.3)	46(20.2)	
Others	-	-	1(7.7)	7(53.8)	5(38.5)	
Residency						
Hosteller	17(8.5)	13(6.4)	50(25.0)	74(37.0)	46(23.0)	0.582*
Non-Hosteller	6(8.2)	4(5.5)	20(27.4)	30(41.1)	13(17.8)	

Chi square test\*

**Figure 1** Difference in attitude regarding EVD in gender

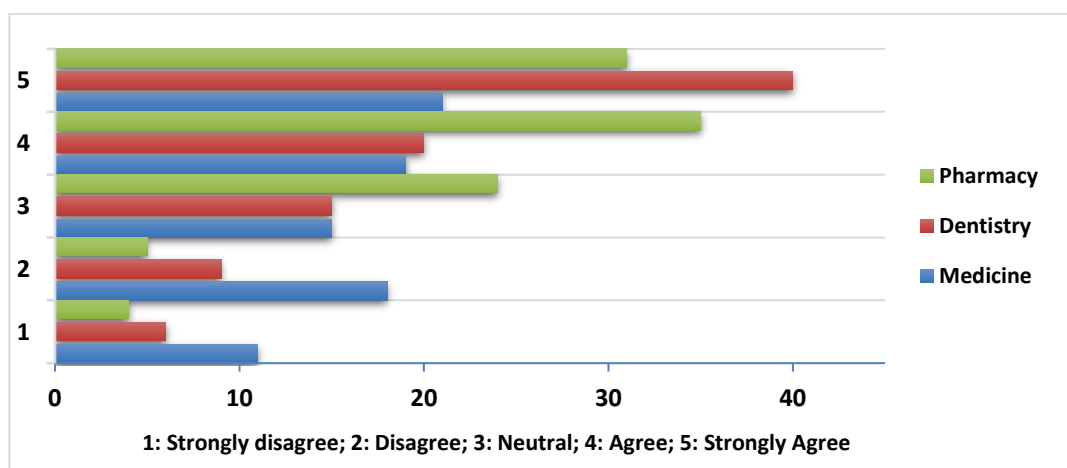
The demographic details and the responses of the students regarding the second question are presented in table 4 and figure 2.

**Table 4** Students' attitude towards question 2

Variables	Strongly disagree N (%)	Disagree N (%)	Neutral N (%)	Agree N (%)	Strongly agree N (%)	p-Value
Faculty						
Medicine	11(13.1)	18(21.4)	15(17.9)	19(22.6)	21(25.0)	0.039**
Dentistry	6(6.7)	9(10.0)	15(16.7)	20(22.2)	40(44.4)	
Pharmacy	4(4.0)	5(5.1)	24(24.2)	35(35.4)	31(31.3)	
Year of study						
Pre-final	10(7.4)	18(13.3)	26(19.3)	39(28.9)	42(31.1)	0.057*
Final	11(8.0)	14(10.1)	28(20.3)	35(25.4)	50(36.2)	
Age						
20-25 years	21(7.9)	32(12.0)	54(20.2)	72(27.0)	88(33.0)	0.436*
26-30 years	-	-	-	1(25.0)	3(75.0)	
31-35 years	-	-	-	-	1(100.0)	
Gender						
Male	12(11.7)	11(10.7)	14(13.6)	24(23.3)	42(40.8)	0.053*
Female	9(5.3)	21(12.4)	40(23.5)	50(29.4)	50(29.4)	
Race						
Malay	-	-	2(66.7)	1(33.3)	-	0.059**
Chinese	17(9.2)	17(9.2)	34(18.5)	55(29.9)	61(33.2)	
Indian	4(4.7)	15(17.6)	18(21.2)	18(21.2)	30(35.3)	
Others	-	-	-	-	1(100.0)	
Education background						
A-level	-	-	-	-	-	0.051*
STPM	2(14.3)	2(14.3)	4(28.6)	5(35.7)	1(7.1)	
Diploma	-	-	4(22.2)	6(33.3)	8(44.4)	
Foundation	19(8.3)	27(11.8)	45(19.7)	60(26.3)	77(33.8)	
Others	-	3(23.1)	1(7.7)	3(23.1)	6(46.2)	
Residency						
Hosteller	15(7.5)	21(10.5)	39(19.5)	58(29.0)	67(33.5)	0.069**
Non-Hosteller	6(8.2)	11(15.1)	15(20.5)	16(21.9)	25(34.2)	

Chi square test\*

Fisher exact test\*\*

**Figure 2** Difference in attitude regarding EVD in faculty

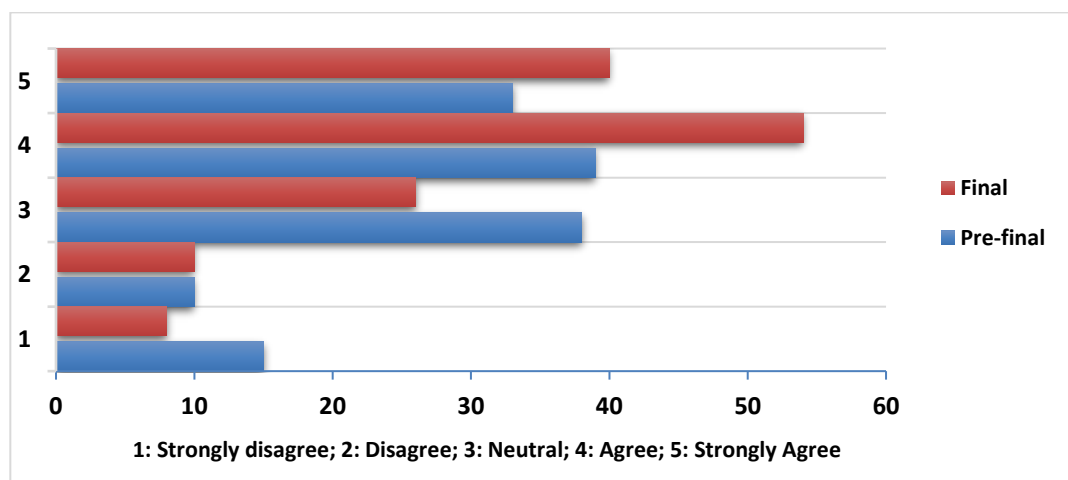
The demographic details and the responses of the students regarding the third question are presented in table 5 and figure 3.

**Table 5** Students' attitude towards question 3

Variables	Strongly disagree N (%)	Disagree N (%)	Neutral N (%)	Agree N (%)	Strongly agree N (%)	p-Value
<b>Faculty</b>						
Medicine	15(16.9)	8(9.5)	13(15.5)	25(29.8)	23(27.4)	0.066**
Dentistry	6(6.7)	6(6.7)	25(27.8)	28(31.1)	25(27.8)	
Pharmacy	2(2.0)	6(6.1)	26(26.3)	40(40.4)	25(25.3)	
<b>Year of study</b>						
Pre-final	15(11.1)	10(7.4)	38(28.1)	39(28.9)	33(24.4)	0.045*
Final	8(5.8)	10(7.2)	26(18.8)	54(39.1)	40(29.0)	
<b>Age</b>						
20-25 years	23(8.6)	19(7.1)	64(24.0)	92(34.5)	69(25.8)	0.069*
26-30 years	-	1(25.0)	-	-	3(75.0)	
31-35 years	-	-	-	1(50.0)	1(50.0)	
<b>Gender</b>						
Male	7(6.8)	8(7.8)	18(17.5)	35(34.0)	35(34.0)	0.075*
Female	16(9.4)	12(7.1)	46(27.1)	58(34.1)	38(22.4)	
<b>Race</b>						
Malay	-	-	2(66.7)	-	1(33.3)	0.035*
Chinese	11(6.0)	13(7.1)	43(23.4)	71(38.6)	46(25.0)	
Indian	12(14.1)	7(8.2)	18(21.2)	22(25.9)	26(30.6)	
Others	-	-	1(100)	-	-	
<b>Education background</b>						
A-level	5(35.7)	1(7.1)	4(28.6)	3(21.4)	1(7.1)	0.351*
STPM	-	2(11.1)	5(27.8)	7(38.9)	4(22.)	
Diploma	18(7.9)	15(6.6)	52(22.8)	81(35.5)	62(27.2)	
Foundation	-	2(15.4)	3(23.1)	2(15.4)	6(46.2)	
Others	-	-	-	-	-	
<b>Residency</b>						
Hosteller	16(8.0)	16(8.0)	48(24.0)	66(33.0)	54(27.0)	0.672*
Non-Hosteller	7(9.6)	4(5.5)	16(21.9)	27(37.0)	19(26.0)	

Chi square test\*

Fisher exact test\*\*

**Figure 3** Difference in attitude regarding EVD in year of study

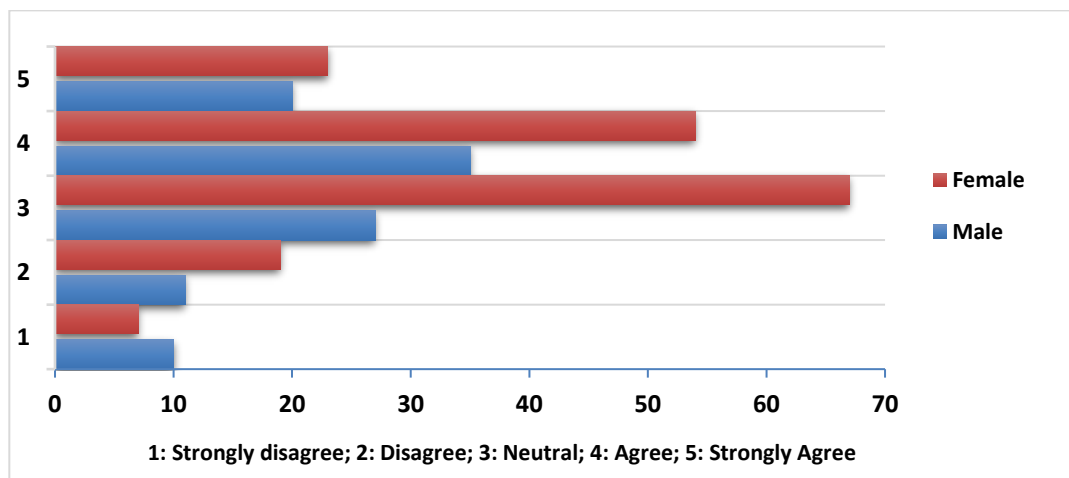
The demographic details and the responses of the students regarding the fourth question are presented in table 6 and figure 4.

**Table 6** Students' attitude towards question 4

Variables	Strongly disagree N (%)	Disagree N (%)	Neutral N (%)	Agree N (%)	Strongly agree N (%)	p-Value
<b>Faculty</b>						
Medicine	8(9.5)	13(15.5)	24(28.6)	24(28.6)	15(17.9)	0.061**
Dentistry	8(8.9)	9(10.0)	34(37.8)	25(27.8)	14(15.6)	
Pharmacy	1(1.0)	8(8.1)	36(36.4)	40(40.4)	14(14.1)	
<b>Year of study</b>						
Pre-final	8(5.9)	12(8.9)	51(37.8)	42(31.1)	22(16.3)	0.213*
Final	9(6.5)	18(13.0)	43(31.2)	47(34.1)	21(15.2)	
<b>Age</b>						
20-25 years	17(6.4)	30(11.2)	94(35.2)	85(31.8)	41(15.4)	0.071*
26-30 years	-	-	-	2(50.0)	2(50.0)	
31-35 years	-	-	-	2(100.0)	-	
<b>Gender</b>						
Male	10(9.7)	11(10.7)	27(26.2)	35(34.0)	20(19.4)	0.039**
Female	7(4.1)	19(11.2)	67(39.4)	54(31.8)	23(13.5)	
<b>Race</b>						
Malay	-	1(33.3)	1(33.3)	1(33.3)	-	0.253*
Chinese	10(5.4)	20(10.9)	67(36.4)	62(33.7)	25(13.6)	
Indian	7(8.2)	9(10.6)	25(29.4)	26(30.6)	18(21.2)	
Others	-	-	1(100.0)	-	-	
<b>Education background</b>						
A-level	-	-	-	-	-	0.065*
STPM	2(14.3)	2(14.3)	4(28.6)	3(21.4)	3(21.4)	
Diploma	1(5.6)	1(5.6)	8(44.4)	7(38.9)	1(5.6)	
Foundation	14(6.1)	26(11.4)	80(35.1)	73(32.0)	35(15.4)	
Others	-	1(7.7)	2(15.4)	6(46.2)	4(30.8)	
<b>Residency</b>						
Hosteller	13(6.5)	19(9.5)	69(34.5)	66(33.0)	33(16.5)	0.475*
Non-Hosteller	4(5.5)	11(15.1)	25(34.2)	23(31.5)	10(13/7)	

Chi square test\*

Fisher exact test\*\*

**Figure 4** Difference in attitude regarding EVD in gender

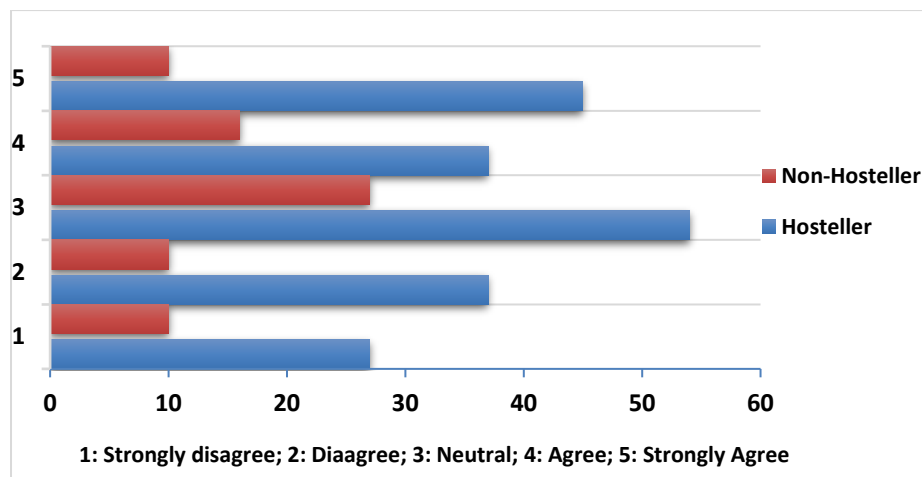
The demographic details and the responses of the students regarding the fifth question are presented in table 7 and figure 5.

**Table 7** Students' attitude towards question 5

Variables	Strongly disagree N (%)	Disagree N (%)	Neutral N (%)	Agree N (%)	Strongly agree N (%)	p-Value
Faculty						
Medicine	10(11.9)	14(16.7)	23(16.7)	19(22.6)	18(21.4)	0.212**
Dentistry	17(18.9)	18(20.0)	28(20.0)	7(7.8)	20(22.2)	
Pharmacy	10(10.1)	15(15.2)	30(30.3)	27(27.3)	17(17.2)	
Year of study						
Pre-final	21(15.6)	28(20.7)	42(31.1)	17(12.6)	27(20.0)	0.047*
Final	16(11.6)	19(13.8)	39(28.3)	36(12.6)	28(20.3)	
Age						
20-25 years	37(13.9)	45(16.9)	80(30.0)	52(19.2)	53(19.9)	0.671*
26-30 years	-	-	1(25.0)	1(25.0)	2(50.0)	
31-35 years	-	2(100.0)	-	-	-	
Gender						
Male	13(12.6)	15(14.6)	26(25.2)	27(26.2)	22(21.4)	0.279*
Female	24(14.1)	32(18.8)	55(32.4)	26(15.3)	33(19.4)	
Race						
Malay	-	-	2(66.7)	1(33.3)	-	0.062**
Chinese	25(13.6)	35(19.0)	56(30.4)	35(19.0)	33(17.9)	
Indian	12(14.1)	11(12.9)	23(27.1)	17(20.0)	22(25.9)	
Others	-	1(100.0)	-	-	-	
Education background						
A-level	-	4(28.6)	3(21.4)	2(14.3)	5(35.7)	0.059*
STPM	-	2(11.1)	5(27.8)	5(27.8)	4(22.2)	
Diploma	2(11.1)	2(11.1)	5(27.8)	5(27.8)	4(22.2)	
Foundation	33(14.5)	39(17.1)	71(31.1)	43(18.9)	42(18.4)	
Others	2(15.4)	2(15.2)	2(15.4)	3(23.1)	4(30.8)	
Residency						
Hosteller	27(13.5)	37(18.5)	54(27.0)	37(18.5)	45(22.5)	0.041*
Non-Hosteller	10(13.7)	10(13.7)	27(37.0)	16(21.9)	10(13.7)	

Chi square test\*

Fisher exact test\*\*

**Figure 5** Difference in attitude regarding EVD in residency



## 4. DISCUSSION

The current study was the first study in Malaysia on EVD for the attitude evaluation of future healthcare providers in any medical university. The results of the current study showed that the students of the medical faculty had a 26.2% negative attitude when the question was asked about the information needed regarding the epidemiology of EVD. Whereas, only 4% negative attitude was seen among the pharmacy students on the same question. The proposed reason behind could be the perception of medical students regarding the management of EVD. They might believe that the medical faculty students should only concentrate on the treatment of the EVD rather than the epidemiology of the disease. These attitude results of healthcare students about the epidemiology of EVD in the current study are supported by a study conducted in Iran, according to which the medical students' attitude about the EVD epidemiology was negative (Holakouie-Naieni *et al.*, 2015).

The results of the present study showed that the final year students had a more positive attitude as compared with the pre-final year students when the question was asked about the admission of the patients in an EVD treatment center upon the diagnosis of EVD. The reason behind could be that the adequate knowledge of final year students as compared with the pre-final year students according to the recommendation of clinical practice guideline about EVD. The justification was strongly supported by another study conducted in Malaysia in 2016. According to the cited study, the patients should be shifted to the EVD treatment center on diagnosis to avoid any complications (Rajiah *et al.*, 2016).

The negative attitude of the medical faculty students was observed in the current study when the question was asked about the quarantine requirements for 3 weeks when a person has direct contact with the EVD diagnosed patient. About 26.4% of medical students showed a negative attitude. This showed the inadequate knowledge of medical students on the recommendation of a clinical practice guideline about EVD in Malaysia. The different results were noted in a study conducted in Nigeria by Etokidem and colleagues according to which all the medical students had the proper knowledge regarding the EVD which resulted in a positive attitude about the EVD (Etokidem *et al.*, 2018). The findings of the current study showed that the male students had a more negative attitude (20.4%) as compared with the females (15.3%) when the question was asked about to be in contact with a patient who had earlier infected with EVD but has recovered and declared healthy from EVD infection. This question showed that male students were more scared about the disease as compared to female students. The reason behind this could be that the less dedication of male students toward the serving of the community. In contrast, female students are more committed to the service of humanity as future healthcare providers. The opposite results were presented by a study conducted in Pakistan, according to which male students were more committed to serving humanity as compared with the females who were more scared about the EVD infection and its probable pandemic situation (Hisam *et al.*, 2016).

More Chinese students showed a positive attitude when the question was asked to kill EVD patients by a lethal drug instead of letting them suffer their remaining life. Similarly, a greater number of pre-final year students showed a positive attitude on the same question. The reason behind this could be the enthusiasm of the students to treat the patients. They were dedicated to their profession, and they wanted to save lives and increase the quality of life of their patients by providing them with proper medical care. Similar results were presented by healthcare providers when their enthusiasm was checked about saving their EVD patients in the USA (Greenberg *et al.*, 2019).

## 5. CONCLUSION

The present study reported mixed findings regarding the attitude towards EVD among healthcare students in the studied cohort. The pharmacy faculty students had a better positive attitude towards EVD. The final year students also had a positive attitude towards information regarding EVD. There are certain limitations associated with the current study? This study was conducted at only one university, so the results of the current study cannot be generalized to all universities in Malaysia.

### Acknowledgment

The authors would like to thank the Deanship of Scientific Research at Prince Sattam bin Abdulaziz University, Alkharj, Saudi Arabia, for the support in the publication of this manuscript. The authors would also like to express their sincere gratitude to all of the participants involved in this study in any capacity.

### Conflicts of interest

The authors declare that there are no conflicts of interest.

### Ethical approval

The ethical committee approval code of the study was AUHAEC/FOP/2016/02.

### Funding

This study had not received any external funding.

### Data and materials availability

All data associated with this study are present in the paper.

### Peer-review

External peer-review was done through double-blind method.

## REFERENCES AND NOTES

1. Abebe, T.B., Bhagavathula, A.S., Tefera, Y.G., *et al.* Healthcare professionals' awareness, knowledge, attitudes, perceptions and beliefs about Ebola at Gondar University Hospital, Northwest Ethiopia: A cross-sectional study. *J Public Health Afr.* 2016; 7(2), 570.
2. Aziz S, Iqbal MZ, Iqbal MS, Mohiuddin SG, Sivadasan S, Veerasamy R, Ali AN, Prajapati SK, Chandran JM. Attitude towards vaccination: A cross sectional study among the parents in Sungai Petani, Kedah, Malaysia. *Int J Pharm Sci & Res.* 2019;10:2465-72.
3. Bah, E. I., Lamah, M.C., Fletcher, T., *et al.* Clinical Presentation of Patients with Ebola Virus Disease in Conakry, Guinea. *N Engl J Med.* 2015; 372(1), 40–47.
4. Baseler, L., Chertow, D.S., Johnson, K. M., *et al.* The Pathogenesis of Ebola Virus Disease. *Annual Review of Pathology: Mechanisms of Disease*, 2017; 12(1), 387–418.
5. Etokidem, A. J., Ago, B. U., Mgbekem, M., *et al.* Ebola virus disease: Assessment of knowledge, attitude and practice of nursing students of a Nigerian University. *Afr Health Sci.* 2018; 18(1), 55–65.
6. Fischer, W. A., Weber, D. J., & Wohl, D. A. Personal Protective Equipment: Protecting Health Care Providers in an Ebola Outbreak. *Clin Ther.* 2015; 37(11), 2402–2410.
7. Goss, J. F., & Goss, C. H. Ebola Virus Disease. *Journal of Emergency Medical Services*, 2015; 40(5), 59–63.
8. Greenberg, A., Michlig, G.J., Larson, E., *et al.* "I Knew I Could Make a Difference": Motivations and Barriers to Engagement in Fighting the West African Ebola Outbreak among U.S.-Based Health Professionals. *Qual Health Res.* 2019; 29(4), 522–532.
9. Hisam, A., Rana, M. N., & Mahmood-Ur-Rahman. Knowledge and attitude regarding Ebola virus disease among medical students of Rawalpindi: A preventable threat not yet confronted. *Pak J Med Sci.* 2016; 32(4), 1015.
10. Holakouie-Naieni, K., Ahmadvand, A., Raza, O., *et al.* Assessing the knowledge, attitudes, and practices of students regarding ebola virus disease outbreak. *Iran J Public Health.* 2015; 44(12), 1670–1676.
11. Iqbal, M., Iqbal, M., Deneshwary, B., *et al.* Knowledge and Perception of Medicine, Dentistry and Pharmacy Students of Malaysian University Regarding Ebola Virus Disease (EVD). *Value in Health*, 2016; 19(7), A913.
12. Katz, L.M., & Tobian, A.A.R. Ebola virus disease, transmission risk to laboratory personnel, and pretransfusion testing. *Transfusion*, 2014; 54(12), 3247–3251
13. Laupland, K. B., & Valiquette, L. Ebola virus disease. *Can J Infect Dis Med Microbiol.* 2014; 25(3), 128–129.
14. Liu WB, Li ZX, Du Y, Cao GW. Ebola virus disease: from epidemiology to prophylaxis. *Military Medical Research.* 2015; 1;2(1):7.
15. O'Keefe, L. C. Ebola Update. *Workplace Health and Safety*, 2016; 64(1), 13–16.
16. Osterholm, M. T., Moore, K. A., Kelley, *et al.* Transmission of Ebola viruses: What we know and what we do not know. *MBio*, 2015; 6(2).
17. Rajiah, K., Maharajan, M. K., Binti Samsudin, S. Z. *et al.* Ebola: Emergency preparedness and perceived response of Malaysian health care providers. *Am J Infect Control.* 2016; 44(12), 1720–1722
18. Yuan S. Possible FDA-approved drugs to treat Ebola virus infection. *Infectious diseases of poverty.* 2015; 1;4(1):23.