Faculty of Medicine and Health Sciences

An-Najah National University

Assessing and improving quality of anesthesia and quality of care provided to epilepsy patients in the Palestinian healthcare practice
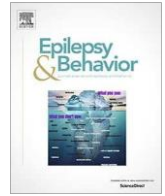
Prepared by:

Mohammad Sameeh Dweik: 11541492

Faris Moatasem Radwan: 11523453

Majd Rashed Abu Issa: 11524828

Supervised by: Dr. Ramzi Shawahna

Dr. Mohammad Jaber

Are medical students adequately prepared to provide quality care for patients with epilepsy? A cross-sectional study of their knowledge and attitude

Ramzi Shawahna [a,b,⇑], Mohammad Jaber [c,d], Iyad Maqboul [c,d], Hatim Hijaz [c,d], Majd Abu-Issa [c], Faris Radwan [c], Mohammad Dweik [c]

[a] *Department of Physiology, Pharmacology and Toxicology, Faculty of Medicine and Health Sciences, An-Najah National University, Nablus, Palestine*
[b] *An-Najah BioSciences Unit, Centre for Poisons Control, Chemical and Biological Analyses, An-Najah National University, Nablus, Palestine*
[c] *Department of Medicine, Faculty of Medicine and Health Sciences, An-Najah National University, Nablus, Palestine*
[d] *An-Najah National University Hospital, An-Najah National University, Nablus, Palestine*

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Objective: This study assessed preparedness of Palestinian medical students as future physicians to care for patients with epilepsy through assessing their knowledge and attitude.
Methods: The current study was conducted in a cross-sectional design. A pre-validated study tool was used to collect sociodemographic and academic details of the students, test their knowledge using a 16-item test, and test their attitude using a 13-item test.
Results: A total of 386 medical students completed the study tool. The median knowledge score was 75.0% (range: 62.5% to 87.5%). The median attitude score was 81.5% (range: 73.8% to 89.2%). Knowledge and attitude scores correlated positively (Spearman's rho = 0.25, p-value < 0.001). Students who were in their clinical training stage (OR = 4.22, 95% CI of 2.54 to 7.01), who had received a course/part of a course on epilepsy (OR = 2.55, 95% CI of 1.26 to 5.17), who perceived their knowledge of epilepsy as moderate (OR = 3.14, 95% CI of 1.87 to 5.28), and those who perceived their knowledge of epilepsy as high (OR = 11.91, 95% CI of 2.47 to 57.41) were more likely to score $\leq$ 70% in the knowledge test compared to those who were in their basic training stage, who had not received a course/part of a course on epilepsy, and who perceived their knowledge of epilepsy as low, respectively.
Conclusion: Findings of the current investigation may indicate that inclusion of courses on epilepsy early in the medical curriculum might promote knowledge of medical students with regard to epilepsy.

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1. Introduction

Epilepsy is a disease of the brain that is characterized by at least one unprovoked seizure followed by a second episode at least 24 h later [1,2]. Seizure is defined as a transit disruption of the brain function due to abnormal or excessive electrical activity in the brain cells [3]. In clinical practice, electroencephalography (EEG) is one of the most commonly used tools to assess patients with epilepsy [4]. Additionally, video-EEG tracking is also an effective method that is used to determine seizures, their types, and/or estimation of the epileptogenic zone in the brain [5].

Worldwide, epilepsy affects a large section of the populations and prevalence rates vary by the population investigated. Ip et al reported that the prevalence rate of epilepsy among Medicare beneficiaries was 152 per 10,000 [6]. In a recent meta-analysis of population-based studies in the Sub-Saharan region of Africa, the prevalence rate of active epilepsy was 90 per 10,000 people [7]. Among Palestinians, the incidence rate of epilepsy was estimated at 104 to 113 per million people [8]. According to some estimates, epilepsy affects more than 65 million patients around the globe [7]. Epilepsy affects people regardless of their age, gender, educational/cultural background, socioeconomic class, or race [9].

Although, neurologists/epileptologists are the most competent healthcare providers to care for patients with epilepsy, many healthcare systems around the world are short with neurologists/epileptologists [10]. As a result, neurologist/epileptologist-based care delivery is not practically feasible on the foreseeable future.

⇑ Corresponding author at: Department of Physiology, Pharmacology and Toxicology, Faculty of Medicine & Health Sciences, New Campus, Building: 19, Office: 1340, An-Najah National University, P.O. Box 7, Nablus, Palestine.
E-mail address: ramzi_shawahna@hotmail.com (R. Shawahna).

Additionally, many patients with epilepsy are not having health conditions severe enough to warrant seeing a neurologist/epileptologist [11,12]. Therefore, general practitioners or primary healthcare physicians are increasingly caring for patients with epilepsy [13].

Despite the increasing use of multi-healthcare provider approach to healthcare, physicians are still the primary healthcare providers in many healthcare systems around the world [14]. Epilepsy is a chronic condition, thus requires long-term treatment and follow-up. Therefore, having adequate knowledge and skills to care for and support patients with epilepsy is mandatory for future physicians. Medical students are the future workforce of physicians in all specialties. Therefore, medical students should be equipped with the adequate knowledge and skills through their education/training on how to care for and support patients including those with epilepsy. However, previous studies in Nigeria, Turkey, Uganda, Saudi Arabia, and Benin have shown that practicing and future healthcare providers including medical students lacked essential knowledge necessary to care for and support patients with epilepsy [15–23].

In Palestine, preparedness of practicing pharmacists to care for patients with epilepsy was assessed [15,24]. Additionally, preparedness of nursing students to provide healthcare for patients with epilepsy and eliminate epilepsy stigma was also investigated [19,20]. However, little is known on how well Palestinian medical students are prepared to care for patients with epilepsy.

It has been argued that possessing adequate knowledge of epilepsy and positive attitude toward people with epilepsy are prerequisites to providing adequate care for people with epilepsy by future physicians. Therefore, this study was conducted to assess preparedness of Palestinian medical students to care for patients with epilepsy through assessing their knowledge and attitude toward epilepsy and patients with epilepsy. Knowledge and attitude were used as surrogates to their preparedness as future physicians to care for patients with epilepsy. Sociodemographic and academic variables that could be associated with possessing adequate knowledge and positive attitude were also investigated in this study.

2. Methods

2.1. Study settings

The Doctor of Medicine (MD) program in Palestine is a 265 credit hours academic/training program that medical students are able to complete in 6 academic years [25]. The MD program is divided into two stages: basic stage (130 credit hours of biomedical science courses/modules) and clinical stage (135 credit hours of clinical courses/modules and hospital/clinic-based training). After obtaining their MD degree, fresh graduates complete a 12-month internship before they can assume roles as practicing physicians. Later, they can be enrolled into residency programs for specialty training.

2.2. Study population

In this study, the study population was Palestinian students enrolled in the MD program. The inclusion criteria were as follows: (a) aged $\leq$ 18 years, (b) enrolled in one the MD programs offered by Palestinian universities, (c) willingness to respond to knowledge and attitude items in a questionnaire, and (d) providing consent to take part in the study.

Fresh graduates, interns, residents, practicing physicians, and specialists were excluded from this study. Palestinians who were enrolled in MD programs elsewhere were also excluded.

2.3. Sample size

The sample size needed for this study was computed utilizing an online sample size calculator that can be freely accessed through the link (www.raosoft.com). Assuming a maximal population of medical students in Palestinian universities as 7000. The sample size was calculated at a 95% confidence interval (CI) and accepting a default margin of error of 5%. The sample size needed for this study was 365 medical students.

2.4. Study design

Because this study was conducted in a cross-sectional deign, this report adheres to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist [26]. Adherence to the STROBE checklist is shown in Supplementary Table S1.

The study tool used in this study was informed by those used in previous studies [16,20,27–29]. The study tool contained three sections. In the first section, medical students were requested to give their sociodemographic and academic characteristics including gender, academic/training stage, and marital status. Medical students were also asked to self-rate their social status, academic status, academic performance, religious commitment, and knowledge about epilepsy on a Likert-scale of 1–3 (1 = low, 3 = high). Medical students were requested to provide the sources of knowledge they used to learn about epilepsy, state whether they have studied a course/part of a course on epilepsy, and state whether they have seen a patient experiencing epileptic seizures. Medical students who stated that they have seen a patient experiencing seizures, were asked to state where. The second section contained a knowledge test of 16 items. On each item, medical students were requested to answer each question by choosing either "true", "false", or "I don't know". In the third section, medical students were requested to answer an attitude test of 13 items. On each item, medical students had to express their attitude on a Likert-scale of 1–5 (5 = strong disagreement, 1 = strong agreement).

2.5. Pilot testing of the study tool

Before conducting the larger study, a pilot test was conducted to assess whether the items included in the study tool were clear, readable, and understandable. The pilot testing was conducted among 20 students who were asked to answer the questionnaire two times. The time difference between the two rounds was (30 min–2 h). The test–retest approach was used to assess the reliability of the tool (stability of scores over a short period of time) and Cronbach's alpha was used to assess inter-item relatedness (internal consistency) [15,19,20,25,30–33]. Reliability of the study tool was ensured by Pearson's correlation coefficient of >80%. The item relatedness was ensured by Cronbach's alpha of >70%.

2.6. Data analysis

Medical students received 1 point for each correct answer and 0 points for each incorrect/I don't know answer. Knowledge scores could range from 0-16. The knowledge scores were also converted into percentages. The attitude scores were summed in the range from 13 to 65. The attitude scores were also converted into percentages.

The knowledge items were psychometrically assessed for their difficulty index (D). D was assessed based on the ratio of correct answers/total number of answers for each item. Items were attributed as follows: (a) very difficult: 20% < D, (b) difficult: 20% $\leq$ D < 40%, (c) moderate: 40% $\leq$ D < 60%, (d) easy: 60% $\leq$ D < 80%, and (e) very easy: D $\leq$ 80% [15].

Shapiro–Wilk test was used to analyze the data for normality of distribution. The data were not normally distributed; therefore, the data were expressed using the median and interquartile range (IQR). Categorical data were compared using Pearson's Chi-square or Fisher's exact test as appropriate. Spearman's rank correlations were used to assess correlations between knowledge and attitude scores. Adequate knowledge was indicated by scoring $\leq$ 70% in the knowledge test and adequate attitude was indicated by scoring $\leq$ 80% in the knowledge test. To investigate predictors of adequate knowledge and attitude, multiple logistic regression was used. Variables with a p-value of <0.1 in Pearson's Chi-square or Fisher's exact test were retained in the multiple logistic regression model. A p-value of <0.05 indicated statistical significance.

2.7. Ethical approval

This study was conducted in adherence to the ethical principles of the Declaration of Helsinki by the World Medical Association and those followed at An-Najah National University. According to legislations in different countries, educational studies fall within the ''Exempt'' review categories as these studies are associated with minimal risk to the study participants. The Institutional Review Board (IRB) of An-Najah National University approved this exemption. Participation in this study was voluntary and medical students who participated in this study provided informed consent.

3. Results

3.1. Stability of scores and inter-item relatedness

When the scores of the students who participated in the first and second rounds of the pilot testing were plotted and correlated, Pearson's correlation coefficient was 91.6% (p-value < 0.001). This high Pearson's correlation coefficient indicated an excellent reliability of the study tool (stability of scores over a short period of time). Cronbach's alpha of the items included in the questionnaire was 75.7% (95% CI of 72.1% to 79.1%). Cronbach's alpha statistics indicated good inter-item relatedness.

3.2. Variables of medical students

In this study, a total of 386 medical students returned complete questionnaire. The sociodemographic and academic characteristics of medical students are provided in Table 1. Of medical students, 59.3% were female, 65.0% were in their clinical training stage, and 97.4% were single. The majority of medical students perceived their social status, financial status, academic performance, religious commitment, and knowledge about epilepsy as moderate. Of medical students, 84.7% reported having studied a course/part of a course on epilepsy and 41.5% have seen a patient experiencing epileptic seizures.

3.3. Sources of information about epilepsy

In this study, the vast majority of medical students (83.9%) reported that the courses/lectures they received in the university was their primary source of information about epilepsy. More than half (60.9%) of medical students reported that the internet was a source of information about epilepsy. Other sources of information about epilepsy reported by medical students were friends/family/acquaintances, courses/lectures in school, awareness campaigns, television/radio, books, and newspapers/magazines. Details of the information sources are provided in Table 2.

Table 1
Sociodemographic and academic characteristics of medical students ($n = 386$).

Characteristics	n	%
Gender		
Male	157	40.7
Female	229	59.3
Academic stage		
Basic training stage (1st to 3rd academic year)	135	35.0
Clinical training stage (4th to 6th academic year)	251	65.0
Marital status		
Single	376	97.4
Married/engaged	10	2.6
Perceived social status		
Low	37	9.6
Moderate	292	75.6
High	57	14.8
Perceived financial status		
Low	32	8.3
Moderate	312	80.8
High	42	10.9
Satisfaction with academic performance		
Low	12	3.1
Moderate	283	73.3
High	91	23.6
Perceived religious commitment		
Low	40	10.4
Moderate	283	73.3
High	63	16.3
Having studied a course/part of a course on epilepsy		
No	59	15.3
Yes	327	84.7
Perceived knowledge about epilepsy		
Low	131	33.9
Moderate	234	60.6
High	21	5.4
Having seen a patient experiencing epileptic seizures		
No	226	58.5
Yes	160	41.5

Table 2
Sources of information used by medical students.

Sources of information	n[a]	%[a]
Courses/lectures in university	324	83.9
Internet	235	60.9
Friends/family/acquaintances	59	15.3
Classes in school	72	18.7
Awareness campaign	20	5.2
Television/radio	41	10.6
Book	147	38.1
Newspaper/magazine	15	3.9

[a] Percentages were calculated from the number of medical students who reported the source of information. The numbers do not sum to the total number of medical students who participated in the study and the percentages do not sum to 100%.

3.4. Seeing a patient experiencing epileptic seizures

Of medical students, 31.9% reported seeing a patient experiencing epileptic seizures while receiving training in hospitals/clinics. The other places reported by medical students included the neighborhood, in the family, and elsewhere. Details of the responses of medical students are provided in Table 3.

3.5. Knowledge of medical students

The median knowledge score of medical students was 75.0% (range: 62.5% to 87.5%). Of medical students, 150 (38.9%) scored < 70.0% and 236 (61.1%) scored $\leq$ 70.0%. Details of the answers of medical students on the 16-item knowledge test are shown in Table 4.

Table 3
Place where medical students have seen a patient experiencing epileptic seizures.

Place where the student has seen a patient experiencing epileptic seizures	n[a]	%[a]
In hospitals/clinics	72	31.9
In the neighbourhood	37	16.4
In the family	31	13.7
Somewhere else	86	38.1

[a] Percentages were calculated from the number of medical students who reported seeing a patient experiencing epileptic seizures ($n = 226$). The numbers do not sum to the total number of medical students who participated in the study and the percentages do not sum to 100%.

Medical students could very easily answer questions relevant to the types of epilepsy (item #1), ability of patients with epilepsy to work (item #2), duration of seizures (item #5), control of seizures by antiepileptic drugs (item #6), ability of patients with epilepsy to be successful at work (item #9), ability of patients with epilepsy to lead a normal life (item #14), and inability of others to notice some types of seizures (item #15). Medical students could easily answer questions relevant to the ability of children with epilepsy to go to public schools (item #3), normal intelligence of the majority of patients with epilepsy (item #8), cause of seizures (item #10), triggers of seizures (item #12), and inability of spilling water on the face of the patient to stop seizures (item #16). On the other hand, medical students answered the items relevant to danger of patients with epilepsy while experiencing seizures (item #4), use of surgical procedures to treat some seizures (item #7), and inability of onion to stop seizures (item #13) with moderate difficulty. The item relevant to curability of epilepsy (item #11) was considered difficult.

3.6. Attitude of medical students

The median attitude score of medical students was 81.5% (range: 73.8% to 89.2%). Of medical students, 163 (42.2%) scored < 80.0% and 223 (57.8%) scored ≤ 80.0%. In general, medical students expressed positive attitude toward epilepsy and patients with epilepsy. Details of the responses of medical students on attitude items are shown in Table 5. Of medical students, 363 (94.0%) disagreed or strongly disagreed to staying away from friends if they had epilepsy (item #5), 353 (91.5%) disagreed or strongly disagreed to feeling embarrassed if a family member had epilepsy (item #4), 338 (87.6%) disagreed or strongly disagreed to consider-

ing patients with epilepsy as frightening (item #6), 328 (85.0%) disagreed or strongly disagreed to considering patients with epilepsy as physically unattractive (item #7), 323 (83.7%) disagreed or strongly disagreed to feeling embarrassed of having epilepsy (item #1), 311 (80.6%) disagreed or strongly disagreed to feeling uncomfortable working with patients with epilepsy (item #3), 310 (80.3%) disagreed or strongly disagreed to staying away from patients with epilepsy (item #2), 296 (76.7%) disagreed or strongly disagreed to distrusting physicians/nurses knowing that they had epilepsy (item #10), 271 (70.2%) disagreed or strongly disagreed to objecting working with patients with epilepsy (item #8), 241 (62.4%) disagreed or strongly disagreed to hiding having epilepsy from friends (item #9), 198 (51.3%) disagreed or strongly disagreed to objecting marriage of son/daughter to a patient with epilepsy (item #12), 177 (45.9%) disagreed or strongly disagreed to objecting marriage with a patient with epilepsy (item #11), and 166 (43.0%) disagreed or strongly disagreed to feeling uncomfortable around patients with epilepsy (item #13).

3.7. Association between sociodemographic and academic characteristics of medical students with knowledge and attitude scores

In this study, there was a positive moderate correlation between knowledge and attitude scores of medical students (Spearman's rho = 0.25, p-value < 0.001).

Pearson Chi-Square/Fisher's Exact test showed that medical students who were in their clinical training stage, had studied a course/part of a course on epilepsy, perceived their knowledge about epilepsy as high, and had witnessed a patient experiencing epileptic seizures tended to score ≤ 70% in the knowledge test compared to those who were in their basic training stage (p-value < 0.001), did not have a course/part of a course on epilepsy (p-value < 0.001), perceived their knowledge about epilepsy as low (p-value < 0.001), and did not witness a patient experiencing epileptic seizures (p-value = 0.001). On the other hand, Pearson Chi-Square/Fisher's Exact test showed that attitude scores were associated with the financial status of medical students (p-value = 0.016). Details of the associations are shown in Table 6.

3.8. Predictors of adequate knowledge and attitude

To control potential confounding variables, a multiple logistic regression model was used retaining all variables with a p-value

Table 4
Answers of medical students on each of the 16-item epilepsy knowledge test.

#	Question	False n	False %	True n	True %	I don't know n	I don't know %	Difficulty index
1	Epilepsy has many different types	0	0.0	366	94.8	20	5.2	Very easy
2	Most patients with epilepsy can work	21	5.4	322	83.4	43	11.1	Very easy
3	Most children with epilepsy can go to public schools	25	6.5	295	76.4	66	17.1	Easy
4	Patients with epilepsy can be dangerous to others during a seizure	172	44.6	178	46.1	36	9.3	Moderate
5	Some seizures may last for a matter of seconds	9	2.3	346	89.6	31	8.0	Very easy
6	For most patients with epilepsy, seizures can be controlled with antiepileptic drugs	13	3.4	324	83.9	49	12.7	Very easy
7	Brain surgery can be used to treat epilepsy in some patients with epilepsy	37	9.6	233	60.4	116	30.1	Moderate
8	Most patients with epilepsy have normal intelligence	19	4.9	289	74.9	78	20.2	Easy
9	Patients with epilepsy can be as successful at work as others	18	4.7	322	83.4	46	11.9	Very easy
10	An epileptic seizure is caused by an abnormal function of the nerve cells in the brain	32	8.3	306	79.3	48	12.4	Easy
11	Epilepsy is a kind of incurable disorder	116	30.1	167	43.3	103	26.7	Difficult
12	Inadequate sleep, stress, and taking alcohol can cause a seizure	29	7.5	297	76.9	60	15.5	Easy
13	When you see a person having a seizure, you can stop the seizure by giving him/her an onion to smell	245	63.5	18	4.7	123	31.9	Moderate
14	Patients with epilepsy can lead normal lives	30	7.8	309	80.1	47	12.2	Very easy
15	Some kinds of seizures can be hardly noticed by others	6	1.6	342	88.6	38	9.8	Very easy
16	When you see a person having a seizure, you should spill water on his/her face to stop the seizure	307	79.5	11	2.8	68	17.6	Easy

Correct answers are in boldface.

Table 5

Answers of medical students on 13 attitude statements.

#	Statement	Strongly disagree		Disagree		Neutral		Agree		Strongly agree	
		n	%	n	%	n	%	n	%	n	%
1	Having epilepsy is something to be embarrassed about	219	56.7	104	26.9	35	9.1	22	5.7	6	1.6
2	I prefer to stay away from patients with epilepsy	172	44.6	138	35.8	60	15.5	13	3.4	3	0.8
3	I feel uncomfortable working with patients with epilepsy	171	44.3	140	36.3	50	13.0	21	5.4	4	1.0
4	I would be embarrassed if someone in my family had epilepsy	250	64.8	103	26.7	21	5.4	10	2.6	2	0.5
5	I would stay away from a friend if I knew she/he had epilepsy	256	66.3	107	27.7	18	4.7	4	1.0	1	0.3
6	I think patients with epilepsy are frightening	220	57.0	118	30.6	35	9.1	9	2.3	4	1.0
7	I think patients with epilepsy are not physically attractive	186	48.2	142	36.8	53	13.7	5	1.3	0	0.0
8	I would object to working with patients with epilepsy	163	42.2	108	28.0	77	19.9	32	8.3	6	1.6
9	If I had epilepsy, I would hide it from my friends	125	32.4	116	30.1	104	26.9	30	7.8	11	2.8
10	I would not trust a doctor/nurse with epilepsy, if I knew of his/her illness	158	40.9	138	35.8	71	18.4	16	4.1	3	0.8
11	I would not marry patients with epilepsy	90	23.3	87	22.5	135	35.0	64	16.6	10	2.6
12	I would object to the marriage of my child with patients with epilepsy	88	22.8	110	28.5	142	36.8	38	9.8	8	2.1
13	I feel comfortable with patients with epilepsy	36	9.3	25	6.5	159	41.2	98	25.4	68	17.6

Table 6

Association between sociodemographic and academic characteristics of medical students with their knowledge and attitude scores.

	Knowledge						Attitude					
	<70%		≤70%				<80%		≤80%			
Variable	N	%	n	%	Pearson Chi-Square/ Fisher's Exact Test	p-value	n	%	n	%	Pearson Chi-Square/ Fisher's Exact Test	p-value
Gender												
Male	57	14.8	100	25.9	0.73	0.398	68	17.6	89	23.1	0.13	0.753
Female	93	24.1	136	35.2			95	24.6	134	34.7		
Academic stage												
Basic training stage (1st to 3rd academic year)	90	23.3	45	11.7	67.56	<0.001	59	15.3	76	19.7	0.19	0.746
Clinical training stage (4th to 6th academic year)	60	15.5	191	49.5			104	26.9	147	38.1		
Marital status												
Single	148	38.3	228	59.1	1.53	0.328	157	40.7	219	56.7	1.33	0.334
Married/engaged	2	0.5	8	2.1			6	1.6	4	1.0		
Perceived social status												
Low	18	4.7	19	4.9	1.67	0.443	21	5.4	16	4.1	3.95	0.138
Moderate	110	28.5	182	47.2			121	31.3	171	44.3		
High	22	5.7	35	9.1			21	5.4	36	9.3		
Perceived financial status												
Low	14	3.6	18	4.7	0.87	0.670	6	1.6	26	6.7	8.18	0.016
Moderate	122	31.6	190	49.2			140	36.3	172	44.6		
High	14	3.6	28	7.3			17	4.4	25	6.5		
Satisfaction with academic performance												
Low	5	1.3	7	1.8	0.02	0.913	5	1.3	7	1.8	0.02	0.978
Moderate	110	28.5	173	44.8			119	30.8	164	42.5		
High	35	9.1	56	14.5			39	10.1	52	13.5		
Perceived religious commitment												
Low	13	3.4	27	7.0	0.83	0.670	13	3.4	27	7.0	4.30	0.119
Moderate	113	29.3	170	44.0			117	30.3	166	43.0		
High	24	6.2	39	10.1			33	8.5	30	7.8		
Having studied a course/part of a course on epilepsy												
No	43	11.1	16	4.1	33.93	<0.001	31	8.0	28	7.3	3.04	0.081
Yes	107	27.7	220	57.0			132	34.2	195	50.5		
Perceived knowledge about epilepsy												
Low	86	22.3	45	11.7	62.23	<0.001	65	16.8	66	17.1	5.35	0.070
Middle	62	16.1	172	44.6			92	23.8	142	36.8		
High	2	0.5	19	4.9			6	1.6	15	3.9		
Having witnessed a patient experiencing epileptic seizures												
No	103	26.7	123	31.9	10.35	0.001	96	24.9	130	33.7	0.01	0.917
Yes	47	12.2	113	29.3			67	17.4	93	24.1		

of <0.1 in Pearson's Chi-square or Fisher's exact tests. The model showed that medical students who were in their clinical training stage (OR = 4.22, 95% CI of 2.54 to 7.01), who had a course/part of a course on epilepsy (OR = 2.55, 95% CI of 1.26 to 5.17), who perceived their knowledge of epilepsy as moderate (OR = 3.14, 95% CI of 1.87 to 5.28), and those who perceived their knowledge of epi-

lepsy as high (OR = 11.91, 95% CI of 2.47 to 57.41) were more likely to score ≤ 70% in the knowledge test compared to those who were in their basic training stage, who had not received a course/part of a course on epilepsy, and who perceived their knowledge of epilepsy as low, respectively.

On the other hand, the model showed that medical students who perceived their financial status as moderate were more likely to score $\leq$ 80% in the attitude test compared to those who perceived their financial status as low (OR = 3.13, 95% CI of 1.05 to 9.30). Details of the multiple logistic model are shown in Table 7.

4. Discussion

The current study was conducted to examine knowledge and attitude of Palestinian medical students with regard to epilepsy and patients with epilepsy as a surrogate to assessing their preparedness as future physicians to care for patients with epilepsy. The present study highlighted some adequate awareness and attitude as well as inadequate awareness and attitude areas. Additionally, the study established associations between sociodemographic and academic characteristics of medical students with their knowledge and attitude scores. Predictors of adequate/inadequate knowledge and attitude were also identified. To our knowledge, the current study is the first to assess knowledge and attitude of Palestinian medical students toward epilepsy and patients with epilepsy. Results of the present study might be useful for patient advocacy groups, decision makers in healthcare authorities and academia, and those interested in designing appropriate interventions to improve preparedness of medical students to care for patients with epilepsy in the future.

In this study, medical students reported using courses/lectures, internet, and books as the main sources of information about epilepsy. These findings were consistent with those reported among other healthcare students, notably, nursing students [20]. Previous studies also showed that university students in Jordan and Turkey used similar sources to learn about epilepsy [28,34]. Of medical students in this study, 41.5% reported witnessing a patient experiencing epileptic seizures. In our previous study, a comparable percentage of nursing students reported witnessing patients experiencing epileptic seizures [20]. This similarity could be attributed to the nature and duration of training received by medical and nursing students during their academic/training programs. In

Palestine, the nursing program is a training intensive program in which students receive training throughout their academic program [19,20,25,35]. On the other hand, medical students start receiving training during their clinical stage.

In clinical practice, physicians care for patients in primary, secondary, and tertiary healthcare establishments/facilities. As physicians are increasingly caring for patients with epilepsy, therefore, it is imperative that future physicians should be knowledgeable of epilepsy and should maintain positive attitude toward patients with epilepsy to ensure providing quality care for their patients. Results of this study showed that the median knowledge score was relatively high. These findings were consistent with those reported among medical students in Turkey [16] and Saudi Arabia [21]. Compared to nurses and nursing students, medical students who took part in this study reported higher knowledge as indicated by the higher median score [20]. Results of this study were concordant with those reported in previous studies in Turkey and Saudi Arabia [16,18,29]. With regard to many issues in epilepsy, medical students included in this study performed better than the general public [34,36], practicing nurses [37], nursing students [20], and hospital staff [38]. Findings of this study are consistent with the greater role anticipated from the physicians in providing care for patients with epilepsy. In this study, knowledge deficits were also recognized among medical students as indicated by opting to "I don't know" option. Recognizing knowledge gaps is an important step toward bridging these knowledge gaps [15,19,20,25,30–32]. In general, medical students who took part in this study had positive attitude toward epilepsy and patients with epilepsy as indicated by the high median attitude score. Results of this study were concordant with those reported among nursing students [20]. Compared to students elsewhere, Palestinian medical and nursing students reported higher positive attitudes compared to those in Turkey [34,36,37].

Our findings showed that there was a moderate positive correlation between knowledge and attitude scores. These findings were concordant with those reported among nursing students in Palestine and elsewhere [20,34,36]. Taken together, these findings might suggest that attitude improves with higher knowledge [20,34,36–38].

Table 7
Predictors of scoring ≤70% in the knowledge and ≤80% in attitude tests.

Domain	Variable	b	SE	Wald	p-value	OR	95% CI for OR Lower	95% CI for OR Upper
Knowledge	Academic stage							
	Basic training stage (1st to 3rd academic year)	Reference category						
	Clinical training stage (4th to 6th academic year)	1.44	0.26	30.97	0.000	4.22	2.54	7.01
	Having studied a course/part of a course on epilepsy							
	No	Reference category						
	Yes	0.94	0.36	6.78	0.009	2.55	1.26	5.17
	Perceived knowledge about epilepsy							
	Low	Reference category						
	Middle	1.15	0.26	18.80	0.000	3.14	1.87	5.28
	High	2.48	0.80	9.53	0.002	11.91	2.47	57.41
	Having witnessed a patient experiencing epileptic seizures							
	No	Reference category						
	Yes	0.22	0.26	0.70	0.403	1.24	0.75	2.07
Attitude	Perceived financial status							
	Low	Reference category						
	Middle	1.14	0.56	4.21	0.040	3.13	1.05	9.30
	High	−0.16	0.34	0.23	0.631	0.85	0.44	1.65
	Having studied a course/part of a course on epilepsy							
	No	Reference category						
	Yes	0.32	0.31	1.08	0.298	1.38	0.75	2.51
	Perceived knowledge about epilepsy							
	Low	Reference category						
	Middle	0.36	0.24	2.35	0.126	1.44	0.90	2.28
	High	0.87	0.52	2.78	0.095	2.40	0.86	6.69

SE: standard error, OR: odds ratio.

In this study, knowledge scores were associated with academic/training stage, studying a course on epilepsy, higher perceived knowledge of epilepsy, and witnessing a patient experiencing epileptic seizures. These findings were consistent with those reported among nursing students in Palestine [20]. When logistic regression was used to control confounding variables, adequate knowledge was predicted by the academic/training stage, having studied a course on epilepsy, and perceiving knowledge of epilepsy as moderate or high. Findings of this study were not surprising. As students advance in their medical education/training, their knowledge of epilepsy and other diseases are expected to increase [16,17,21,29]. With increasing knowledge, students are supposed to gain more confidence. A recent study showed that a seminar improved knowledge and attitude of medical students toward epilepsy and patients with epilepsy [39].

4.1. Strengths and limitations

Results of the current study should be interpreted considering several strength points and limitations. First, this is the first report on knowledge and attitude of Palestinian medical students toward epilepsy and patients with epilepsy. Assessing knowledge and attitude of medical students in a particular region could be important to inform efforts to increase knowledge and correct inadequate attitude toward patients with epilepsy. Second, the study tool used in this study was previously used and validated in different settings and among different populations including medical students elsewhere [18,20,27,28,34,37,38,40–43]. The tool was revalidated using the test–retest approach and Cronbach's alpha statistics. These statistical tools are the most commonly used to re-validate questionnaires. The use of these statistical tools might have improved the validity of the results reported in this study. Third, the number of medical students who responded to the questionnaire in this study exceeded the sample size needed for this study. This might have added to the external validity and the possibility to generalize the findings on the entire population of medical students in Palestine. Fourth, medical students who participated in this study were diversified in terms of their sociodemographic and academic characteristics. The participants in this study were medical students from both genders, in different training/academic stages, from different socioeconomic and financial classes. The sample included medical students who took courses/part of courses on epilepsy, those who witnessed patients experiencing epileptic seizures, and those who self-rated their knowledge of epilepsy as high. In this study, more than half (56.3%) of medical students were female. This percentage reflected the higher proportion of female students in healthcare programs in Palestine including medicine [19,20,25,35]. This might have improved the representativeness of the sample included in this study.

This study has a number of limitations. First, the knowledge items had "true", "false", and "I don't know" answer options. We did not include case studies or another question format to test knowledge of medical students. It is expected that scores of medical students would be different in case a different question format was used. Second, this study was conducted in a cross-sectional design. Results obtained in cross-sectional studies are representative of the time period during which the study was conducted. Third, we did not intervene to correct knowledge and/or attitude of medical students toward epilepsy and patients with epilepsy, neither we provided medical students with the correct answers. Finally, this study was conducted among medical students. Probably, knowledge of physicians in real clinical practice might be higher.

4.2. Conclusion

Medical students in Palestine had relatively high knowledge and positive attitude toward epilepsy and patients with epilepsy. Results of this study exposed high knowledge and attitude areas in addition to knowledge gaps and some negative attitude areas that decision makers might need to bridge. Results of this study may suggest that inclusion of courses on epilepsy early in the medical curriculum can improve knowledge and attitude of medical students toward epilepsy and patients with epilepsy. Further studies are still needed to examine if inclusion of such courses in the medical curriculum can improve knowledge and attitude of Palestinian medical students toward epilepsy and patients with epilepsy.

Declaration of competing interest

The authors declare no competing interests.

Data statement

The datasets used and analyzed during this study are available from the corresponding author on reasonable request.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.yebeh.2021.107976.

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