



Knowledge and attitudes of physical educators toward epilepsy and students with epilepsy: A cross-sectional study from Palestine



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ABSTRACT

Objective: The study aimed to test knowledge and attitudes of physical educators in Palestine toward epilepsy and students with epilepsy. The study also aimed to identify the variables that were associated with adequate knowledge and positive attitudes toward epilepsy and students with epilepsy.

Methods: This study was done in a cross-sectional design among physical educators in Palestinian schools. The questionnaire tested knowledge and attitudes of physical educators using 18-item and 12-statement tests, respectively.

Results: Complete questionnaires were returned by 226 physical educators (response rate = 75.3%). The median knowledge score of the physical educators on the 18-item knowledge test was 50% [33.0, 61.0] and the median attitudes score of the physical educators on the 12-statements was 50.0% [42.0, 58.0]. Higher knowledge scores were associated with age, teaching experience, educational level, having known/interacted with people with epilepsy, and receiving education about epilepsy. Higher attitude scores were associated with gender, age, educational level, place of residence, type of school, having known/interacted with people with epilepsy, and receiving education about epilepsy.

Conclusion: Knowledge gaps and negative attitudes toward epilepsy and students with epilepsy were identified among physical educators in Palestine. Appropriately designed interventions are still needed to improve knowledge and correct attitudes of physical educators about epilepsy and students with epilepsy.

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1. Introduction

Epilepsy is the most prevalent chronic neurological condition of the brain after stroke. Epilepsy affects more than 65 million people around the world. In a systematic review and meta-analysis, Fiest et al reported a lifetime prevalence of epilepsy at a rate of 7.60/1000 population (95% CI 6.17–9.38) [1]. Prevalence of epilepsy in low- and middle-income countries was reported at a higher rate compared to high-income countries (8.75/1000; 95% CI 7.23–10.59 vs. 5.18/1000; 95% CI 3.75–7.15). Differences in prevalence and incidence rates were attributed differences in exposure to risk and etiologic factors, method of diagnosis, and other methodological differences [1–4]. In Egypt, the lifetime prevalence of epilepsy in childhood and adolescence was esti-

mated at 9.7/1000 [5]. In the same study, prevalence of epilepsy was reported at a higher rate among children younger than 12 years old compared to adolescents (10.8/1000 vs. 7.2/1000). In Turkey, prevalence of epilepsy among children and adolescence younger than 17 years old was estimated at 8/1000 [6]. In Palestine, little was reported on the incidence and prevalence of epilepsy among the general population. In a comprehensive review of epilepsy in the Arab world, Bhalla et al reported an estimated incidence rate of epilepsy at 10.4 per 100,000 among Palestinians [7].

Epilepsy is often manifested as recurrent seizures. These seizures were reported to affect the quality of life of the affected people including children and adolescents [8]. Epilepsy was also shown to affect the patients psychologically, socially, and economically [9]. Historically, epilepsy has been considered more than a chronic neurological disease of the central nervous system. Through ages, seizures were considered supernatural powers and/or satanic possessions in many cultures [10]. Therefore, people with epilepsy have suffered stigma, prejudice, negative attitudes, and

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discrimination [10–14]. These behaviors have resulted in alienating people with epilepsy by large segments of many societies.

Previous studies showed lack of knowledge and prevalence of negative attitudes toward epilepsy and people with epilepsy among school educators. In a recent study, Sansa et al identified several knowledge gaps with regard to epilepsy and students with epilepsy among school educators in Tunisia [15]. In another study in Niger, Toudou-Daouda and Ibrahim-Mamadou showed that attitudes of school educators toward epilepsy and students with epilepsy were not associated with their teaching experience, level of school, and religion [16]. The authors concluded that school educators needed educational/training sessions on epilepsy. In another study, Vancini et al identified knowledge gaps about epilepsy among school physical educators in Brazil [17]. Jones et al conducted a systematic review of studies reporting on knowledge and attitudes of educators toward epilepsy [18]. Knowledge deficits and negative attitudes were reported in all of the reviewed studies. School educators lacked essential knowledge with regard to seizure management and emergency procedures. The review concluded that educational/training interventions were needed to improve knowledge of school educators about epilepsy.

Experts and professional groups have recommended physical exercise/activity for people with epilepsy including children and adolescents [19–21]. Physical exercise/activity was shown to reduce weight, risks of cardiovascular and endocrine diseases, improve muscle and bone health, improve self-esteem, and reduce stress, signs of depression, and anxiety [19,22,23]. Despite medical recommendations toward encouraging participation of people with epilepsy in physical exercise/activity, children and adolescents with epilepsy were less physically active compared to their healthy sibling peers [24]. Other studies reported low degree of participation of people with epilepsy in physical exercise/activity compared to their age-matched peers [25–27].

Physical education was included in school education in almost all educational systems around the world [28]. Traditionally, students with neurological and neurobehavioral diseases were subjects to exclusion from participation in physical educational sessions and games along with their healthy peers [29–31]. Although some exclusions are motivated by fear of injuries, stigma, prejudice, negative attitudes, and discrimination are believed to be prevalent among physical educators/trainers. It is widely believed that stigma, prejudice, negative attitudes, and discrimination are alimented by ignorance and lack of knowledge about epilepsy and people with epilepsy. International organizations and professional groups like the World Health Organization (WHO), the International League Against Epilepsy (ILAE), the International Bureau of Epilepsy (IBE), and the Institute of Medicine (IOM) launched campaigns to eradicate stigma and discrimination against people with epilepsy [32–36]. Despite these efforts, studies have shown that school educators lack essential knowledge about and hold negative attitudes toward epilepsy and students with epilepsy.

In Palestine, little is known on knowledge and attitudes of school educators, particularly, physical educators with regard to epilepsy and students with epilepsy. The study aimed to test knowledge and attitudes of physical educators in Palestine toward epilepsy and students with epilepsy. The study also aimed to identify the variables that were associated with adequate knowledge and positive attitudes toward epilepsy and students with epilepsy.

2. Methods

2.1. Study design

In a cross-sectional design, knowledge and attitudes of physical educators in different schools across the West Bank of Palestine

were tested in this study. Guidelines used in conducting and reporting cross-sectional studies were adhered to in this study [37–39].

2.2. Study population and sample size calculation

Physical educators in Palestinian schools were the study population in this study. The sample size was calculated using Daniel's equation. Because we aimed to include 1 physical educator from each school, the sample size was calculated based on 2300 schools. The sample size was calculated at a 90% confidence interval (CI) and tolerating a margin of error of 5%. The sample size in this study was 243 physical educators.

The inclusion criteria were as follows: (a) having an academic degree in physical education, (b) teaching physical education in a school in Palestine, (c) willing to respond to knowledge and attitudes items in a questionnaire, and (d) expressing willingness to provide an informed consent.

2.3. Study tool

In this study, the study tool was a questionnaire that was adopted and modified from previous studies [16,17,40–42]. Sociodemographic and professional details of the physical educators like gender, age, professional seniority level (having teaching experience of 10 and more years), place of residence, and type of school in which the physical educator was employed were collected. The physical educators were also asked if they had a family member/close relative/friend with epilepsy, if they have interacted with people/students with epilepsy before, and if they have received education or part of a course on epilepsy during their academic education/training. The questionnaire tested knowledge of physical educators about epilepsy using 18 yes or no questions. Attitudes of the physical educators were assessed using 12 statements. The physical educators had to respond to each statement by either strongly disagree, disagree, neutral, agree, or strongly agree with each statement.

Before the questionnaire was used in the full-scale study, the questionnaire was pilot tested with 20 physical educators who did not participate in the full study. In the pilot study, the 20 physical educators were asked to respond to the questionnaire. The internal consistency of the items in the questionnaire was tested using Cronbach's alpha statistics. It was decided a priori that a Cronbach's alpha value of >0.7 would indicate adequate internal consistency of the items. In this study, the study tool had a Cronbach's alpha of 0.79. To assess if the scores were stable over a short period of time, the rest–retest method was used. The physical educators were asked to respond to the questionnaire. After 30 min to 2 h, the physical educators were asked to respond to the questionnaire once again. Scores obtained in the two rounds were compared using Pearson's correlations. It was decided a priori that a Pearson's correlation coefficient (Pearson's r) of >0.8 would indicate adequate stability. In this study, the Pearson's r was 0.93 which indicate excellent stability of scores over a short period of time.

2.4. Collection of data

In this study, physical educators were invited to take part in the study by responding to the items in the questionnaire. The physical educators were informed that the study was completely voluntary and no incentives were offered to the participants in exchange of their participation in this study.

2.5. Data analysis

For the knowledge items, the physical educators were awarded 1 point for each correct answer and 0 point for each incorrect answer. Scores of the physical educators on the knowledge items could range from 0 to 18. Scores were converted into percentages that could range from 0% to 100%. Similarly for the attitude items, the physical educators were awarded 1 point for each positive attitude and 0 point for each less than positive attitude. Scores of the physical educators on the attitude items could range from 0 to 12. Scores were also converted into percentages that could range from 0% to 100%.

Data were entered into Microsoft Excel and then imported into IBM SPSS. The Kolmogorov–Smirnov test was used to assess the data for normality of distribution. As the data were not normally distributed, nonparametric tests were used to analyze the data and compare differences between categories. The data were expressed using lower quartile (Q1), median (Q2), and upper quartile (Q3). Correlations were investigated using Spearman’s rank correlations. Groups were compared using Mann–Whitney *U* test. A *p*-value of <0.05 indicated statistical significance.

2.6. Ethical considerations

This study was conducted in compliance with the international regulations/guidelines followed in scientific research. The study received approval from the Institutional Review Board (IRB) of An-Najah National University. The physical educators who participated in this study provided informed consents. The anonymity of the participants was preserved and no information leading to the identification of the participants was disclosed.

3. Results

3.1. Characteristics of the physical educators

A total of 300 physical educators were invited. Of those, 226 returned complete questionnaires, giving a response rate of 75.3%. Of the physical educators who participated in this study, 135 (59.7%) were male, and 138 (61.1%) were younger than 35 years. Less than one-third (29.6%) of the physical educators were professionally seniors (having a teaching experience of 10 or more years), about 1 in 5 (19.9%) had a master’s degree, and little more than half (51.8%) taught in elementary schools. Of the physical educators, 22 (9.7%) had a family member/close relative/friend with epilepsy, 45 (19.9%) had interacted with people/students with epilepsy, and 22 (9.7%) had received education/part of a course on epilepsy. Details of the sociodemographic and professional variables of the physical educators who participated in this study are shown in [Table 1](#).

3.2. Knowledge of physical educators about epilepsy

The median knowledge score of the physical educators on the 18-item knowledge test was 50% [33.0%, 61.0]. Of the physical educators, 203 (89.8%) knew that epilepsy was a chronic disease of the brain. On the other hand, 156 (69.0%) of the physical educators did not know that head trauma or brain infection could cause epilepsy. The majority of the physical educators wrongly thought that epilepsy was a psychiatric illness. Of the physical educators, 157 (69.5%) did not think that epilepsy was due to witchcraft and 203 (89.8%) did not think that epilepsy was due to demon possession. Of the physical educators, 135 (59.7%) knew that epilepsy was manifested by convulsions with loss of consciousness. On the other hand, 171 (75.7%) of the physical educators thought that students

Table 1
Sociodemographic and professional variables of the physical educators who participated in this study (n = 226).

Variable	n	%
Gender		
Female	91	40.3
Male	135	59.7
Age (years)		
<35	138	61.1
≥35	88	38.9
Professional seniority level		
<10 years of teaching experience	159	70.4
≥10 years of teaching experience	67	29.6
Educational level		
Bachelor’s degree	181	80.1
Master’s degree	45	19.9
Place of residence		
Rural	91	40.3
Urban	135	59.7
Type of school		
Elementary	117	51.8
Secondary/High	109	48.2
Having a family member/close relative/friend with epilepsy		
No	204	90.3
Yes	22	9.7
Interacted with people/students with epilepsy		
No	181	80.1
Yes	45	19.9
Received education/part of a course on epilepsy		
No	204	90.3
Yes	22	9.7

with epilepsy usually have associated mental retardation, 138 (61.1%) thought that students with epilepsy have a school performance below normal. The majority of the physical educators (80.1%) mistakenly thought that heredity was the main cause of epilepsy and 145 (64.2%) thought that students with epilepsy have intelligence below average. Similarly, the majority of the physical educators (80.5%) mistakenly thought that students with epilepsy do not have correct intelligence like other students and 191 (84.5%) thought that students with epilepsy have a high risk of developing insanity. On the other hand, 146 (64.6%) of the physical educators knew that epilepsy was not a contagious disease, 143 (63.3%) knew that epilepsy was not transmitted by physical contact with patients, their saliva, and/or urine, and 158 (69.9%) did not think that epilepsy was transmitted by contact with the place where the patient fell during the seizure. However, 166 (73.5%) of the physical educators knew that epilepsy was a treatable/controlable disease. Of the physical educators, 135 (59.7%) knew that treatment of epilepsy was based on modern medicine and 68 (30.1%) thought that treatment of epilepsy was based on traditional medicine. Details of the answers of the physical educators on the knowledge items are shown in [Table 2](#).

3.3. Attitudes of physical educators about epilepsy

The median attitude score of the physical educators on the 12 statements was 50.0% [42.0, 58.0]. Of the physical educators, 134 (59.3%) expressed positive attitudes toward practice of sports by children with epilepsy and 155 (68.6%) expressed positive attitudes toward students with epilepsy whose seizures are controlled by medication to be considered as other students with other chronic illnesses. On the other hand, 61.5% of the physical educators thought that students with epilepsy in their classrooms could disrupt the education process in the class and 50.4% of the physical educators thought that having students with epilepsy in the class could provoke bad psychic effects upon the other students. Of the physical educators, 136 (60.2%) thought that students with epilepsy should not be placed in an adapted class for them and 135

Table 2
Responses of the physical educators on the 18-item knowledge test

#	Items	Correct/adapted answer	Answered correctly		Answered incorrectly	
			n	%	n	%
1	Epilepsy is a chronic disease of the brain	Yes	203	89.8	23	10.2
2	Head traumas and/or brain infections can cause epilepsy	Yes	70	31	156	69
3	Epilepsy can be considered as a psychiatric illness	No	49	21.7	177	78.3
4	Epilepsy can be caused by witchcraft	No	157	69.5	69	30.5
5	Epilepsy can be caused by possession by demons	No	203	89.8	23	10.2
6	Epilepsy can be manifested by convulsions with loss of consciousness	Yes	135	59.7	91	40.3
7	Students with epilepsy usually have mental retardation	No	55	24.3	171	75.7
8	Students with epilepsy have a school performance below normal	No	88	38.9	138	61.1
9	Epilepsy is mainly caused by heredity	No	45	19.9	181	80.1
10	Students with epilepsy have intelligence below average	No	81	35.8	145	64.2
11	Students with epilepsy have correct intelligence like other students	Yes	44	19.5	182	80.5
12	Students with epilepsy have a high risk of developing insanity	No	35	15.5	191	84.5
13	Epilepsy is a contagious illness	No	146	64.6	80	35.4
14	Epilepsy can be transmitted by physical contact with patients, their saliva, and/or urine	No	143	63.3	83	36.7
15	Epilepsy can be transmitted by contact with the place where the patient fell during the seizure	No	158	69.9	68	30.1
16	Epilepsy is a treatable or controllable disease	Yes	60	26.5	166	73.5
17	Epilepsy can be managed using modern medicine	Yes	135	59.7	91	40.3
18	Epilepsy can be managed using traditional medicine	No	68	30.1	158	69.9

Table 3
Responses of the physical educators on the 12-item attitude statements

#	Items	Positive attitude	Answered positively		Answered negatively	
			n	%	n	%
1	The practice of physical exercise/sport should be strictly prohibited for students with epilepsy	Strongly disagree	134	59.3	92	40.7
2	Students with epilepsy whose seizures are controlled by medication are like other students with another chronic disease	Strongly agree	155	68.6	71	31.4
3	Having students with epilepsy in your classroom can disrupt the education process in the class	Strongly disagree	87	38.5	139	61.5
4	Having students with epilepsy in the class can provoke bad psychic effects upon the other students	Strongly disagree	112	49.6	114	50.4
5	Students with epilepsy should be placed in an adapted class for them	Strongly disagree	136	60.2	90	39.8
6	I would allow my son/daughter to play/sit in the same classroom with a student with epilepsy	Strongly agree	135	59.7	91	40.3
7	I would allow my son/daughter to marry someone with epilepsy	Strongly agree	111	49.1	115	50.9
8	I would put something in the mouth of students with epilepsy while having seizures to keep the airway open	Strongly disagree	67	29.6	159	70.4
9	I would maintain students with epilepsy on their side while having seizures until the crisis passes	Strongly agree	67	29.6	159	70.4
10	I would clear the airways of students with epilepsy while having seizures if they were not breathing well	Strongly agree	182	80.5	44	19.5
11	At the end of the crisis, I would send students with epilepsy to their homes	Strongly disagree	68	30.1	158	69.9
12	At the end of the crisis, I would take students with epilepsy to the hospital	Strongly agree	181	80.1	45	19.9

(59.7%) thought that they would allow their child to play or sit in the same classroom with a child with epilepsy. On the other hand, 115 (50.9%) of the physical educators would not allow their son/daughter to marry someone with epilepsy. Of the physical educators, 159 (70.4%) thought that it was preferred to put something in the mouth of someone while having an epileptic seizure to keep the airway open. On the other hand, 67 (29.6%) of the physical educators thought that it was preferred to maintain someone while having an epileptic seizure on the side until the crisis passes. Of the physical educators, 182 (80.5%) thought that it was preferred to clear the airways of someone while having an epileptic seizure if the student was not breathing well. Of the physical educators, 158 (69.9%) thought that at the end of the crisis, the student should be sent home. Of the physical educators, 181 (80.1%) thought that at the end of the crisis, the student should be taken to the hospital. Details of the answers of the physical educators on the attitude items are shown in [Table 3](#).

3.4. Association between sociodemographic and professional variables of the physical educators with knowledge and attitude scores

There was a moderate and positive correlation between knowledge and attitude scores (Spearman’s rho = 0.53, p-value = 0.000).

Knowledge scores of physical educators who were 35 years and older, had teaching experience of 10 and more years, had a master’s degree, had a family member/close relative/friend with epilepsy, interacted with people/students with epilepsy, and received education/part of a course on epilepsy were significantly higher compared to those who were younger than 35 years, had teaching experience of less than 10 years, had a bachelor’s degree, did not have a family member/close relative/friend with epilepsy, did not interacted with people/students with epilepsy, and did not received education/part of a course on epilepsy. Details of the association between sociodemographic and professional variables of the physical educators with knowledge scores are shown in [Table 4](#).

Attitude scores of physical educators who were female, were 35 years and older, had a master’s degree, resided in urban areas, taught in elementary schools, had a family member/close relative/friend with epilepsy, interacted with people/students with epilepsy, and received education/part of a course on epilepsy were significantly higher compared to those who were male, younger than 35 years, had a bachelor’s degree, resided in rural areas, taught in secondary/high schools, did not have a family member/close relative/friend with epilepsy, did not interacted with people/students with epilepsy, and did not received education/part of a course on epilepsy. Details of the association between sociodemo-

Table 4
Association between sociodemographic and professional variables of the physical educators with knowledge and attitude scores

Variable	n	%	Knowledge			p-value	Attitude			p-value
			Q1	Median	Q3		Q1	Median	Q3	
Gender										
Female	91	40.3	22.0	50.0	67.0	0.358	25.0	50.0	83.0	<0.001
Male	135	59.7	39.0	50.0	61.0		42.0	42.0	58.0	
Age (years)										
<35	138	61.1	22.0	44.0	61.0	<0.001	42.0	46.0	50.0	<0.001
≥35	88	38.9	44.0	56.0	67.0		46.0	58.0	64.8	
Professional seniority level										
<10 years of teaching experience	159	70.4	22.0	50.0	61.0	0.009	42.0	50.0	75.0	0.653
≥10 years of teaching experience	67	29.6	44.0	50.0	67.0		42.0	50.0	58.0	
Educational level										
Bachelor's degree	181	80.1	25.0	44.0	61.0	<0.001	42.0	42.0	62.5	0.007
Master's degree	45	19.9	50.0	61.0	67.0		50.0	50.0	58.0	
Place of residence										
Rural	91	40.3	28.0	56.0	67.0	0.132	25.0	42.0	50.0	<0.001
Urban	135	59.7	33.0	44.0	61.0		42.0	50.0	83.0	
Type of school										
Elementary	117	51.8	36.0	50.0	67.0	0.087	42.0	50.0	62.5	0.006
Secondary/High	109	48.2	22.0	50.0	61.0		42.0	50.0	58.0	
Having a family member/close relative/ friend with epilepsy										
No	204	90.3	28.0	47.0	61.0	<0.001	42.0	50.0	58.0	<0.001
Yes	22	9.7	67.0	72.0	72.0		75.0	83.0	83.0	
Interacted with people/students with epilepsy										
No	181	80.1	25.0	44.0	56.0	<0.001	42.0	42.0	58.0	<0.001
Yes	45	19.9	64.0	67.0	72.0		50.0	50.0	83.0	
Received education/part of a course on epilepsy										
No	204	90.3	28.0	47.0	61.0	<0.001	42.0	50.0	58.0	<0.001
Yes	22	9.7	67.0	72.0	72.0		75.0	83.0	83.0	

graphic and professional variables of the physical educators with attitude scores are shown in Table 4.

4. Discussion

Encouraging people with epilepsy to engage in physical exercise/activity rather than restricting them from participation has been recommended by many experts in professional groups. Despite these recommendations, engagement of people with epilepsy including children and adolescents is still less than optimal. Apart from fear of injuries, lack of participation in physical exercise/activity could also be alimeted by lack of knowledge about epilepsy, stigma, misconceptions, and negative attitudes held by physical educators/trainers toward students with epilepsy. This study sought to assess knowledge and attitudes of physical educators in Palestine toward epilepsy and students with epilepsy for the first time. The study also identified the variables that were associated with higher knowledge and attitude scores. In this study, several knowledge deficits and negative attitude areas need to be addressed among physical educators in Palestine. Findings of this study might be informative for decision makers in academia, healthcare authorities, professional groups, and patient advocacy groups who might be interested in designing appropriate measures to improve knowledge and correct attitudes of physical educators toward epilepsy and students with epilepsy.

In this study, the median knowledge score and percentage of incorrect answers on the 18-item knowledge tests indicated knowledge deficits among physical educators in Palestine with regard to etiology of epilepsy, causes/risk factors, nature of the disease, intelligence of people with epilepsy, and treatment of the disease. In this study, although the majority of the physical educators could recognize that epilepsy was a chronic disease of the brain, a considerable percentage of them did not know that many people were at risk of developing epilepsy as a result of head trauma and/or infections of the central nervous system. Knowledge deficits with regard to etiology and causes/risk factors of epilepsy were

previously recognized among school educators in Niger [16], India [43], Ethiopia [44], and Tunisia [15], among others. In this study, the majority of the physical educators thought that epilepsy was a psychiatric illness, students with epilepsy also have associated mental retardations, students with epilepsy have a school performance below normal, student with epilepsy do not have correct intelligence like other students, and students with epilepsy have a high risk of developing insanity. Although the majority of the physical educators did not think that epilepsy was caused by witchcraft and possession by demons, 30.5% and 10.2% thought so. Probably, lack of knowledge about the nature of epilepsy could alimnt stigma, misconceptions, prejudice, and negative attitudes toward students with epilepsy. Previous studies also showed that school educators held negative attitudes, stigma, misconceptions, prejudice against students with epilepsy [15,16,43,44]. In this study, about one-third of the physical educators thought that epilepsy was contagious or could be transmitted through physical contact with the patient, through body fluids, or though contact with the place where the person fell during the seizure. These misconceptions and myths might alimnt negative attitudes toward befriending, marrying, playing with, and/or sitting with people with epilepsy and in extreme cases helping patients while experiencing seizures. Together, these findings might suggest that there is a pressing need to design appropriate interventions to dispel these myths and stigma.

Findings of this study showed that 40.7% of the physical educators though that practice of sport should be strictly prohibited for children with epilepsy. These findings were alarming as physical educators are responsible for physical education and game sessions in schools. These findings contradicted with the modern professional and medical recommendations of encouraging people with epilepsy to remain physically active. Currently, the American Academy of Pediatrics, the American Medical Association, and the International League Against Epilepsy encourage engagement of people with epilepsy in physical exercise/activity [19]. Physical educators should be educated about the benefits and risks of physical exercise/activity for people with epilepsy. Additionally, physi-

cal educators should be educated how to include school students with epilepsy in physical exercise/activity and sport sessions. Physical educators should know that there are few sports that could be restricted for patients with epilepsy, otherwise in general, people with epilepsy can be included without restrictions in aerobic physical exercises/activities like running/jogging, handball, basketball, football, stationary bike, aerobics, and gymnastics that do not involve heights [19]. It is noteworthy mentioning that people with epilepsy whose seizures are poorly controlled, those who recently initiated or stopped therapy with antiepileptic drugs, and those with comorbidities might need further evaluation by specialty services before a case-by-case recommendation can be made. More than half of the physical educators in this study thought that students with epilepsy could disrupt the education process and could provoke bad psychic effects upon the other students. Additionally, about 40% of the physical educators thought that students with epilepsy should not be included in classes with other students, about the same percentage would not allow their child to play or sit in the same classroom with a child with epilepsy, and more than half (50.9%) of the physical educators would not allow their child to marry someone with epilepsy. These percentages were alarming and might highlight the pressing need to address stigma and negative attitudes toward students with epilepsy among physical educators in particular and school teachers in general [15,16,43,44]. In this study, the majority would dangerously put something in the mouth of someone while having an epileptic seizure in an attempt to keep the airway open. In case so, this might suffocate the patients and put their life in danger. Again, the same percentage would not maintain the patient on the side until the crisis passes. These percentages indicated lack of knowledge of adequate practices with regard to helping patients with epilepsy while experiencing seizures [15,16,43,44]. Together, these results might highlight the need to train physical educators on how to help students with epilepsy while experiencing seizures.

In this study, knowledge scores positively correlated with attitude scores. These findings were not surprising and were consistent with those previously shown among healthcare professionals [45–47]. Knowledge scores were associated with age, length of teaching experience, educational level, having known/interacted with a patient with epilepsy, and receiving a course/education on epilepsy. On the other hand, attitude scores were associated with gender, age, educational level, place of residence, type of school, having known/interacted with a patient with epilepsy, and receiving a course/education on epilepsy. Findings of this study might suggest that improving knowledge of physical educators about epilepsy might also improve their attitudes and reduce misconceptions and stigma against students with epilepsy. Decision makers might need to design appropriate interventions to improve knowledge of younger physical educators and increase exposure of physical educators to people with epilepsy. Findings of this study might have implications on improving future inclusion of students with epilepsy in physical education sessions in schools.

5. Strengths and limitations

Findings of this study might be interpreted after considering a number of strength and limitation points. First, this study was the first to assess knowledge and attitudes of physical educators in Palestine with regard to epilepsy and people with epilepsy. Second, the sample recruited in this study was diversified in terms of gender, age groups, professional seniority, educational level, place of residence and geographical distribution, type of school, interaction with people with epilepsy, and receiving education on epilepsy. Such diversity might add validity and strength to the findings of this study. Third, knowledge and attitudes were

assessed using a validated scale. The tool was pilot tested for rest–retest reliability and internal consistency. Finally, appropriate statistical tests were used to investigate correlations and associations between variables of the physical educators with knowledge and attitude scores.

This study was also associated with a number of limitations. First, this study was conducted in a cross-sectional design. Observational studies are limited by design and their findings are time-bound. Interventional studies with the aim of improving knowledge and correcting attitudes of physical educators could bring more superior results. Second, the sample size used in this study was relatively small. Larger samples should have produced superior results. Third, the sample size was calculated at a 90% CI. Using a 90% CI yielded a small sample size. The sample size should have been more adequate if calculated at a 95% CI. Fourth, responses of the participants were self-reported. Respondents might have been biased by attempting to provide more positive attitudes. Therefore, the attitude scores obtained in this study might be overestimation of the attitudes of the physical educators with regard to epilepsy and students with epilepsy.

6. Conclusion

In conclusion, knowledge gaps and negative attitudes toward epilepsy and students with epilepsy were identified among physical educators in Palestine. Physical educators who were older, with teaching experience of 10 years and longer, having higher education, having interacted with people with epilepsy, and having received education on epilepsy reported higher knowledge scores about epilepsy. Physical educators who were female, older, having higher education, resided in urban areas, worked in elementary schools, having interacted with people with epilepsy, and received education on epilepsy reported higher attitude scores about epilepsy. Appropriately designed interventions are still needed to improve knowledge and correct attitudes of physical educators about epilepsy and people with epilepsy.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Data statement

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

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