

Knowledge of and attitudes towards epilepsy among teachers: A systematic review

Chloe Jones^{1,2}

Patricia Atkinson³

J Helen Cross^{1,2,4}

Colin Reilly^{1,2}

Affiliations

¹Research Department, Young Epilepsy, Lingfield, Surrey, RH7 6PW, UK.

²UCL Great Ormond Street Institute of Child Health (ICH), 30 Guilford Street
London WC1N 1EH UK.

³Child Development Centre, Crawley Hospital, Crawley, West Sussex. RH11 7DH.

⁴*Great Ormond Street Hospital for Children NHS Trust, Great Ormond Street, London
WC1N 3JH, UK.*

Correspondence to: Colin Reilly, Research Department, Young Epilepsy, Lingfield,
Surrey, RH7 6PW, UK. creilly@youngepilepsy.org.uk 01342 832243

Number of words:

Number of figures: 2

Number of tables: 3

Short title: Teacher knowledge of and attitudes towards epilepsy

Keywords: epilepsy, children, teachers, attitudes, knowledge

Abstract

The objective was to systematically review research which has focussed on knowledge of, and attitudes among teachers towards epilepsy.

EMBASE, PUBMED, PsycINFO, Google scholar and Cochrane library databases were searched from 2000 to 2017. Cross-sectional and intervention studies were included and analysed for quality. Thematic analysis was used to identify common themes in the results. 54 eligible studies (total participants 17,256 in 27 different countries) were identified in the search period, including seven studies which focussed on assessing attitudes and knowledge before and after an educational intervention. It was not possible to systematically analyse levels of knowledge and nature of attitudes due to the wide variety of mostly bespoke study specific instruments used. Few studies employed valid and reliable instruments. Thematic analysis revealed three main themes in the results: 1) deficits in knowledge and negative attitudes were pervasive across all studies 2.) teachers often had a negative attitude towards participation of children with epilepsy in physical activities/sport 3.) teachers often expressed limited knowledge of seizure management/emergency procedures. There was a lower level of knowledge and more negative attitudes amongst teachers towards epilepsy compared to comparison conditions. All studies focussing on interventions showed that at least some aspects of knowledge and attitudes improved as a result of teacher participation in an educational intervention but study quality was universally rated as low. A higher level of education and experience of teaching a child with epilepsy was significantly associated with greater knowledge in a number of studies. Additionally, having experience of teaching a child with epilepsy and greater assessed knowledge of epilepsy were associated with more positive attitudes. The wide range of methods used makes it difficult to generalise regarding level of attitudes and knowledge among teachers towards epilepsy. Nevertheless, all studies indicate that there are some deficits in knowledge of, and negative attitudes towards epilepsy among teachers. It would appear that knowledge and attitudes can be improved by educational interventions. Future research should focus on developing psychometrically sound assessment instruments that can be used globally and on identifying the most effective ways of delivering efficacious educational initiatives employing robust study designs.

1. Introduction

Population-based studies of long-term outcome in childhood epilepsy indicate that the condition is associated with significant adverse outcomes compared with the normal population across a range of domains including education and employment^{1,2}. In addition to seizures, children with epilepsy are at increased risk for learning and behavioural difficulties compared to children without epilepsy and children with other chronic medical conditions^{3,4}. Additionally the condition is often associated with significant stigma which can result in significant impairments in quality of life⁵ and mental health difficulties⁶. Stigma and social discrimination are often the most difficult aspects of having epilepsy for individuals with epilepsy especially in resource poor settings⁷.

School-related difficulties, as evidenced by receipt of special educational services, are common in children with epilepsy⁸. Cognitive, behavioral, motor and academic difficulties are often associated with the condition^{9,10}. These additional difficulties often have a greater impact on quality of life than the epileptic seizures¹¹ and contribute most to the economic cost of the condition¹². However, the difficulties are often unrecognized despite having a very significant impact on school performance⁹.

A number of studies have highlighted a significant gap in teachers' knowledge of epilepsy and highlighted the presence negative attitudes¹³. From a list of seven medical conditions, teachers reported lowest familiarity with epilepsy¹⁴. Teachers including those who were teaching a child with epilepsy at the time, are often not aware of the high risk for learning difficulties in individuals with epilepsy¹⁴ and in many cases, parents are likely to be the main providers of information to teachers of children with epilepsy¹⁴. Studies have also highlighted teachers' concerns about emergency procedures for students with epilepsy, apprehension in responding to seizures, a lack of resources and knowledge for meeting the needs of a child experiencing a prolonged convulsive seizure, and a fear of liability¹⁵.

Given the potential wide ranging impact of epilepsy on a child's education it is important to understand the levels of knowledge among teachers as well as their attitudes towards epilepsy. The aim of this paper is to systematically review studies which have focused on levels of knowledge and attitudes towards epilepsy among teachers. Studies which focus on interventions to improve knowledge and attitudes are also reviewed. Additionally, the review focusses on factors significantly associated with knowledge and attitudes.

2. Methods

The PRISMA (Preferred Reporting Items for Systematic Review and Meta-Analyses) guidelines¹⁶ were followed in order to undertake the systematic review of the literature and to present the results. A literature search was conducted on 15th January 2018. The electronic databases PubMed, Cochrane CENTRAL, EMBASE, ERIC, PsychINFO and Google Scholar were searched using different combinations of the following keywords: teachers, knowledge, attitudes, epilepsy, perception, between the period 1st January 2000 to 31st December 2017. The combinations searched are in supplement 1. Inclusion criteria were: at least some teachers (this included teachers in training) in the sample, a focus on either attitudes towards and knowledge of epilepsy or both, published in English. Studies could be cross sectional or intervention studies

i.e. studies which assessed attitudes and knowledge before and after an educational intervention. Papers were excluded where there was not a clearly defined measure of attitudes/knowledge or the participants did not include teachers. A data extraction form was developed (see supplement 2) which focussed on extracting the main study characteristics and results. Data was independently extracted by two reviewers (CJ & CR) with any differences being resolved by consensus. The review was registered at https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=91026.

Due to the heterogeneity of methods used it was not possible to systematically review/analyse levels of knowledge or nature of attitudes among teachers. Given this it was decided to conduct a qualitative analysis using thematic analysis¹⁷ to identify themes in the results regarding levels of knowledge and nature of attitudes among teachers. Thematic analysis is a method for identifying and subsequently analyzing and reporting patterns or themes with data. The process of thematic analysis involved the two raters (CR and CJ) familiarizing themselves with the results in all studies. The results sections in all papers were read through in their entirety by both researchers. At this stage, both researchers took notes to hint at possible themes. The results section of each paper were then blindly rated by both researchers using the generated themes on three separate occasions. After each occasion the raters met to discuss discrepancies i.e., lack of agreement regarding where a response should go in terms of themes and agreement was reached before the next coding. The final coding was performed unblinded by both researchers together in order to facilitate agreement on themes, and it is this final assignment of themes which is reported on in the current paper.

In reporting of results in the intervention studies the term 'significant' is used to denote associations between variables that were statistically significant at the $p < 0.05$ level.

Study quality

All intervention studies were assessed for quality using the Effective Public Health Practice Project (EPHPP) tool quality rating tool (http://www.ehphp.ca/PDF/Quality%20Assessment%20Tool_2010_2.pdf accessed May 3rd 2018). This measure includes six questions focusing on selection bias study design, confounders, blinding, data collection methods, and withdrawals and drop-out. Ratings on the six questions are used to derive a global rating which can be 'Strong' (no weak ratings), 'Moderate' (one weak rating) and 'Weak' (two or more weak ratings) and these are reported on in the current study.

Study quality for the cross section studies were based on two questions from the EPHPP focussing on selection bias and data collection methods. On each of these two questions a study was rated as 'Strong', 'Moderate' or 'Weak'. Each study was given a rating for both these questions.

Study quality for all studies were rated together by CJ and CR.

3. Results

Figure 1 shows the search process. Fifty-five studies were identified that met eligibility criteria and data was subsequently extracted on these studies. During data extraction it was noted that two studies^{18,19} reported on the same dataset using the same analysis and were identical with respect to study findings. One of these, the study which was published later¹⁹ was subsequently removed from further analysis. Details on the remaining 54 studies are in Table 1 (cross-sectional studies) and table 2 (intervention studies).

Forty-seven studies were cross-sectional focussing on level of knowledge about or nature of attitudes towards epilepsy whilst seven focused on knowledge and attitudes amongst teachers before and after an educational intervention. Studies took place in 27 different countries. The country where studies were most often undertaken was Nigeria (7) followed by Italy and US (both 5). Study locations are categorised into WHO regions⁷¹ in Figure 2. The total number of respondents was 17,256 (range 35-1404; mean 319.56). In the 52 studies where gender of the teacher was reported 34% (5,724) were male and 11,075 (66%) were female. The response rate to the surveys was reported in 35 of the studies and ranged from 9.3% to 100%. Sampling was random in 29 (54%) cases indicating that either schools and/or teachers were randomly selected for inclusion.

In 83% (n=45) of the studies the surveys used were bespoke in that they were created specifically for the study or used for the first time in that study. Of the nine studies that employed surveys that were standardised i.e. had previously been used with data available on psychometric properties five studies utilised the Attitudes Towards People with Epilepsy scale (ATPE)⁷². Forty-eight of the studies considered knowledge and attitudes, four knowledge alone and two attitudes alone. With respect to aspects of attitudes considered, 26 of the studies consider social contacts, 22 marriage, 14 driving, 20 employment, 10 aspects of education (predominantly inclusion of the child with epilepsy in the classroom) and seven participation in sports/physical activities. With respect to aspects of knowledge considered 41 of the studies focussed on management of seizures and 39 on beliefs about causes of epilepsy.

With respect to study quality only three^{44,49,50} of the cross-sectional studies were rated as 'strong' with respect to both selection bias and data collection methods.

3.1 Level of knowledge and nature of attitudes

It was not possible to conduct any systematic analyses of the studies regarding the levels of knowledge or attitudes towards epilepsy among teachers. The majority of surveys used were bespoke and contained different question types i.e. categorical questions, Likert formats or open questions. Reports of results of levels of knowledge or nature of attitudes were often based on analysis of single questions and/or non-objective criteria i.e. good/poor knowledge/attitudes based on subjective judgement. Even in the studies where a validated measure was used, the same version of the test or reporting of the responses was not uniform across studies.

The qualitative process of thematic analysis study resulted in the following agreed themes: 1.) Deficits in knowledge and negative attitudes were pervasive across all studies. 2.) Teachers had a negative attitude towards participation of individuals with epilepsy in physical activities or sport^{18,21,30,33,47,48,61}. This included a belief that

children/individuals with epilepsy should not participate in certain sports/physical activities or that their participation should be restricted.

3.2 Studies which included comparison conditions

Five studies included questions which focussed on knowledge or attitudes towards other medical or neurodevelopmental conditions in comparison with epilepsy. Aydin & Yildiz⁶⁹ compared knowledge of and attitudes towards epilepsy and asthma in a sample of Turkish teachers. The teachers had significantly more negative attitudes towards children with epilepsy than asthma on all nine attitude questions in the survey which included having a child with epilepsy/asthma in their class, concerns about the child's aggression, placement a special school, objections from parents if the child with epilepsy was in the class, participation in sports and encouraging their own child to play/sit beside a child with epilepsy. However, significantly more teachers felt that they could manage an epileptic seizure compared with an asthma attack. With respect to knowledge, significantly more teachers felt incorrectly that epilepsy was a psychological disease and was related to poor living conditions compared with asthma. Kampra et al.²⁵ reported that with respect to hindering school attendance Greek teachers felt that heart disease was most the important followed by epilepsy, diabetes and asthma. Toli et al³⁸ reported that Greek teachers perceived epilepsy as the most difficult condition to manage in school compared to cancer, diabetes and asthma. Bishop and Boag (2006)¹³ considered teacher familiarity with seven conditions. Epilepsy was the condition with lowest familiarity and thus lower than in order of most familiarity ADHD, Diabetes, Asthma, HIV/AIDS, mental retardation and autism. Olson et al.⁵⁷ reported that teachers in the US felt that epilepsy and AIDS were the conditions with the greater overall impact on schooling. The other conditions were asthma, leukaemia, diabetes and congenital heart disease. Epilepsy was most often endorsed as the condition where other children would be disrupted by the presence of a child with epilepsy and teachers believed that children with epilepsy were most likely to more teacher attention and parent contact compared with the other conditions. Additionally, epilepsy was the condition most of with respect to creating a medical emergency in the school.

3.3 Intervention studies

Studies which have focussed on interventions are in Table 2.

The follow up-period after intervention ranged from immediately post intervention⁷⁰ to one year follow up⁶⁵. The interventions where described mostly consisted of once-off presentation/workshops. In all cases at least some aspects of attitudes or knowledge significantly improved as a result of participation in the intervention. However, global rating of study quality was weak for all interventions studies (see supplement 3 for all ratings). None of the studies involved randomisation or blinding.

3.4 Factors considered as possibly associated with knowledge/attitudes knowledge

Table 3 shows the factors considered as possibly associated with levels of knowledge or attitudes towards epilepsy among teachers.

The influence of gender was considered in 13 studies (12 knowledge and 11 attitudes) and results were inconsistent for both knowledge and attitudes. A significant difference was found for knowledge in three studies. Males had significantly higher knowledge in

two studies^{21,45} and females in one study²⁹. A significant difference between males and females in relation to attitudes was found in six studies. Females had significantly better attitudes in four studies^{33,34,13,54} and males in one study²¹ while males had significantly more negative attitudes in one study⁴⁷.

Age of the teachers was considered in 12 studies for knowledge and eight for attitudes and again results were inconsistent regarding direction of association where a significant difference was found. In two studies younger teachers had significantly better knowledge than older teachers^{18,50}. In two studies younger age was associated with better attitudes^{21,47} whilst in one study better attitudes were found in older teachers⁶³.

Level of education was considered in 16 studies focusing on knowledge and 10 on attitudes and there was a consistent association between higher level of education and knowledge. A higher level of education was associated with significantly better knowledge in eight studies^{27,29,32,34,37,46,13,63} and with better attitudes in two studies^{13,54}. Number of years teaching was considered in 13 studies focusing on knowledge and 11 focussing on attitudes. Three studies showed a significant positive relationship between number of years teaching and knowledge^{24,32,13} and four showed a significant negative relationship^{21,29,18,50}. Four studies showed a significant positive relationship between numbers of years teaching and attitudes^{24,13,58,63}.

Ten studies considered the role of previous experience/contact with a person with epilepsy on knowledge and 12 on attitudes and a consistent association between previous/contact experience and better attitudes was evident. Five studies showed a significant positive association between previous contact/experience and knowledge^{24,37,42,14,13} and ten showed a significant positive association between previous contact/experience and attitudes^{24,27,42,49,50,13,53,54,55,58}. Marital status was considered in six studies on knowledge and six on attitudes. In one study married teachers had significantly better knowledge²⁹ and in another study single teachers had significantly better knowledge¹⁸. In one study married teachers had significantly better attitudes²⁴. Location was included as a consideration in five studies on knowledge and six studies on attitudes. In two studies urban residence was associated with significantly better knowledge^{25,45}. In two studies urban residence was significantly associated with better attitudes^{13,53}. In the four studies where a possible association between knowledge and attitudes was considered a significant positive association was noted^{27,37,49,50}.

4. Discussion

This systematic review provides a comprehensive overview on studies which have focused on levels of knowledge and attitudes towards epilepsy among teachers. Additionally, the review provides for a consideration of factors associated with knowledge and attitudes as well as the impact of interventions to improve knowledge and attitudes among teachers. This synthesis of the literature can inform directions for policy and future research directions. Despite the heterogeneity in assessment approaches the review suggest that there are sufficient gaps in knowledge and presence of a significant degree of negative attitudes among teachers to warrant concern. The results of the limited number intervention studies suggest however, that

targeted educational initiatives can positively impact knowledge and reported attitudes but study quality was universally low.

Studies focusing on teacher attitudes and knowledge on all continents in the study area with the exception of Oceania have been published in the period considered in this review. This highlights that teacher attitudes towards and knowledge of epilepsy is a global issue. The wide variation in survey instruments used makes it impossible to compare results between studies or across countries but the qualitative analysis suggest that attitudes and knowledge are a concern in all countries where they have been assessed. Limited knowledge and negative attitudes among teachers are likely to add to the challenges faced by children with epilepsy who already are a group at increased risk for cognitive, behavioral and academic difficulties^{3,4,10}. The results of this review suggest that attitudes towards participation in physical activities are particularly negative. People with epilepsy have often been advised against participating in sports and exercise because of fear, overprotection and ignorance^{73,74}. However, The International League Against Epilepsy (ILAE) Task Force Report on Sports and Epilepsy emphasizes the importance of sport and exercise in epilepsy due to the positive medical and psychosocial effects that there are a few sports that should be off limits provided appropriate individualized risk assessment has been carried out⁷⁵. Given this, a particular focus on improving attitudes towards physical activity among teachers children with epilepsy will be useful. Another theme that emerged from the analysis was that teachers often felt ill equipped to deal with management of seizures and administration of emergency medication. A previous review focusing on emergency medication practices in six European countries identified that existing legal frameworks are vague and open to interpretation¹⁵. Additionally, it was suggested that whether a child receives rescue medication at school depends primarily on the availability of a willing teacher¹⁵. A study focussing on the training of preschool teachers in the administration of rescue medication showed that such training improved both self-confidence but also reduces errors in administration of medication⁷⁶. Thus training as well as comprehensive guidelines may be needed to ensure that teachers feel comfortable administering emergency medication⁷⁷.

The studies which have compared epilepsy to other chronic medical conditions indicate that not only have teachers limited knowledge of epilepsy but have more negative attitudes towards it. This highlights that even though school professionals may have positive attitudes about children with chronic health conditions⁵⁷ concern about specific diseases such as epilepsy persist. In the case of epilepsy, parents are often the sole providers of disease information¹⁴ but school professionals often only feel confident dealing with the situation when someone perceived to be an expert in epilepsy visits that school⁷⁹. This increases the risk that educational professionals' concerns may not be addressed⁵⁷ and the need for epilepsy professionals to support parents in informing educational professional about the condition.

This review included seven intervention studies to improve knowledge and attitudes and in all cases improvements were noted indicating that educational interventions are likely to be useful. The areas where improvements were noted varied significantly across studies probably reflecting the differing focus of the interventions. Therefore, identifying what aspects of the interventions are mostly successful with respect to which aspects of knowledge and attitudes is difficult. Additionally, none of the studies

included control group or randomization highlighting the need for more robust study design in this area.

Regarding factors associated with increased knowledge, previous/current contact/experience with a child with epilepsy was associated with improved knowledge in most studies where it was considered suggesting that teachers may learn on the job when they come into contact with a child with epilepsy. Better attitudes were also associated with contact with a child with epilepsy perhaps decreasing fear of the unknown. Better attitudes were associated with better knowledge emphasizing the positive role of knowledge based interventions to increase not only knowledge but also attitudes. Future intervention studies should include more robust study design including randomized controlled studies. Educational interventions in epilepsy employing RCT designs have been successfully used to improve student knowledge of and attitudes towards epilepsy⁷⁹ and individuals' knowledge of epilepsy⁸⁰. Online training to reduce stigma in young adults has been successful⁸¹ and the use of online training for teachers should also be evaluated to maximize participation. Multisite studies across countries using agreed up on assessment methods to assess attitudes and knowledge but also interventions should be considered. The development of education programs should be done collaboratively with teachers, parents and young people so as they address the areas important stakeholders. Follow up over a long period of time is needed to assess whether knowledge gains and attitude changes are sustained.

5. Summary and conclusion

Deficient knowledge and negative attitudes towards epilepsy among teachers are found in all parts of the world where they have been studied. Educational interventions appear to be useful in improving knowledge and attitudes. However, better quality research is needed employing more robust study design and to develop a better understanding of what negative attitudes exists and what are the most effective methods of improving both attitudes and knowledge.

References

- [1] Geerts A, Brouwer O, van Donselaar C, Stroink H, Peters B, Peeters E, Arts WF. Health perception and socioeconomic status following childhood-onset epilepsy: The Dutch study of epilepsy in childhood. *Epilepsia*. 2011 Dec 1;52(12):2192-202.
- [2] Jalava M, Silanpää M, Camfield C, et al. Social adjustment and competence 35 years after onset of childhood epilepsy: a prospective controlled study. *Epilepsia* 1997;38:708–715.
- [3] Baillet LL, Turk WR. The impact of childhood epilepsy on neurocognitive and behavioral performance: a prospective longitudinal study. *Epilepsia*. 2000 Apr 1;41(4):426-31.
- [4] Davies S, Heyman I, Goodman R. A population survey of mental health problems in children with epilepsy. *Developmental medicine and child neurology*. 2003 May;45(5):292-5.

- [5] Wu YP, Follansbee-Junger K, Rausch J, Modi A. Parent and family stress factors predict health-related quality in pediatric patients with new-onset epilepsy. *Epilepsia*. 2014 Jun 1;55(6):866-77.
- [6] Funderburk JA, McCormick BP, Austin JK. Does attitude toward epilepsy mediate the relationship between perceived stigma and mental health outcomes in children with epilepsy?. *Epilepsy & Behavior*. 2007 Aug 31;11(1):71-6.
- [7] Jacoby A, Snape D, Baker GA. Epilepsy and social identity: the stigma of a chronic neurological disorder. *The Lancet Neurology*. 2005 Mar 1;4(3):171-8
- [8] Berg AT, Smith SN, Frobish D, Levy SR, Testa FM, Beckerman B, Shinnar S. Special education needs of children with newly diagnosed epilepsy. *Developmental medicine and child neurology*. 2005 Nov;47(11):749-53.
- [9] Reilly C, Atkinson P, Das KB, Chin RF, Aylett SE, Burch V, Gillberg C, Scott RC, Neville BG. Neurobehavioral comorbidities in children with active epilepsy: a population-based study. *Pediatrics*. 2014 Jun 1;133(6):e1586-93.
- [10] Fastenau PS, Shen J, Dunn DW, Austin JK. Academic underachievement among children with epilepsy: proportion exceeding psychometric criteria for learning disability and associated risk factors. *Journal of learning disabilities*. 2008 May;41(3):195-207.
- [11] Baca CB, Vickrey BG, Caplan R, Vassar SD, Berg AT. Psychiatric and medical comorbidity and quality of life outcomes in childhood-onset epilepsy. *Pediatrics*. 2011 Nov 21:peds-2011.
- [12] Hunter RM, Reilly C, Atkinson P, Das KB, Gillberg C, Chin RF, Scott RC, Neville BG, Morris S. The health, education, and social care costs of school-aged children with active epilepsy: A population-based study. *Epilepsia*. 2015 Jul 1;56(7):1056-64.
- [13] Bishop M, Boag EM. Teachers' knowledge about epilepsy and attitudes toward students with epilepsy: results of a national survey. *Epilepsy & Behavior*. 2006 Mar 1;8(2):397-405.
- [14] Wodrich DL, Jarrar R, Buchhalter J, Levy R, Gay C. Knowledge about epilepsy and confidence in instructing students with epilepsy: Teachers' responses to a new scale. *Epilepsy & Behavior*. 2011 Feb 1;20(2):360-5.
- [15] Wait S, Lagae L, Arzimanoglou A, Beghi E, Bennett C, Cross JH, Mifsud J, Schmidt D, Harvey G. The administration of rescue medication to children with prolonged acute convulsive seizures in the community: what happens in practice?. *European Journal of Paediatric Neurology*. 2013 Jan 1;17(1):14-23.
- [16] Moher D, Liberati A, Tetzlaff J, Altman DG, Prisma Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS medicine*. 2009 Jul 21;6(7):e1000097.

- [17] Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative research in psychology*. 2006 Jan 1;3(2):77-101.
- [18] Eze CN, Ebuehi OM. Improving First Aid Management of Epilepsy by Trainee Teachers of the Federal College of Education (Technical), Akoka–Lagos, South West Nigeria–Can Health Education have an Effect?. *Nigerian quarterly journal of hospital medicine*. 2013;23(4):257-68
- [19] Eze CN, Ebuehi OM, Brigo F, Otte WM, Igwe SC. Effect of health education on trainee teachers' knowledge, attitudes, and first aid management of epilepsy: An interventional study. *Seizure-European Journal of Epilepsy*. 2015 Dec 1;33:46-53.
- [20] Quereshi C, Standing HC, Swai A, Hunter E, Walker R, Owens S. Barriers to access to education for young people with epilepsy in Northern Tanzania: A qualitative interview and focus group study involving teachers, parents and young people with epilepsy. *Epilepsy & Behavior*. 2017 Jul 1;72:145-9.
- [21] Elhassan MA, Alemairy AA, Amara ZM, Hamadelneel AA, Mohamed AH, Elaimer AA. Epilepsy: Knowledge, Attitude, and Practice Among Secondary School Teachers in Khartoum State. *Neurology and therapy*. 2017 Dec 1;6(2):225-35.
- [22] Berhe T, Yihun B, Abebe E, Abera H. Knowledge, attitude, and practice about epilepsy among teachers at Ethio-National School, Addis Ababa, Ethiopia. *Epilepsy & Behavior*. 2017 May 1;70:150-3.
- [23] Gebrewold MA, Enquselassie F, Teklehaimanot R, Gugssa SA. Ethiopian teachers: their knowledge, attitude and practice towards epilepsy. *BMC neurology*. 2016 Dec;16(1):167.
- [24] Al-Hashemi E, Ashkanani A, Al-Qattan H, Mahmoud A, Al-Kabbani M, Al-Juhaidli A, Jaafar A, Al-Hashemi Z. Knowledge about epilepsy and attitudes toward students with epilepsy among middle and high school teachers in Kuwait. *International journal of pediatrics*. 2016;2016.
- [25] Kampra M, Tzerakis NG, Losidis S, Katsarou E, Voudris K, Mastroianni S, Mouskou S, Siatouni A, Gatzonis S. Teachers' knowledge about epilepsy in Greece: Information sources and attitudes towards children with epilepsy during school time. *Epilepsy & Behavior*. 2016 Jul 1;60:218-24.
- [26] Savarese G, Carpinelli L, D'Elia D, Coppola G. Teachers of various school grades and representations of epilepsy: problems, relational aspects and perspectives of life quality. *Italian journal of pediatrics*. 2015 Dec;41(1):70.
- [27] Brabcová D, Kohout J, Kršek P. Knowledge about epilepsy and attitudes towards affected people among teachers in training in the Czech Republic. *Epilepsy & Behavior*. 2016 Jan 1;54:88-94.
- [28] Dumeier HK, Neining MP, Bernhard MK, Syrbe S, Merckenschlager A, Zabel J, Kiess W, Bertsche T, Bertsche A. Knowledge and attitudes of school teachers, preschool teachers and students in teacher training about epilepsy and emergency management of seizures. *Archives of disease in childhood*. 2015 Sep 1;100(9):851-5.

- [29] Karimi N, Heidari M. Knowledge and attitudes toward epilepsy among school teachers in West of Iran. *Iranian journal of neurology*. 2015 Jul 6;14(3):130.
- [30] Alqahtani JM. Knowledge and practice of schoolteachers towards students with epilepsy in Khamis Mushate, Southern Saudi Arabia. *Journal of family & community medicine*. 2015 Sep;22(3):163.
- [31] Buccheri T, Quattropani MC. Perception of, attitudes toward, and knowledge of epilepsy among teachers and high school and college students in Sicily. *Epilepsy & Behavior*. 2015 Dec 1;53:43-50.
- [32] Khanal K, Maharjan R, Pokharel BR, Sanjel S. School Teachers' Knowledge about Epilepsy in Kathmandu Metropolitan City. *Kathmandu University Medical Journal*. 2017 Feb 26;13(4):316-22.
- [33] Mecarelli O, Messina P, Capovilla G, Michelucci R, Romeo A, Beghi E, De Simone R, Lucibello S, Ferrari A, Vecchi M, de Palma L. An educational campaign toward epilepsy among Italian primary school teachers: 1. Survey on knowledge and attitudes. *Epilepsy & Behavior*. 2014 Mar 1;32:84-91.
- [34] Owolabi LF, Shehu NM, Owolabi SD. Epilepsy and education in developing countries: a survey of school teachers' knowledge about epilepsy and their attitude towards students with epilepsy in Northwestern Nigeria. *The Pan African Medical Journal*. 2014;18.
- [35] Ali DB, Tomek M, Lisk DR. The effects of epilepsy on child education in Sierra Leone. *Epilepsy & Behavior*. 2014 Aug 1;37:236-40.
- [36] Bhesania NH, Rehman A, Savul IS, Zehra N. Knowledge, attitude and practices of school teachers towards epileptic school children in Karachi, Pakistan. *Pakistan journal of medical sciences*. 2014 Jan;30(1):220.
- [37] Abulhamail AS, Al-Sulami FE, Alnouri MA, Mahrous NM, Joharji DG, Albogami MM, Jan MM. Primary school teacher's knowledge and attitudes toward children with epilepsy. *Seizure-European Journal of Epilepsy*. 2014 Apr 1;23(4):280-3.
- [38] Toli T, Sourtzi P, Tsoumakas K, Kalokerinou-Anagnostopoulou A. Association between knowledge and attitudes of educators towards epilepsy and the risk of accidents in Greek schools. *Epilepsy & Behavior*. 2013 Apr 1;27(1):200-3.
- [39] Lim KS, Hills MD, Choo WY, Wong MH, Wu C, Tan CT. Attitudes toward epilepsy among the primary and secondary school teachers in Malaysia, using the public attitudes toward epilepsy (PATE) scale. *Epilepsy research*. 2013 Oct 1;106(3):433-9.
- [40] Zanni KP, Matsukura TS, Maia Filho HD. Beliefs and attitudes about childhood epilepsy among school teachers in two cities of Southeast Brazil. *Epilepsy research and treatment*. 2012;2012.
- [41] Asadi-pooya AA, Torabi-nami M. Knowledge and attitude towards epilepsy among biology teachers in Fars Province, Iran. *Iranian journal of child neurology*. 2012 Feb 17;6(1):13-8.

- [42] Brabcova D, Lovasova V, Kohout J, Zarubova J. Familiarity with and attitudes towards epilepsy among teachers at Czech elementary schools—the effect of personal experience and subspecialization. *Seizure-European Journal of Epilepsy*. 2012 Jul 1;21(6):461-5.
- [43] Alkhamra H, Tannous A, Hadidi M, Alkhateeb J. Knowledge and attitudes toward epilepsy among school teachers and counselors in Jordan. *Epilepsy & Behavior*. 2012 Aug 1;24(4):430-4.
- [44] Mott J, Shellhaas RA, Joshi SM. Knowledge of epilepsy and preferred sources of information among elementary school teachers. *Journal of child neurology*. 2013 Jun;28(6):740-4.
- [45] Mustapha AF, Odu OO, Akande O. Knowledge, attitudes and perceptions of epilepsy among secondary school teachers in Osogbo South-West Nigeria: a community based study. *Nigerian journal of clinical practice*. 2013;16(1):12-8.
- [46] Akpan MU, Ikpeme EE, Utuk EO. Teachers' knowledge and attitudes towards seizure disorder: a comparative study of urban and rural school teachers in Akwa Ibom State, Nigeria. *Nigerian journal of clinical practice*. 2013;16(3):365-70.
- [47] Mecarelli O, Capovilla G, Romeo A, Rubboli G, Tinuper P, Beghi E. Knowledge and attitudes toward epilepsy among primary and secondary schoolteachers in Italy. *Epilepsy & Behavior*. 2011 Oct 1;22(2):285-92.
- [48] Babikar HE, Abbas IM. Knowledge, practice and attitude toward epilepsy among primary and secondary school teachers in South Gezira locality, Gezira State, Sudan. *Journal of family and community medicine*. 2011 Jan;18(1):17.
- [49] Lee SA, Yim SB, Rho YI, Chu M, Park HM, Lee GH, Park SP, Jung DS. Factors contributing to Korean teachers' attitudes toward students with epilepsy. *Epilepsy & Behavior*. 2011 Feb 1;20(2):378-81.
- [50] Lee H, Lee SK, Chung CK, Yun SN, Choi-Kwon S. Familiarity with, knowledge of, and attitudes toward epilepsy among teachers in Korean elementary schools. *Epilepsy & Behavior*. 2010 Feb 1;17(2):183-7.
- [51] Shehata GA, Mahran DG. Knowledge, attitude and practice with respect to epilepsy among school teachers in Assiut city, Egypt. *Epilepsy research*. 2010 Dec 1;92(2-3):191-200.
- [52] Thacker AK, Verma AM, Ji R, Thacker P, Mishra P. Knowledge awareness and attitude about epilepsy among schoolteachers in India. *Seizure-European Journal of Epilepsy*. 2008 Dec 1;17(8):684-90.
- [53] Birbeck GL, Chomba E, Atadzhanov M, Mbewe E, Haworth A. Zambian teachers: what do they know about epilepsy and how can we work with them to decrease stigma?. *Epilepsy & Behavior*. 2006 Sep 1;9(2):275-80.
- [54] Sanya EO, Salami TA, Goodman OO, Buhari OI, Araoye MO. Perception and attitude to epilepsy among teachers in primary, secondary and tertiary educational institutions in middle belt Nigeria. *Tropical doctor*. 2005 Jul 1;35(3):153-6.

- [55] Alikor EA, Essien AA. Childhood epilepsy: knowledge and attitude of primary school teachers in Port Harcourt, Nigeria. *Nigerian journal of medicine: journal of the National Association of Resident Doctors of Nigeria*. 2005;14(3):299-303.
- [56] Kaleyias J, Tzoufi M, Kotsalis C, Papavasiliou A, Diamantopoulos N. Knowledge and attitude of the Greek educational community toward epilepsy and the epileptic student. *Epilepsy & Behavior*. 2005 Mar 1;6(2):179-86.
- [57] Olson AL, Seidler AB, Goodman D, Gaelic S, Nordgren R. School professionals' perceptions about the impact of chronic illness in the classroom. *Archives of pediatrics & adolescent medicine*. 2004 Jan 1;158(1):53-8.
- [58] Bishop M, Slevin B. Teachers' attitudes toward students with epilepsy: results of a survey of elementary and middle school teachers. *Epilepsy & Behavior*. 2004 Jun 1;5(3):308-15.
- [59] Millogo A, Siranyan AS. Knowledge of epilepsy and attitudes towards the condition among schoolteachers in Bobo-Dioulasso (Burkina Faso). *Epileptic Disorders*. 2004 Mar 1;6(1):21-6.
- [60] Prpic I, Korotaj Z, Vlašić-Cicvaric I, Paucic-Kirincic E, Valerjev A, Tomac V. Teachers' opinions about capabilities and behavior of children with epilepsy. *Epilepsy & Behavior*. 2003 Apr 1;4(2):142-5.
- [61] Ojinnaka NC. Teachers' perception of epilepsy in Nigeria: a community-based study. *Seizure*. 2002 Sep 1;11(6):386-91.
- [62] Rambe AS, Sjahrir H. Awareness, attitudes and understanding towards epilepsy among school teachers in Medan, Indonesia. *Neurol J Southeast Asia*. 2002;7:77-80.
- [63] Hsieh LP, Chiou HH. Comparison of epilepsy and asthma perception among preschool teachers in Taiwan. *Epilepsia*. 2001 May 12;42(5):647-50.
- [64] Dantas FG, Cariri GA, Cariri GA, Ribeiro Filho AR. Knowledge and attitudes toward epilepsy among primary, secondary and tertiary level teachers. *Arquivos de neuro-psiquiatria*. 2001 Sep;59(3B):712-6.
- [65] Dumeier HK, Neininger MP, Bernhard MK, Merckenschlager A, Kiess W, Bertsche T, Bertsche A. Providing teachers with education on epilepsy increased their willingness to handle acute seizures in children from 1-10 years of age. *Acta Paediatrica*. 2017 Nov 1.
- [66] Mecarelli O, Messina P, Capovilla G, Michelucci R, Romeo A, Beghi E, De Simone R, Cerquiglini A, Vecchi M, Boniver C, Monti F. An educational campaign about epilepsy among Italian primary school teachers. 2. The results of a focused training program. *Epilepsy & Behavior*. 2015 Jan 1;42:93-7.
- [67] Goel S, Singh N, Lal V, Singh A. Evaluating the impact of comprehensive epilepsy education programme for school teachers in Chandigarh city, India. *Seizure-European Journal of Epilepsy*. 2014 Jan 1;23(1):41-6.

- [68] Fernandes PT, Noronha AL, Araújo U, Cabral P, Pataro R, De Boer HM, Prilipko L, Sander JW, Li LM. Teachers perception about epilepsy. *Arquivos de Neuro-psiquiatria*. 2007 Jun;65:28-34.
- [69] Aydin K, Yildiz H. Teachers' perceptions in central Turkey concerning epilepsy and asthma and the short-term effect of a brief education on the perception of epilepsy. *Epilepsy & Behavior*. 2007 Mar 1;10(2):286-90.
- [70] Bekiroğlu N, Özkan R, Gürses C, Arpacı B, Dervent A. A study on awareness and attitude of teachers on epilepsy in Istanbul. *Seizure-European Journal of Epilepsy*. 2004 Oct 1;13(7):517-22.
- [71] Institute for Health Metrics and Evaluation. Global Burden of Disease, http://www.healthdata.org/sites/default/files/files/images/GBD_map_GBD2010_regions_super-regions.png [accessed 30 April 2018].
- [72] Antonak RF. Psychometric analysis and validation of the scale of attitudes toward persons with epilepsy. *Journal of Epilepsy*. 1990 Jan 1;3(1):11-6.
- [73] Howard GM, Radloff M, Sevier TL. Epilepsy and sports participation. *Current sports medicine reports*. 2004;3:15-9.
- [74] Roth DL, Goode KT, Williams VL, Faught E. Physical exercise, stressful life experience, and depression in adults with epilepsy. *Epilepsia*. 1994;35:1248-55.
- [75] Capovilla G, Kaufman KR, Perucca E, Moshé SL, Arida RM. Epilepsy, seizures, physical exercise, and sports: a report from the ILAE Task Force on Sports and Epilepsy. *Epilepsia*. 2016 Jan 1;57(1):6-12.
- [76] Dumeier HK et al.: Seizure management by preschool teachers: A training concept focussing on practical skills. *Seizure* 2017;50:38-42.
- [77] Cross JH, Wait S, Arzimanoglou A, Beghi E, Bennett C, Lagae L, Mifsud J, Schmidt D, Harvey G. Are we failing to provide adequate rescue medication to children at risk of prolonged convulsive seizures in schools? *Archives of disease in childhood*. 2013 Jul 30:archdischild-2013.
- [78] Johnson M, Thomas L. Schools' responses to pupils with epilepsy. *Support for Learning*. 1999 Feb 1;14(1):13-21.
- [79] Martiniuk AL, Speechley KN, Secco M, Campbell MK, Donner A. Evaluation of an epilepsy education program for Grade 5 students: a cluster randomized trial. *Epilepsy & Behavior*. 2007 Jun 1;10(4):604-10.
- [80] Ibinda F, Mbuba CK, Kariuki SM, Chengo E, Ngugi AK, Odhiambo R, Lowe B, Fegan G, Carter JA, Newton CR. Evaluation of Kilifi epilepsy education programme: a randomized controlled trial. *Epilepsia*. 2014 Feb 1;55(2):344-52.
- [81] Sajatovic M, Herrmann LK, Van Doren JR, Tatsuoka C, Welter E, Perzynski AT, Bukach A, Needham K, Liu H, Berg AT. A randomized prospective pilot trial of Web-delivered epilepsy stigma reduction communications in young adults. *Epilepsia*. 2017 Nov 1;58(11):1946-54.

