Epilepsy Research 154 (2019) 79–85

Contents lists available at ScienceDirect

Epilepsy Research

journal homepage: www.elsevier.com/locate/epilepsyres

Investigation into attitudes toward epilepsy among non-/neurological doctors and nurses in southern China

Ke Yang[a], Zongwei Yue[a], Mengli Zhou[b], Jing Wang[a], Bo Xiao[a], Li Feng[a,*]

[a] Department of Neurology, Xiangya Hospital, Central South University, Changsha, Hunan, China
[b] Clinical Pharmacology Center, The Third Xiangya Hospital, Central South University,Changsha, Hunan, China

ARTICLE INFO

Keywords:
Attitudes
Basic-level hospitals
Epilepsy
Non-/Neurological medical staffs

ABSTRACT

Purpose: To assess attitudes concerning epilepsy among non-/neurological medical personnel from basic-level hospitals in southern China and identify significant predictive factors for future stigma reduction interventions.
Method: The Chinese Public Attitudes Toward Epilepsy (CPATE) scale was administered to 184 neurological and 264 non-neurological medical staff members from basic-level hospitals in southern China. Positively stated items in the PATE scale were reversely scored; in this case, a higher score would indicate a more negative attitude.
Results: The mean score of each item among the neurological group was statistically lower than that of the non-neurological group. The mean scores in both the general and personal domains of the CPATE scale were significantly lower among the doctors as compared to nurses.
Conclusions: This was the first study to evaluate the attitudes toward epilepsy among medical personnel with different characteristics in basic-level hospitals in China. Health education can be a new model for stigma-reducing public interventions in China. Future strategies should first focus on improving access to correct knowledge about epilepsy among non-neurological medical staffs. This would be a vital breakthrough point to improve attitudes toward epilepsy in the whole society to help ease the disease burden on people with epilepsy, their families and the community in the years to come.

1. Introduction

Epilepsy is a critical, prevalent public health disease in China that needs to be urgently addressed (Wang et al., 2003; Mac et al., 2007; Li et al., 2010). Due to the nature of epileptic seizures, epilepsy-related stigma that is based on cultural misconceptions has proven to be a greater handicap to people with epilepsy than the disability of repetitive seizures or even medicinal side effects, resulting in quality-of-life impairments in patients with epilepsy and creating a socio-psychological burden for their families and the entire society (Global, regional, 2017; Newton and Garcia, 2012; Thurman et al., 2017; MH F et al., 2015). There are about 9 million people with epilepsy in China (Pi et al., 2014), among whom an estimated two thirds have active epilepsy, so it is imperative to formulate stigma-reduction interventions for people with epilepsy to correct these misunderstandings in China.

Seventy percent of China's populace resides in rural areas where superstitious and traditional perceptions toward epilepsy endure. In these areas, epilepsy has been considered as some kind of mental illness for a long time, resulting in more serious discrimination and stigma among the public in rural China than elsewhere (Jacoby et al., 2008). While, in most cases, patients from rural areas were diagnosed and received further treatment in basic-level hospitals, the medical staffs of these hospitals have the most direct and powerful influences on these patients, except for their caregivers. In consideration of their professionalism and prolonged communication with these patients, the attitudes among these medical professionals are naturally important in the course of the patients' diagnosis and treatment. Of note is that our previous study (Yang et al., 2018) has demonstrated that staffs in the primary healthcare system still showed conservative attitudes concerning personal domain, compared with that of general populations, and there were some discrepancies in attitudes toward epilepsy within staffs in different specialties and occupations.

Therefore, it is necessary to further identify how the two factors mentioned above affect attitudes toward epilepsy among medical staffs from basic-level hospitals, with the aim to provide us with preliminary evidence about how best to tackle stigma in the context of healthcare reform in China.

* Corresponding author.
E-mail address: fenglihx@163.com (L. Feng).

https://doi.org/10.1016/j.eplepsyres.2019.05.005
Received 26 November 2018; Received in revised form 14 April 2019; Accepted 3 May 2019
Available online 10 May 2019
0920-1211/

2. Materials and methods

2.1. Population

This cross-sectional survey was conducted in basic-level hospitals in southern China, which included basic inpatient and outpatient services in small or midsize towns, mainly county hospitals and township hospitals. There were 478 medical personnel randomly selected in four regions (center, north, southwest, and southeast) from April to October 2017. The multicenter design was used to achieve diverse territorial and socioeconomic representation within the medical staffs from multitudinous parts of the basic-level areas in an attempt to approximate a study of the whole of southern China.

Participants actively practicing in clinical work were included if they did not have epilepsy or epilepsy in their immediate families. We illustrated the aim of the study and guaranteed verbal consent by face-to-face before proceeding to the questionnaire. To maintain anonymity, a code number was assigned to each questionnaire and no names were recorded. Then respondents were asked to independently fill in the questionnaire using paper and pen.

First, medical staffs from basic-level hospitals were categorized into non-neurological and neurological groups. To further investigate the impact of different medical occupations on attitudes toward epilepsy, we divided these two groups into four target populations, including non-neurological doctors and nurses, neurological doctors and nurses (Table 2).

2.2. Measures

The two-dimensional 14-item Chinese Public Attitudes Toward Epilepsy (CPATE) scale was used to measure attitudes toward epilepsy. This scale consisted of a nine-item general domain designed to uncover participant's general views of people with epilepsy (items 1–9) and a five-item personal domain concerning personal relationship with epileptic patients (items 10–14). Each item was scored using a 5-point Likert's scale, with 1 being "strongly disagree" and 5 being "strongly agree." The scores for all positively stated items (items 2, 5, 10, 11, 14) were reversed, so the weighted sums of the items provided a measure of the participants' attitudes toward epilepsy. The higher the score, the more negative the response toward epilepsy. The items in the scale were further subcategorized into four groups on the grounds of the social aspects of life, *i.e.*, attitudes toward education (items 1, 8, and 9), social life (items 3, 4, 5, and 7), marital relationship (items 6, 10, 11, and 13), and employment (items 12 and 14). Our previous study tested the CPTAE scale with psychometric analysis, using exploratory, confirmatory factorial analysis and internal consistency analysis, confirming that the scale is both a content and construct validated translated version that can be applied in Mainland China (Yue et al., 2017).

Demographic data were also collected on the medical staffs' characteristics, which have been proven to influence attitudes toward epilepsy among various populations. In basic-level hospitals in rural China, doctors and nurses do not always need to get a degree from a regular medical university; some of them obtain a position just through apprenticeship, which means they receive medical training from other skilled medical staff members rather than through a formal school education. Therefore, the educational level of the medical personnel in basic-level hospitals might be inferior to that of the undergraduate level. Taking this into account, we included "technical secondary, or below," "junior college," and "undergraduate or above" as options for educational level among medical staffs.

2.3. Statistical analysis

Data were expressed as the means and SDs in the case of normally distributed data. A student's *t*-test or one-way analysis of variance (ANOVA) with the Scheffé post hoc test for normally distributed data was performed to compare group characteristics, and the chi-square test for categorical variables. Pearson's or Spearman's correlation tests were conducted to determine the correlations between variables.

The mean score in both domains was correlated with the demographic characteristics according to analysis of variance, respectively. Remaining explanatory variables that were statistically significant were considered for the multivariate model to identify the independent factors associated with a high degree of rejection in each domain.

Data were analyzed using Statistical Package for Social Sciences version 19 (SPSS 19.0).

Table 1
Demographic characterists of the study population.

Parameter	Neurological group n (%)	Non-neurologist group n (%)	p-value
N	184 (41.1)	264 (58.9)	
Gender			
Male	58 (31.5)	99 (37.5)	0.192
Female	126 (68.5)	165 (62.5)	
Age (years old)			
14–25	72 (39.1)	72 (27.3)	< 0.01
26–35	90 (48.9)	116 (43.9)	
36–45	18 (9.8)	64 (24.2)	
≥46	4 (2.2)	12 (4.5)	
Ethnicity			
Han	153 (83.2)	221 (83.7)	0.875
Minority	31 (16.8)	43 (16.3)	
Residence			
Urban	95 (51.6)	133 (50.4)	0.848
Rural	89 (48.4)	131 (49.6)	
Occupation			
Doctor	98 (53.3)	154 (58.3)	0.289
Nurse	86 (46.7)	110 (41.7)	
Title			
Resident	152 (82.6)	226 (85.6)	0.117
Attending physician	22 (12.0)	34 (12.9)	
Professor	10 (5.4)	4 (1.5)	
Years in clinical practice			
0–5	109 (59.2)	102 (38.6)	< 0.01
6–10	43 (23.4)	55 (20.8)	
11–15	13 (7.1)	41 (15.5)	
16–20	11 (6.0)	45 (17.0)	
≥21	8 (4.3)	21 (8.0)	
Education level			
Technical secondary or below	35 (19.0)	42 (15.9)	0.083
Junior college	71 (38.6)	130 (49.2)	
Undergraduate or above	78 (42.4)	92 (34.8)	
Marital status			
Married	101 (54.9)	192 (72.7)	< 0.01
Unmarried	83 (45.1)	72 (27.3)	
Individual monthly income (Chinese Yuan*)			
<5000	160 (87.0)	236 (89.4)	0.428
≥5000	24 (13.0)	28 (10.6)	

† *1USD = 6.87 Chinese Yuan.
‡ Statistical significance ($p < 0.05$) is indicated in bold.

3. Results

3.1. Demographic data of the respondents

Of the 478 subjects being interviewed, 13 medical staff members refused and 17 did not complete all the items on the questionnaire, so 448 subjects were included in the analysis (93.7% of the recruitment rate). Table 1 showed that the proportion of the neurological group, of which the majority were residents, 53.3% were doctors and 46.7% were nurses, in some ways, was similar with the non-neurological group

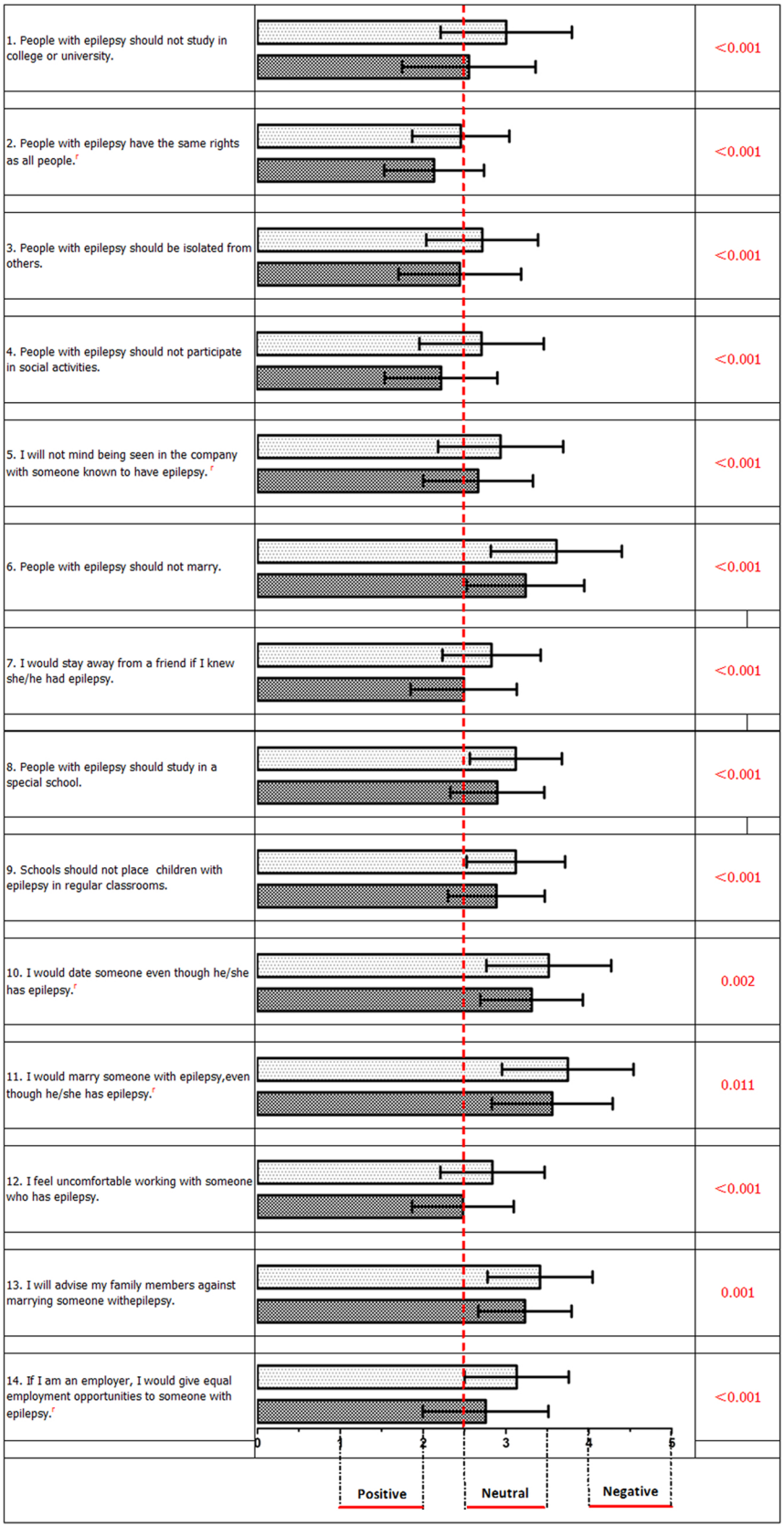

Fig. 1. "Column Bar" of graded responses for each item of the questionnaire.
Each bar represents the range of per-question scores on a scale of 1–5 (X-axis) obtained from sampled neurologists () and the group of non-neurologists ().The plot indicates the mean score with standard deviation at the end of the bar. The p-values are reported in the right column (red values = significant) with significance level lowered to $p < 0.05$. Each original question is summarized as a brief statement placed next to the corresponding bar.

Table 2
The means and standard deviations of the scores in each domain and item, in Neurological and Non-neurological groups.

ID	Item	Mean ± SD			
		Non-neurological Doctor (n = 154)	Non-neurological Nurse (n = 110)	Neurological Doctor(n = 98)	Neurological Nurse(n = 86)
	General Domain	2.89 ± 0.78	3.08 ± 0.70*	2.54 ± 0.76*	2.74 ± 0.73*
1	People with epilepsy should not study in college or university.	2.95 ± 0.84	3.14 ± 0.74	2.45 ± 0.84*	2.72 ± 0.76*
2	People with epilepsy have the same rights as all people.[r]	2.41 ± 0.61	2.57 ± 0.55	2.11 ± 0.64*	2.20 ± 0.57
3	People with epilepsy should be isolated from others.	2.62 ± 0.69	2.89 ± 0.64*	2.42 ± 0.79	2.51 ± 0.70
4	People with epilepsy should notparticipate in social activities.	2.60 ± 0.75	2.92 ± 0.73*	2.13 ± 0.65*	2.36 ± 0.70*
5	I will not mind being seen in the company with someone known to have epilepsy. [r]	2.87 ± 0.77	3.08 ± 0.73*	2.57 ± 0.72*	2.81 ± 0.58
6	People with epilepsy should not marry.	3.54 ± 0.84	3.77 ± 0.71*	3.07 ± 0.68*	3.48 ± 0.70
7	I would stay away from a friend if I knew she/he had epilepsy.	2.78 ± 0.67	2.95 ± 0.47*	2.43 ± 0.64*	2.60 ± 0.64*
8	People with epilepsy should study in a special school.	3.10 ± 0.60	3.20 ± 0.50	2.84 ± 0.64*	3.01 ± 0.47
9	Schools should not place children with epilepsy in regular classrooms.	3.10 ± 0.65	3.21 ± 0.51	2.83 ± 0.66*	3.00 ± 0.49
	Personal Domain	3.28 ± 0.77	3.45 ± 0.75*	2.99 ± 0.83*	3.16 ± 0.72
10	I would date someone even though he/she has epilepsy.[r]	3.48 ± 0.76	3.64 ± 0.75	3.32 ± 0.62	3.36 ± 0.63
11	I would marry someone with epilepsy,even though he/she has epilepsy.[r]	3.69 ± 0.80	3.89 ± 0.78	3.57 ± 0.76	3.60 ± 0.71
12	I feel uncomfortable working with someone who has epilepsy.	2.77 ± 0.67	2.98 ± 0.56*	2.36 ± 0.65*	2.66 ± 0.54
13	I will advise my family members against marrying someone with epilepsy.	3.40 ± 0.61	3.49 ± 0.67	3.26 ± 0.56	3.26 ± 0.58
14	If I am an employer, I would give equal employment opportunities to someone with epilepsy.[r]	3.06 ± 0.63	3.23 ± 0.62	2.47 ± 0.78*	2.90 ± 0.72

† [r] These items were reversely scored.
‡ * p-value is < 0.0083 because of Bonferroni correction (as compared to Non-neurological Doctor).

(85.6% residents, 58.3% of doctors, and 41.7% of nurses).

The analysis of variance showed that there were significant differences among the four groups in both the general ($F(3, 447) = 22.085$, $p < 0.001$) and the personal ($F(3, 447) = 14.249$, $p < 0.001$) domains.

3.2. Attitudes toward epilepsy between non-/neurological groups

As expected, the mean score of each item among the neurological staffs was statistically lower than that of the non-neurological (Fig. 1). In line with findings from our previous work, misconceptions and discrimination about epilepsy occurred most often when asked something concerning marriage.

More specifically, taking occupation into consideration, the mean score in both the general and personal domains were significantly lower in neurological doctors as compared to that of non-neurological doctors. The same trend also existed in attitudes toward epilepsy among nurses, as shown in Table 2.

3.3. Attitudes toward epilepsy between doctors and nurses

Post hoc comparison showed that the attitudes of non-neurological doctors were significantly better than non-neurological nurses in both the general and personal domains. The subanalysis according to social aspects of life in Fig. 2 showed that the attitudes of non-neurological doctors were significantly better than the non-neurological nurses toward employment ($p = 0.004$), social life ($p < 0.001$) and marriage ($p = 0.031$), but not toward education ($p = 0.069$).

Similar results can be seen in neurological doctors and nurses, and the only difference occurred in a better performance in aspects associated with education ($p = 0.014$) but not in aspects associated with marriage ($p = 0.128$) among neurological doctors.

3.4. Attitudes toward epilepsy between non-neurological doctors and neurological nurses

We then selected two groups, different in both specialty and occupation, to identify the magnitude of influences of the abovementioned two variables regarding attitudes toward epilepsy. In contrast to our expectation, a significant difference was discovered in the mean score of the general domain between non-neurological doctors and neurological nurses ($p = 0.041$), but not in the personal domain ($p = 0.057$), as shown in Table 2.

3.5. Demographic data and scores by domains among non-neurologists

Among the variables (Table 1), we combined age and years in clinical practice into one variable for multicollinearity (Variance Inflation Factor (VIF) > 10) by dimensionality reduction.

Univariate analysis was conducted in the group of non-neurological staff members (Table 3), in which more negative attitudes exist, indicating that age/years in the clinical practice, gender, educational level, title, individual monthly income, and marital status, were correlated with attitudes toward epilepsy in both domains, and utilized for multivariate analysis (Table 4), whereas neither ethnicity nor residence was attained. Our multiple linear regression model found that neither the general domain nor the personal domain performance was associated with gender, educational level, marital status, or individual monthly income independently. Whereas, age/years in clinical practice and title were associated with attitudes toward epilepsy in both domains independently, suggesting that younger non-neurologists with fewer years in clinical practice with a lower title tend to be more negative toward patients with epilepsy. These models for the general and personal domains explained 17.9% ($R^2 = 0.185$, $F(2261) = 52.340$, $p < 0.001$) and 11.6% ($R^2 = 0.123$, $F(2261) = 18.240$, $p < 0.001$) of the total variance, respectively.

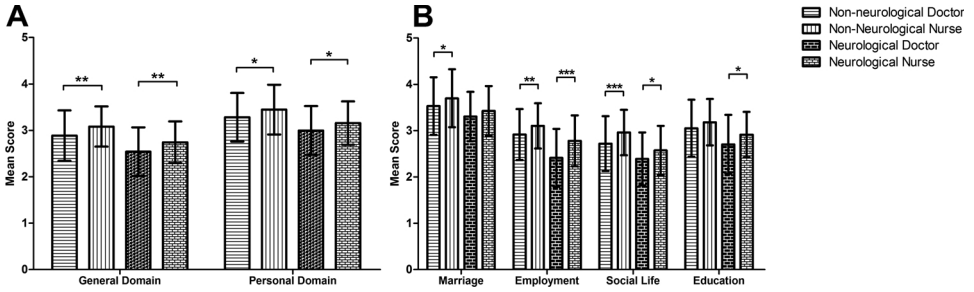

Fig. 2. Mean scores of two domains and four social aspects of life in people with epilepsy among non-/neurological doctors and nurses.

(A) Comparison among groups: Mean scores of general domain and personal domain between non-neurological doctors/nurses and neurological doctors/nurses, respectively.

(B) Comparison among groups: Attitudes toward various social aspect of life in people with epilepsy among non-neurological doctors/nurses and neurological doctors/nurses, respectively.

Statistical significance $p < 0.05$ is marked with *, $p < 0.01$ is marked with ** and $p < 0.001$ is marked with ***.

Table 3
Mean scores by domains and demographic characteristics among Non-neurological medical personnel (n = 264).

Variable	Group (n)	General Domain	Personal Domain
Age/Years in clinical practice ⓘ		**−0.298**	**−0.286**
		Mean ± SD	Mean ± SD
Gender	Male	2.87 ± 0.53	3.25 ± 0.56
	Female	**3.02 ± 0.49**	**3.41 ± 0.51**
Ethnicity	Han	2.96 ± 0.50	3.33 ± 0.53
	Minority	3.03 ± 0.54	3.47 ± 0.57
Residence	Urban	2.91 ± 0.54	3.29 ± 0.56
	Rural	3.02 ± 0.48	3.40 ± 0.51
Title	Primary title	**3.25 ± 0.45**	**3.42 ± 0.51**
	Intermediate title or above	2.46 ± 0.55	2.95 ± 0.50
Education level	Technical secondary or below	**3.19 ± 0.44**	**3.60 ± 0.50**
	Junior college	2.94 ± 0.38	3.32 ± 0.49
	Undergraduate	2.90 ± 0.66	3.28 ± 0.59
Marital status	Unmarried	**3.14 ± 0.48**	**3.49 ± 0.52**
	Married	2.90 ± 0.51	3.30 ± 0.53
Individual monthly income	< 5000 yuan	**3.03 ± 0.46**	**3.40 ± 0.51**
	≥ 5000 yuan	2.42 ± 0.54	2.96 ± 0.55

† ⓘ Based on Pearson's correlations.

‡ * Statistical significance (based on Bonferroni correction) is indicated in bold with higher score, as compared to different groups in same domain.

Table 4
Results of multivariate analysis among Non-neurological personnel (n = 264).

Variable	Multivariate analysis p-value	
	General Domain	Personal Domain
Gender	0.314	0.202
Age or Yeas in clinical practice	**0.016**	**0.003**
Title	**< 0.001**	**0.001**
Education level	> 0.05	> 0.05
Marital status	0.632	0.724
Individual monthly income	0.23	0.974

† Statistical significance ($p < 0.05$) is indicated in bold.

4. Discussion

Even though a number of research studies have documented the stigmatizing attitudes of the general public toward individuals with epilepsy, little is known about healthcare professionals' perceptions toward individuals with epilepsy at an international level. For all we know, this is the first study that has tried to gauge and understand the attitudes toward epilepsy among medical personnel and to identify key influencing factors contributing to different attitudes in basic-level hospitals in China.

The neurological group's attitudes toward epilepsy were much more positive than that of the non-neurological group, both consisting of doctors and nurses. Previous studies on perceptions about epilepsy around the world have indicated that people displayed more positive attitudes and less stigmatization toward patients with epilepsy with increased awareness and understanding of epilepsy (Limotai et al., 2017; Kartal, 2016; Abulhamail et al., 2014). With the popularization of specialization in the medical systems in China, more and more non-neurological medical personnel, consisting of the majority in the hospitals, just concentrate on their own area of expertise, leading to a limited understanding and awareness of epilepsy. Such poor knowledge may be a main source of the stigma and discrimination toward epileptic patients among non-neurological medical staff members, compared to the neurological group.

Overall, nurses were more negative toward epilepsy when compared with doctors. This finding supported the results of a study by Sherilyn Changthe (Chang et al., 2017) that differences in education and training received by doctors and nurses may give rise to this observed discrepancy in attitudes. On the other hand, Cleary and Dowling (Hdip ACMRB and rm MDpmbrr, 2010) also demonstrated that nurses had a relatively poorer understanding of their role and responsibilities in the recovery process of patients with epilepsy compared to doctors. It has been traditionally viewed that doctors are involved in the cure component, while nurses take on a caregiving role, thus nurses perceived that their contribution in the recovery of the patients was less important. Also, some investigations into patients' beliefs about the social status of physicians and nurses in China have also shown that the majority of patients consider doctors' social status higher than nurses (Cao et al., 2008) and score of the role perception of doctors was higher than that of nurses (Zhang and Cao, 2008), which reflected that people with epilepsy always show more respect to doctors than to nurses. Therefore, such inherent role distinction may exert a great influence on nurses' attitudes toward epilepsy, which was probably the main reason for more negative attitudes among nurses.

Unfortunately, there was also the stigma of marrying persons with epilepsy, which also appears to be deep rooted, irrespective of exposure to education and medical knowledge in Chinese society and mainly due to local preconceived sociocultural beliefs about the condition, including the notion often held that epilepsy is not treatable by conventional means to a great extent (Wang et al., 2009; Ekeh and Ekrikpo, 2015). In the subanalysis of the social aspects of life, our results showed that differences existed in attitudes toward marriage, social life, and employment, but not for education, between non-neurological doctors and nurses (Fig. 2). A possible reason is that some healthcare workers in rural China still believe that epilepsy is a "contagious disease", "possession by evil spirits" (Mac et al., 2007; Newton and Garcia, 2012; Jacoby et al., 2008; Patel et al., 2016; Amoroso et al., 2006; Moshé et al., 2015). They have higher expectations for their child's future success (Mcgrath, 2000; Li et al., 2017; Lansford et al., 2016) and are

not willing to take any risk of possible transmissibility of epilepsy or demonic possession, even though most epileptic specialists consider this view to be extremely ridiculous with no basis in scientific fact. Since people with epilepsy fear the possible hostile reactions of others who are not afflicted with the disease, they silently endure the inappropriate treatment and remain socially isolated in China. We hope this study can provide some novel and effective ways to reduce the discrimination of epileptics in basic-level Chinese medical systems. In the first place, professional education and training relevant to epilepsy in primary hospitals should be given more attention (Alaqeel et al., 2015; Goel et al., 2014). By correcting the misinterpretation and one-sided perceptions toward epilepsy among medical professionals, especially regarding knowledge related to marriage and heredity, the medical personnel's stigma could probably be reduced, and the doctor-patient relationship might be improved as well. Furthermore, younger medical staffs with a lower title or less working experience were found to have more negative attitudes, indicating that longer clinical working time and experience would exert a positive impact on medical staffs' performance toward patients with epilepsy, due to a better understanding of this disease and doctors' responsibilities in the treatment of people with epilepsy (Hasan et al., 2010; Shen et al., 2014). Thus, our study provided the insights that epilepsy awareness interventions should be emphasized at an earlier stage during medical training, especially for medical students, who represent a well-educated part of the society and are the future workforce in the field of medicine of every country. Medical school training programs should also include a humanitarian course to increase the awareness of the students about epilepsy to maintain an appropriate attitude toward a patient with epilepsy (Shen et al., 2014).

Starting in 2000, a demonstration project, "Epilepsy Management at a Primary Health Level," was carried out in rural China to raise epilepsy to a new plane of acceptability in the public domain (Wanted, 2012; Wang et al., 2008). The project was successful in implementing treatment and management of convulsive forms of epilepsy in rural areas of the country in some way, reducing the treatment gap by about 13%. However, easing the burden of epilepsy to achieve the strategic goal of "health for all" is complicated and faces many barriers because not only should the level of diagnosis and treatment be improved, but the stigma associated with epilepsy should be addressed and dramatically reduced. Unfortunately, we found that attitudes toward people with epilepsy in China were still more negative than in Western countries, or even in some other Asian countries (Hasan et al., 2010; Wong and Chung, 2010; Wong et al., 2004; Kheng Seang et al., 2013). Therefore, we hold that any interventions to improve attitudes toward epilepsy among medical staffs should be based on Chinese medical conditions. Specifically, our study indicates that lectures, courses, or other such methods that provide professional knowledge toward epilepsy conducted by neurological staffs could be applied to non-neurological group members to improve healthcare workers' attitudes toward epilepsy. This would be regarded as a vital first step toward the implementation of effective educational interventions tailored to the whole society. As such, we hope our study may have significant implications for the development of an effective and sustainable framework for epilepsy care at the primary health institutions in China and scale-up in other resource-poor settings to address and improve the care for people with epilepsy. However, our study has some limitations that should be considered. This study was a cross-sectional study; therefore, the associations between variables described may not necessarily be causal or explain the change in attitudes over time in the source population. Also, we only focused on Hunan Province, China, so further studies should expand the region covering all ethnic groups. Despite these limitations, one of the benefits of this study is that it has helped to provide a set of findings that could be considered as a baseline for comparison with future studies and may have significant implications for policy makers and key opinion leaders to implement focused educational interventions.

5. Conclusions

In summary, neurological medical staffs were more positive toward patients with epilepsy than non-neurological group members in both the general and personal aspects. More specifically, non-neurological doctors showed more negative attitudes toward epilepsy than neurological doctors, but more positive attitudes than non-neurological nurses. Health education can be a new model of stigma-reducing public interventions in China. Future strategies should pay more attention to improving access to true scientific understanding of epilepsy in medical personnel from basic-level hospitals, particularly younger non-neurological healthcare workers with less clinical experience and lower titles, which would be a vital breakthrough to improve attitudes toward epilepsy in the whole society and help to ease the burden of epilepsy on people with epilepsy, their families, and the community in the years to come.

Conflicts of interest

On behalf of all authors, the corresponding author states that there is no conflict of interest.

Ethics approval

This study was approved by the ethics committee of the Xiangya Hospital of Central South University. All data remained confidential, participants provided an informed consent before participating in the study, and they were allowed to quit the study at any stage.

Acknowledgments

This study was supported by grants from Omics-based precision medicine of epilepsy being entrusted by Key Research Project of the Ministry of Science and Technology of China (Grant No. 2016YFC0904400) and National Natural Science Foundation of China (Grant nos. 81771407).

References

Wang, W., Wu, J., Wang, D., Dai, X., Yang, B., Wang, T., et al., 2003. The prevalence and treatment gap in epilepsy in China: an ILAE/IBE/WHO study. Neurology 60 (9), 1544–1545.

Mac, T., Tran, D., Quet, F., Odermatt, P., Preux, P., Tan, C., 2007. Epidemiology, aetiology, and clinical management of epilepsy in Asia: a systematic review. Lancet Neurol. 6 (6), 533–543.

Li, S., Wu, J., Wang, W., Jacoby, A., Boer, H.D., Sander, J.W., 2010. Stigma and epilepsy: the Chinese perspective. Epilepsy Behav. 17 (2), 242–245.

Global, regional, 2017. Global, regional, and national burden of neurological disorders during 1990-2015: a systematic analysis for the Global Burden of Disease Study 2015. Lancet Neurol. 16 (11), 877–897.

Newton, C., Garcia, H., 2012. Epilepsy in poor regions of the world. Lancet. 380 (9848), 1193–1201.

Thurman, D., Logroscino, G., Beghi, E., Hauser, W., Hesdorffer, D., Newton, C., et al., 2017. The burden of premature mortality of epilepsy in high-income countries: A systematic review from the Mortality Task Force of the International League Against Epilepsy. Epilepsia. 58 (1), 17–26.

MH F, L A, HR A, VF B, S B, M B, et al., 2015. Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks in 188 countries, 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013.%A. Lancet 386 (10010), 2287–2323 (London, England).

Pi, X., Zhou, L., Cui, L., Liu, A., Zhang, J., Ma, Y., et al., 2014. Prevalence and clinical characteristics of active epilepsy in southern Han Chinese. Seizure 23 (8), 636–640.

Jacoby, A., Wang, W., Vu, T., Wu, J., Snape, D., Aydemir, N., et al., 2008. Meanings of epilepsy in its sociocultural context and implications for stigma: findings from ethnographic studies in local communities in China and Vietnam. Epilepsy Behav. 12 (2), 286–297.

Yang, K., Ma, C., He, Y., Wang, J., Yue, Z., Xiao, B., et al., 2018. Attitudes toward epilepsy among medical staffs in basic-level hospitals from southern China. Epilepsy Behav.

Yue, Z., Ma, C., Lim, K., Xiao, B., Wu, Q., Shu, Y., et al., 2017. Validation of the Chinese version of public attitudes toward epilepsy scale in Mainland China. Epilepsy Behav. 72, 150–155.

Limotai, C., Manmen, T., Urai, K., Limarun, C., 2017. A survey of epilepsy knowledge, attitudes and practice in school-aged children in Bangkok, Thailand. Acta Neurol.

Scand. 137 (Suppl. 9).
Kartal, A., 2016. Knowledge of, perceptions of, attitudes and practices regarding epilepsy among medical students in Turkey. Epil. Behav. E & B. 58, 115–118.
Abulhamail, A.S., Al-Sulami, F.E., Alnouri, M.A., Mahrous, N.M., Joharji, D.G., Albogami, M.M., et al., 2014. Primary school teacher's knowledge and attitudes toward children with epilepsy. Seizure. 23 (4), 280–283.
Chang, S., Ong, H.L., Seow, E., Chua, B.Y., Abdin, E., Samari, E., et al., 2017. Stigma towards mental illness among medical and nursing students in Singapore: a cross-sectional study. BMJ Open 7 (12).
Hdip ACMRB, rm MDpmbrr, 2010. Knowledge and attitudes of mental health professionals in Ireland to the concept of recovery in mental health: a questionnaire survey. J. Psychiatr. Ment. Health Nurs. 16 (6), 539–545.
Cao, Z., Wu, Y., Zhao, X., Wang, G., 2008. Investigation of patients cognition for social status of physicians and nurses. Chin J Prac Nurs. 24 (27), 6–9 [Chinese with English abstrct].
Zhang, J., Cao, Z., 2008. The study of social status of physician and nurse. Chin J Mod Nur. 14 (22), 2345–2349 [Chinese with English abstrct].
Wang, W., Zhao, D., Wu, J., Wang, T., Dai, X., Ma, G., et al., 2009. Changes in knowledge, attitude, and practice of people with epilepsy and their families after an intervention in rural China. Epil. Behav. E & B. 16 (1), 76–79.
Ekeh, B.C., Ekrikpo, U.E., 2015. The knowledge, attitude, and perception towards epilepsy amongst medical students in Uyo. Southern Nigeria. Adv. Med. 2015 (2015-3-31), 1–6 2015.
Patel, V., Xiao, S., Chen, H., Hanna, F., Jotheeswaran, A., Luo, D., et al., 2016. The magnitude of and health system responses to the mental health treatment gap in adults in India and China. Lancet. 388 (10063), 3074–3084.
Amoroso, C., Zwi, A., Somerville, E., 2006. Grove N. Epilepsy and stigma. Lancet. 367 (9517), 1143–1144.
Moshé, S., Perucca, E., Ryvlin, P., Tomson, T., 2015. Epilepsy: new advances. Lancet. 385 (9971), 884–898.
Mcgrath, E.P., 2000. Mothers' and fathers' attitudes toward their children's academic performance and children's perceptions of their academic competence. J. Youth Adolesc. 29 (6), 713–723.
Li, M., Xue, H., Wang, W., Wang, Y., 2017. Parental Expectations and Child Screen and Academic Sedentary Behaviors in China. Am. J. Prev. Med. 52 (5), 680.
Lansford, J.E., Godwin, J., Alampay, L.P., Uribe Tirado, L.M., Zelli, A., Al-Hassan, S.M., et al., 2016. Mothers', fathers' and children's perceptions of parents' expectations about children's family obligations in nine countries. Int. J. Psychol. 51 (5), 366–374.
Alaqeel, A., Kamalmaz, H., Al-Shaar, H.A., Alzahrani, I., Alaqeel, A., Aljetaily, S., et al., 2015. Evaluating the initial impact of the riyadh epilepsy awareness campaign. Epil. Behav.r E & B. 52 (Pt A), 251–255.
Goel, S., Singh, N., Lal, V., Singh, A., 2014. Evaluating the impact of comprehensive epilepsy education programme for school teachers in Chandigarh city. India. Seizure. 23 (1), 41–46.
Hasan, S.S., Alen, Y.K., Wayne, W.G., Ahmadi, K., Anwar, M., Goh, G.K., 2010. Understanding of and attitudes toward epilepsy among the urban Chinese population in Malaysia. Singapore Med. J. 51 (4), 290.
Shen, Y., Dong, H., Fan, X., Zhang, Z., Li, L., Lv, H., et al., 2014. What can the medical education do for eliminating stigma and discrimination associated with mental illness among future doctors? Effect of clerkship training on chinese students' attitudes. Int. J. Psychiatry Med. 47 (3), 241–254.
Wanted, 2012. Wanted: a global campaign against epilepsy. Lancet. 380 (9848), 1121.
Wang, W., Wu, J., Dai, X., Ma, G., Yang, B., Wang, T., et al., 2008. Global campaign against epilepsy: assessment of a demonstration project in rural China. Bull. World Health Organ. 86 (12), 964–969.
Wong, V., Chung, B.H.Y., 2010. Survey of public awareness, attitudes, and understanding toward epilepsy in Hong Kong. Epilepsia. 44 (2), 268–270.
Wong, V., Chung, B., Wong, R., 2004. Pilot survey of "Public awareness, attitudes and understanding towards epilepsy" (PASG) – a comparison of chinese and western culture. Neurol. Asia 9.
Kheng Seang, L., Hills, M.D., Yuen, C.W., Mee Hoo, W., Cathie, W., Tin, T.C., 2013. Attitudes toward epilepsy among the primary and secondary school teachers in Malaysia, using the public attitudes toward epilepsy (PATE) scale. Epilepsy Res. 106 (3), 433–439.