Epilepsy & Behavior 37 (2014) 139–144

Contents lists available at ScienceDirect

Epilepsy & Behavior

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

Empathy and emotion recognition in patients with idiopathic generalized epilepsy

Yubao Jiang, Ying Hu, Yu Wang, Nong Zhou, Li Zhu, Kai Wang *

Department of Neurology, The First Affiliated Hospital of Anhui Medical University, Hefei City, Anhui Province, PR China

ARTICLE INFO

Article history:
Received 7 March 2014
Revised 12 May 2014
Accepted 4 June 2014
Available online 10 July 2014

Keywords:
Epilepsy
Empathy
Eye emotion recognition
Social cognition

ABSTRACT

Patients with epilepsy have deficits in social cognition. In this study, we examined the changes in empathy and eye emotion recognition using the Interpersonal Reactivity Index and eye emotion recognition tasks. Forty-two patients with idiopathic generalized epilepsy and 47 healthy controls were involved. The eye emotion recognition and cognitive empathy abilities of the patients with IGE were impaired, but the affective empathy was intact. The cognitive empathy performance of the patients with IGE was positively correlated with their performance in sadness recognition, MoCA, verbal fluency, and the Stroop test. These results suggest that the empathy ability was impaired in patients with IGE, and this impairment may be caused by deficits in frontal lobe function.

1. Introduction

Empathy, the ability to share another's internal world of thoughts and feelings, has become an increasingly popular subject in science and culture [1]. The capacity for empathy is a trait that we all share in a more or less comparable manner. It is found in different cultures worldwide and thus may qualify very well as a human transcultural universal. Empathy is fundamental for the success of human relationships and societies and might have a crucial role in human communication. Evidence from previous research suggests that there are different systems that mediate empathy: early affective empathy and more advanced cognitive empathy. Affective empathy is an affective state that is elicited by the perceived, imagined, or inferred state of the affective state of another; it is similar (isomorphic) to the other's affective state, is oriented towards the other, and includes at least some cognitive appreciation of the other's affective state comprising perspective-taking, self–other distinction, and knowledge of the causal relation between the self and the other's affective state defined as an observer's emotional response to another person's emotional state. On the other hand, cognitive empathy refers to the ability to understand the feelings of others without necessarily implying that the empathizer is in an affective state himself [1]. For example, there can be purely cognitive understanding that someone is sad without any emotional effect on the observer. The affective and cognitive components of empathy may be separated but related constructs [2]. Lesions that may impair affective empathy will not have an effect on cognitive empathic abilities and vice versa [3]. Impaired empathy is the central characteristic of several neurological and psychiatric disorders such as lesions to the ventromedial prefrontal and inferior frontal gyri [3], autism spectrum conditions [4], and schizophrenia [5]. Recently, researchers found that cognitive empathy is very closely related to theory of mind (ToM) or mentalizing [1]. Theory of mind refers to the ability to represent and understand the mental states of others in general. Mentalizing about affective states of others is therefore called affective theory of mind—which is more or less synonymous with cognitive empathy. Thus empathy and ToM overlap as follows: cognitive ToM = mentalizing about cognitive states while affective ToM = mentalizing about affective states = cognitive empathy [1]. It has been repeatedly reported that theory of mind or mentalizing abilities are impaired in patients with ventromedial prefrontal lesions [6,7].

Epilepsy is a common brain disease that is characterized by recurrent and spontaneous seizures that result from abnormal and excessive synchronization of neuronal activity. There exists a prevailing belief that the social cognition of patients with epilepsy is impaired. Mesial temporal lobe epilepsy (mTLE) is the most prevalent focal epilepsy among adults, and a previous study found that, compared to healthy controls, patients with mTLE are significantly impaired in most measures of social cognition batteries. Patients with mTLE are predominantly impaired in general emotion recognition compared to patients with extra-mTLE, and the performance of the control group with epilepsy, although not significantly different from the performances of the group with mTLE or healthy control group, was between these two groups [8]. Studies suggest that patients with TLE are impaired in both basic ToM and advanced ToM [9]. Frontal lobe epilepsy (FLE) is also accompanied by deficits in ToM abilities, and FLE may affect online performance due to

* Corresponding author. Tel./fax: +86 551 2923704.
E-mail addresses: jiangyubao1982@126.com (Y. Jiang), calottriangle@126.com (Y. Hu), yw4d@hotmail.com (Y. Wang), zhounong@hotmail.com (N. Zhou), zhuli5655@126.com (L. Zhu), wangkai1964@126.com (K. Wang).

http://dx.doi.org/10.1016/j.yebeh.2014.06.005
1525-5050/

long-lasting dysfunctions of the prefrontal areas, while medial temporal lobe sclerosis (mTLS) may provoke selective ToM deficits due to medial temporal damage, prefrontal dysfunctions, or early interference with cognitive development [10]. Children with benign epilepsy with centrotemporal spikes (BECTs) are significantly impaired in 'affective theory of mind' tasks but not in 'cognitive theory of mind' conditions [11]. Social cognition, especially the theory of mind, is well studied in patients with epilepsy, but there is no study that emphasized the functionality of empathy in patients with epilepsy. Emotion recognition in patients with epilepsy is well studied in previous research [12,13], but there is little study that emphasized the relationship between emotion and empathy [14]. In this study, we measured the empathy and eye emotion recognition abilities of patients with idiopathic generalized epilepsy in order to find the functionality of empathy in patients with epilepsy and the correlation between emotion and empathy.

2. Material and methods

2.1. Participants

All patients evaluated in the epilepsy clinic of the First Affiliated Hospital of Anhui Medical University from May to October in 2013 were considered for participation in the present study. A total of 47 right-handed patients (30 males and 17 females) with IGE met the criteria and agreed to participate; 5 participants (3 males and 2 females) were dropped from analyses due to low Montreal Cognitive Assessment (MoCA) scores. All patients received detailed clinical and neurological examinations, continuous ambulatory EEG monitoring, and high-resolution MRI. To be included in the study, patients had to (a) have been diagnosed with IGE or have been diagnosed with IGE with only generalized tonic–clonic seizures (GTCSs), as defined by the Commission on Classification and Terminology of the International League Against Epilepsy [15]; (b) have a normal intelligence quotient, as determined by MoCA; (c) have more than 5 year of education; (d) have normal or corrected vision; and (e) have the ability to understand the procedures of the experiment. Excluded were those with evidence of a neurological or psychiatric disorder, as determined by medical history, physical examination, or neuroimaging.

All patients were being treated with antiepileptic drugs (AEDs); valproic acid (29 patients) and lamotrigine (13 patients) were the most frequently used AEDs among the patients with IGE. None of the patients experienced a seizure in the 24-h period that proceeded the experimental session. Patients with MoCA scores below 26 were excluded.

An additional control group included 47 right-handed healthy participants (29 males and 18 females) who were matched to the patient group for age, gender, and education as closely as possible.

2.2. Neuropsychological examinations

All patients completed the Montreal Cognitive Assessment (MoCA) Beijing version. The Beck Depression Inventory (BDI, translated into Chinese) was administered to obtain a measure of depressive symptoms for the patients with IGE and the healthy controls. Frontal lobe function was assessed with the Stroop (executive functions), verbal fluency (using animal, fruit, and vegetable categories), and digit span (forward and backward) tests.

2.3. Eye emotion recognition task

A computerized task was designed to assess the subjects' abilities to recognize various categories of emotional expressions (basic and complex) [16]. The Eye Basic Emotion Discrimination Task (EBEDT) consists of 120 photographs of eyes expressing the 6 basic emotions (happiness, sadness, fear, surprise, disgust, and anger) with two words printed above each picture: one word describes the correct emotion expressed by the eyes and the other is a distracter of a different type. The subjects were asked to choose one of the two words. The Eye Complex Emotion Discrimination Task (ECEDT) consists of 34 photographs of eyes (17 males and 17 females) (scheming, thoughtful, quizzical, bored, arrogant, guilty, admiring, flirting…). The subjects were asked to choose one of the four words that were printed at each of the four corners of each picture.

2.4. Affective and cognitive empathy

Individuals differ in their sensitivity to the feeling states of others, and these differences can be measured using self-report questionnaires such as the Interpersonal Reactivity Index (IRI) [17]. The IRI is a 28-item self-report questionnaire that measures both components of empathy. To date, it is the only published measure that allows a multidimensional assessment of empathy. We use the Interpersonal Reactivity Index—China (IRI-C) to assess multidimensional empathy. The IRI-C is the Chinese version of IRI [18], and this questionnaire contains four subscales (two cognitive subscales and two affective subscales). The two cognitive subscales are the perspective-taking (PT) scale and the fantasy (FS) scale. The PT scale measures the tendency to spontaneously adopt the psychological point of view of others ('I sometimes try to understand my friends better by imagining how things look from their perspective'), and the FS scale measures the tendency to imaginatively transpose oneself into fictional situations ('When I am reading an interesting story or novel, I imagine how I would feel if the events in the story were happening to me'). The two affective subscales are the empathy concern (EC) scale and the personal distress (PD) scale. The EC scale measures the respondents' feelings of warmth, compassion, and concern for others (e.g., 'I often have tender, concerned feelings for people less fortunate than me'). The PD scale assesses self-oriented feelings of anxiety and discomfort that result from tense interpersonal settings (e.g., 'Being in a tense emotional situation scares me').

Each subscale was rated on scales that varied from 1 to 5; the subjects were asked to select the best response for each item. We used the mean of the PT and FS subscale scores to assess cognitive empathy, and affective empathy was assessed using the mean of the EC and PD subscale scores.

2.5. Statistical methods

All statistical procedures were performed using the Statistical Package for the Social Sciences version 20. The results that were normally distributed are expressed as the mean values ± the standard deviations, and the results that were not normally distributed are expressed as the medians (P_{25}–P_{75}). Between-group differences in demographic variables, neuropsychological examination performance, emotion recognition task performance, and empathy subscale scores were assessed with nonparametric tests for two independent samples (Mann–Whitney tests). The differences in cognitive and affective empathy and empathy between the groups were assessed with two independent samples t-tests. Probability values below 0.05 were considered to be significant. Spearman correlations were used to determine the strengths of the relationships between scores of cognitive empathy and the performance in eye emotion recognition and neuropsychological examinations.

3. Results

3.1. Demographic variables and results of the neuropsychological examinations

There were no significant differences in age, education level, and BDI between the two groups. However, the MoCA scores of the patients with IGE were lower than those of the healthy controls despite the fact that patients with MoCA scores below 26 were excluded ($P < 0.05$). Moreover, the patients with IGE performed worse than the healthy controls in the Stroop, digit span, and verbal fluency tests ($P < 0.05$). The details are shown in Table 1.