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Contribution of the family environment to depression in Korean adults with epilepsy

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ABSTRACT

Purpose: Depression is common in adults with epilepsy and an important factor that affects quality of life in these individuals. However, there are few studies on the interactions between epilepsy and family factors in adults and we here investigate this association.
Methods: This cross-sectional, multicenter study collected data on 391 adults with epilepsy and their caregivers recruited from 27 hospitals throughout Korea. The Beck Depression Inventory (BDI), Stigma Scale, and Caregiver Burden Inventory (CBI) were used to evaluate the study population. Multivariate analysis was conducted using hierarchical linear regression. The Sobel test and structural equation modeling were used to examine interrelationships among the potential factors.
Results: The mean patient BDI score was 16.3 (SD = 11.1). Depressive symptoms (BDI $\geq$ 10) were in 68.3% and 57.0% in patients and their caregivers, respectively. Hierarchical linear regression analysis only identified caregiver BDI ($\beta = 0.219$; $p < 0.001$) as an independent factor related to patient BDI. The mediational model suggested that caregiver BDI mediated the effects of other family factors on patient BDI: caregiver's educational level ($p = 0.002$), caregiver's CBI score ($p < 0.001$), caregiver's Stigma Scale score ($p < 0.001$), and family APGAR score ($p < 0.001$). In addition, structural equation modeling showed that the relation between caregiver and patient BDI was unidirectional.
Conclusion: Caregiver depression is the most important contributor to depression in adults with epilepsy. The other family factors such as caregiver's perception of burden and the level of family function are indirectly correlated with patient depression via the mediating effects of caregiver depression.

1. Introduction

Depression is the most common psychiatric comorbidity with epilepsy. The point prevalence of depression is substantially higher among patients with epilepsy than the general population, ranging from 13 to 35% according to large population-based studies.[1–3] This prevalence can be as high as 50% among patients with medically refractory epilepsy.[4,5] The pathogenic mechanisms of depression in patients with epilepsy result from the complex interactions between neurobiological (including genetic), iatrogenic, and psychosocial pathogenic factors.[6] Furthermore, several studies suggest a bidirectional relationship between depressive disorders and epilepsy.[7]

Depression significantly impacts quality of life (QoL) in patients with epilepsy. In patients with uncontrolled seizures in particular, depression causes greater QoL reductions than the seizures themselves.[8] Several factors, including demographic, seizure-related, treatment-related, and psychosocial factors, can contribute to depression in patients with epilepsy.[9] The impact of epilepsy is not limited to patients who experience seizures, but also affects all members of the family to a certain degree. Most studies in this regard have focused on childhood epilepsy when assessing the relationship between the family environment and depression, and found that the family environment is predictive of the psychological well-being of children and adolescents with epilepsy.[10] For example, parental perception of epilepsy stigma is associated with depression in children with epilepsy,[10] and maternal depression negatively correlated with QoL in children with new-onset epilepsy.[11]

In contrast, there have been few studies of family members of adults with epilepsy. Poor social support (which mostly comes from the family) is a significant predictor of depression in adults

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with epilepsy.[12] In a recent study, QoL in adults with epilepsy was reportedly significantly related to the QoL of family members,[13] and negative family reactions may be detrimental to the QoL of adults with epilepsy.[14] In addition, family life dissatisfaction is an established factor that affects the QoL and psychosocial well-being of adults with epilepsy.[15] These findings suggest the need for further research into the family factors that affect adults with epilepsy. We have here investigated the relationship between family factors and depression in adults with epilepsy.

2. Materials and methods

2.1. Patients

This cross-sectional, multicenter study collected data from adults with epilepsy and their caregivers who attended the neurological outpatient clinics of 22 university hospitals in Korea. Individuals >18 years of age who had been diagnosed with any type of epilepsy and had been treated for >1 year were allowed to participate. Patients were excluded if they had experienced a seizure in the 48 h prior to answering any questionnaires, were mentally disabled, had neurological deficits that affected daily living activities, or had major medical, surgical, or psychiatric illnesses. Demographic and clinical data were collected by interview and by reviewing each patient's medical files. All patients and their caregivers were asked to fill out questionnaires on the day they visited their neurologists at the outpatient clinic. Written informed consent was obtained from all patients.

2.2. Measures

Adults with epilepsy in the current study series filled out questionnaires on depression and perceived stigma. Depressive symptoms were assessed using the Beck Depression Inventory (BDI), which consists of 21 items rated on a 4-point scale. Higher scores represent higher levels of depression. Perceived stigma was measured using the Stigma Scale for epilepsy,[16,17] which consists of the 3 items and requires simple yes/no responses. Patients were asked to say if they felt other people were uncomfortable with them, treated them as inferior, or preferred to avoid them because of their epilepsy. Patients scored 1 point for each item they agreed with, and their overall score was the sum of their positive responses; thus, a higher score indicates that the patient felt more likely to face stigma.

Caregiver depression, perceptions of stigma, and burden for caring for patients were evaluated and assessed using BDI, Stigma Scale, and Caregiver Burden Inventory (CBI), respectively. CBI is a 22-item inventory that evaluates the effects of disease on caregiver QoL, psychological suffering, financial difficulties, shame, guilt, and difficulty in social and family relationships. Scores range from 0 to 88, and a higher score indicates a higher burden.[18] The Stigma Scale was modified to assess the caregiver's perception of stigma in our current analyses. For example, the question "Because of your epilepsy, do you feel that other people are uncomfortable with you?" was modified for the caregiver to read: "Because of your offspring's epilepsy, do you feel that other people are uncomfortable with him/her?" Family function constructs were assessed using the family APGAR (Adaptation, Partnership, Growth, Affection, and Resolve) questionnaire,[19] which uses 5 questions to assess the components of family functioning. Three possible answers are allowed ("almost always", "sometimes", "almost never"), and the score varies between 0 and 2 points. Therefore, the sum ranges between 0 and 10 points, and families are characterized as functional (7–10) or dysfunctional (≤6). A dysfunctional family can be classified as mild (3–6) or severely dysfunctional (≤2).

2.3. Statistical analysis

The relationship between patient BDI and family factors was determined after controlling for demographic and clinical variables. The patient's BDI score was considered a dependent variable. Independent variables included the caregiver BDI score, Stigma Scale score, CBI score, educational level and family APGAR. Adjusted variables included age, sex, employment status, education, perceived stigma, and epilepsy-related variables such as age at onset, epilepsy duration, seizure frequency, generalized tonic-clonic (GTC) seizure frequency, and receiving polypharmacy. In univariate analysis, Pearson correlation analysis was used to assess numeric and ordinal variables and Student's *t* test was used to assess nominal variables. Multivariate analysis using hierarchical linear regression analysis was used to further assess variables with *p* values <0.05 according by univariate analysis. Significance was set at $p < 0.05$. IBM SPSS 21.0 software (IBM Inc., Armonk, NY) was used to perform these statistical analyses.

We also employed the mediational model, which proposes that some family factors affect patient depression via mediators such as caregiver depression. Evidence for mediation is considered sufficient if the relationship between some family factors and patient BDI is reduced when the effects of the mediators are controlled. Mediation effects were assessed using the Sobel test, which was performed using the R statistics program (version 2.14.2) and the "bda" package.

Lastly, using the structural equation modeling, we evaluated interrelationships among the potential factors affecting patient BDI, which were identified based on multiple linear regression analysis and Sobel test. Structural equations shown in Fig. 1 were conducted by AMOS 22.0 (SPSS Inc., Chicago, IL) based on the Maximum Likelihood Method. Standardized path coefficients were presented. For fitted model evaluation, chi-square with the degrees of freedom, the normed fit index (NFI), and the relative fit index (RFI) were measured and all the measures were acceptable.

3. Results

The demographic and clinical characteristics of the 391 study patients and their caregivers are listed in Table 1. The mean age of the adults with epilepsy in the current study series was 38.8 years (SD = 14.5; range 18–79) and 187 patients (47.8%) were female. The mean age at seizure onset was 24.7 years (SD = 16.8), and

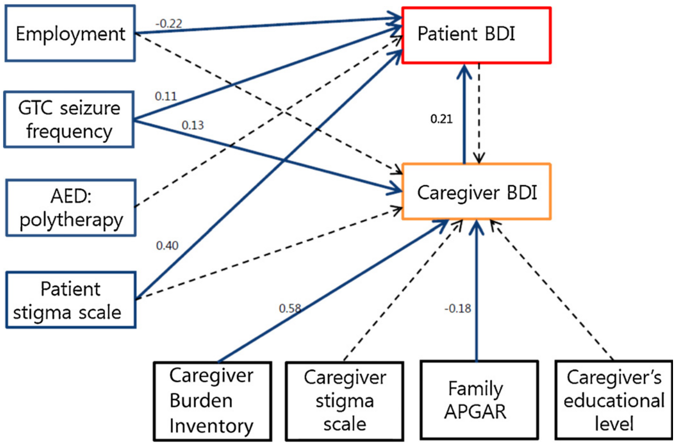

Fig. 1. Structural model used to explore the inter-relationships between patient depression (BDI) and the clinical variables. A continuous arrow represents a direct relationship from one variable to another. A dashed arrow represents a non-significant correlation between the two variables. Numbers are standardized path coefficients.