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REVIEW ARTICLE

Cognition and Behavioral Effects in Epilepsy: A Review

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ABSTRACT

Epilepsy is a chronic neurological disorder which is caused by various factors which may vary according to the age of patients which results in asynchronization of neurons. Cognitive functional impairment is mostly seen in epileptic patients compared to the general population, and the degree of its impairment varies from one another according to the epilepsy syndrome. Behavioral changes are more seen in epileptic people and people with drug-resistant epilepsy, frequent seizures, and associated neurological or mental abnormalities. In children and adults, many data suggest a correlation between behavior/cognition and some other specific epilepsy syndromes. The major predictors of such behavioral changes in children with epilepsy are epilepsy itself, treatment, the underlying structural lesion, and epilepsy treatment.

Keywords: Behavior, Cognitive impairment, Epilepsy, Structural abnormalities, Syndromes

INTRODUCTION

Epilepsy is a neurological disorder characterized by episodic or recurrent seizures. The word "epilepsy" has its origin in ancient Greece which means "to seize, possess." Epilepsy is due to asynchronization of neurons. It is a chronic non-communicable disorder of brain.[1].It is one of the most common neurological disorders that affect people of all age groups.[2] The incidence of epilepsy ranges from 30 to 57/100,000 population.[3] These rates change with age, more in infants and young children, and then decreased throughout adulthood until approximately 60 years of age, when they again begin to raise. The overall prevalence of epilepsy is approximately 6/1000 population.[3]

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COGNITION AND BEHAVIORAL CHANGES IN CHILDHOOD EPILEPSY

Several studies have reported that epileptic seizures may be associated with cognitive and behavioral alterations in infants and adults.[4,5] Well-defined psychological and pathological patterns can be found in specific epilepsy syndromes. Several reports suggest that there is a close correlation between mood, behavior, seizure activity, and cognition in these conditions.[6] Many epidemiological studies reported that cognitive functions (attention, reaction time, emotional memory, and specific learning disorders, such as those affecting reading, writing, or many skills) are impaired in people with epileptic seizures than in the general population.[7] Psychological impairment is an important comorbid condition of chronic epilepsy.[8] Mental retardation, learning disabilities, memory impairment, attention deficit hyperactivity disorder, autism, anxiety, and conduct disorders are greatly observed in epileptic

individuals.[9,10] Behavioral disorders include depression, anxiety, and anger are more frequent in people with epileptic seizures than individuals who do not have epilepsy.[11-14] Serious psychiatric problems are less common in children than adults with seizures.[15] Many children and adults have behavioral problems, even if they are seizure-free. For example, Austin *et al*.[16] showed that behavioral problems could be recognized before the first clinical seizure (like depressive symptoms before Alzheimer's dementia) and autism cases have been found to precede the sudden onset of seizures.[17] Many findings say that in some patients epilepsy is a pervasive condition which includes both seizures and behavioral problems. Among the comorbidities that are associated with epilepsy, cognitive, and behavioral abnormalities are the most common and severe condition.[18,19]

FACTORS LINKED WITH COGNITIVE AND BEHAVIORAL CHANGES IN EPILEPSY

Structural brain abnormalities

Approximately 1/4th of all childhood epilepsy occurs due to structural brain lesions, presumed early insults, as evidenced by cerebral palsy.[20] One major factor that may underlie cognitive changes in children with epilepsy is the structural brain abnormality. Quantitative magnetic resonance imaging has been used to characterize the nature and pattern of brain abnormality in adults with epilepsy, especially the temporal lobe epilepsy.[21-24]

Progressive cognitive impairment

Many recent investigations have focused on the neurobiological burden associated with chronic epilepsy and the risk of progressive cognitive impairment.[25] In addition, much interest is growing in lifespan models of the neuropsychology of epilepsy condition.[26,27]

Epilepsy itself a factor

The epilepsy itself is associated with behavioural changes, which are frequently not much serious. In most cases, epilepsy condition is reversible. Often, behavioural alterations can be identified as mild or limited psychiatric manifestations, that are included in any specific diagnostic category as defined by the Diagnostic statistical manual of mental disorders V.[28,29] The most frequent causes were prodromal (27%) or postictal changes (12%) and frequent subtle seizures (18%).The abnormal synaptic activity of the brain may induce some changes through various mechanisms, and impair the naturally occurring homeostatic seizure-suppressing mechanisms which maintain the interictal state, with adverse effects on the normal neuronal function.[30] There is clear evidence that simple partial or complex partial seizures and secondarily generalized seizures may be associated with neural damage[31] and that brain extracellular glutamate may build up in partial seizures to neurotoxic levels,[32] which can be predictors of behavioral problems includes depression and anger. Moreover, epileptic seizures are known to disrupt sleep patterns and also endocrine functions, which can result in an alteration of behavior.[33]

Epilepsy treatment

Cognitive functions, including psychomotor speed, cognition, attention, depression, anger, and mood, are affected by antiepileptic drugs (AEDs) in many different ways; children and old people are especially vulnerable to such cognitive adverse effects. It is very important to treat epileptic patients with appropriate drugs, such as valproate, levetiracetam, and phenytoin. However, incorrect AED use can increase these symptoms. For example, phenobarbital and benzodiazepines have a negative effect on cognitive changes and behavioral functions.[33]

CONCLUSION

Although there are many relevant studies specifically aiming to define behavioral disturbances in epilepsy syndromes, behavioral disturbance is very frequent in people with epilepsy than in the general population. The most possible causes of this apparent association are many; most of them are reversible and are linked to epilepsy itself or to

state-dependent cognitive dysfunction. On the other hand, when brain lesions and/or brain dysfunctions are present, behavioral disturbances are secondary to the same underlying cause as epilepsy and may be permanent disease conditions. There are some clinical situations in which behavioral disturbances are closely linked to epilepsy at the onset of (or before) seizures and this suggests that epilepsy could be interpreted as a condition of complex neuropsychiatric disorder. In children, there is no specific epileptic behavior, but there are many causes of different behavioral changes. A good and early therapeutic approach may be associated with a better prognosis. However, new studies are needed to evaluate the role of epileptic activity, underlying brain dysfunction, genetic factors, and social/environmental factors in the pathophysiology of psychiatric disturbance in epilepsy.

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