

Cognitive Functions in Patients with Brain Cancer

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Introduction

Cancer is the second cause of death worldwide [1,2] brain cancer accounts for approximately 1.4% of all cancers types and 2.3% of all cancer related deaths. The incidence of primary cerebral malignancies varies between 4 and 10/100,000 in the general population. This incidence tends to increase with age (4/100,000 up to the age of 12 years; 6/100,000 up to the age of 35 years; 18/100,000 up to the age of 55 years; 70/100,000 up to the age of 75 years). There is a wide range of risk factors that can cause brain cancer, including diet, smoking, alcohol, occupational exposures, radiation, infections, allergies, head trauma, and family history. In recent times, there is a great focus on inherited polymorphisms in genes related to carcinogen metabolism, and DNA repair, as well as, gene-environment interactions [3].

Brain tumors are classified into two types: primary brain tumors that originate in the brain and metastatic (secondary) brain tumors caused by cancer cells that have migrated from the rest of the body organs. Primary brain cancer can spread beyond the central nervous system scarcely; uncontrolled tumor growth within the limited space of the skull can cause death. Secondary brain cancer indicates advanced disease and has a poor prognosis. Primary brain tumors may be cancerous or noncancerous. Both types take up space in the brain and may cause dangerous symptoms (e.g. vision or hearing loss) and complications (e.g. stroke). All cancerous brain tumors are life-threatening because they have an offensive and invasive nature [4].

Cognitive deficits occur frequently in patients with brain cancer [5,6]. The percentage of patients with brain cancer, who display cognitive functions varied widely [7], ranging from 29% to 90% in different brain tumor groups [8-11].

These cognitive deficits can be due to tumor site or oncological therapies, such as surgery, radiotherapy, and chemotherapy [12,13] many studies in the field of brain tumor reported a discrepancy between objectively measured cognitive ability and self-reported cognitive ability [14-18].

Patients with brain cancer displayed a wide range of cognitive disorders, such as attention, memory, executive and intellectual functions, processing speed, visuo spatial and constructional abilities, perception and language [19-22], these cognitive deficits can be appeared in the isolated or simultaneous way [23].

Children with brain tumors displayed impaired working memory and predict poor intellectual outcome in patients treated with Cranial Spinal Radiation (CSR) [24,25] there is a consensus that working memory considered a core of human cognition, over the last 40 years, working memory has aroused the most interest in cognitive psychology; so many models and definitions have proposed for it. Working memory generally refers to a cognitive system with a limited capacity, that responsible for active temporary storing, manipulation, and retrieving of information in a simultaneous way in service of ongoing cognition [26-28]. Neural studies indicated that the components of the cerebello-thalamo-cerebral pathway the cerebellum, thalamus, and Dorsolateral Prefrontal Cortex (DLPFC) are all implicated in working memory function [29-31]; so any problems in this neural pathway due to tumors or exposure to radio and chemotherapy will affect working memory efficiency, this was confirmed by the study of (Law N et al. 2011) their finding that working memory function is related to the integrity of cerebello-thalamo-cerebral connections, also they observed that the cranial radiation group have poorer working memory scores group relative to controls [32].

Cognitive disorders may have a great impact on patients' lives, especially if these patients suffered from brain tumors at a relatively young age when they are often active in their work and social life because patients live longer with possible cognitive disorders [33-35].

Because brain cancer patients have difficulties in sustained focused attention; so they have many daily life problems [5]. They have difficulty in performing more than one activity at the same time (simultaneously) [36].

All of the previous cognitive disorders will certainly affect brain cancer patients' life quality and affect the patient's ability to function at premorbid levels professionally and socially [37-39].

Conclusion

Many patients with brain cancer display a wide range of cognitive impairments such as executive functions, memory, processing speed, attention, perception, language and visual-spatial tasks. These impairments may be a result of brain cancer itself or as a result of radio and chemotherapy, these impairments affect life quality and social skills for brain cancer patients; so these patients need many studies to investigate

their whole cognitive picture also, cognitive sciences researchers have to focus on rehabilitation programs and cognitive training to aid them in coup cognitive impairments in order improve life quality.

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