



# Cognitive decline in patients of breast cancer at Sohag University Hospital

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## Abstract

Cognitive decline in breast cancer patients can occur treatment related or non-treatment related. Disturbance of cognition can occur before start of any cancer therapy or in association with breast cancer therapy (e.g., radiation, hormonal therapy). Risk factors include a patient's characteristics, such as psychological and genetic parameters other than the impact of cancer and cancer therapy. Incidence of cognitive disturbance in patients who receive chemotherapy is higher than patients receiving hormonal therapy, according to several surveys. Hypothesis of cognitive dysfunction includes increased systemic inflammation, mitochondrial dysfunction in neurons and Oxidative damage. Symptoms of cognitive dysfunction were more frequent in women who received high-dose chemotherapy, so that cognitive impairment is considered as treatment toxicity. Cognitive dysfunction was common among breast cancer patients as a toxic effect of chemotherapy. Complex attention, executive function, learning and memory are common affected domains. Pharmacologic treatment of cognitive dysfunction includes medication for dementia but without conclusive efficacy. Also, physical exercise is considered a suitable intervention, but has not been efficiently evaluated.

**Keywords:** Cognitive decline, breast cancer, chemotherapy, hormonal therapy, cognitive domains.

## Introduction:

Most cancers are present in patients with age-related disorders, including dementia, and more prevalent in older age groups. With increasing age, the possibility of having a co-existing cancer and a diagnosis of dementia increases<sup>(1)</sup>. Breast cancer is considered a common cause of cancer in the world. Cognitive is a common neurological complication in patients of breast cancer<sup>(2)</sup>. Dementia is associated with decreased cancer specific and overall survival<sup>(3)</sup>. A large number of studies concerned with measuring cognitive dysfunction in patients with breast cancer over the last ten years<sup>(4)</sup>. The most

affected domains include executive function, learning and memory<sup>(5)</sup>. Cognitive dysfunction may last for several years post-treatment in patients with cancer<sup>(6)</sup>

### Incidence of Cognitive dysfunction

Although cognitive dysfunction is very common in breast cancer, the incidence varies according to the number of patients in a sample of the population. A survey include 1147 of breast cancer patients received chemotherapy 77% developed cognitive impairment<sup>(7)</sup>. With the increase of use different type of therapy of breast

cancer (chemotherapy, hormonal therapy, radiotherapy), Cognitive decline continues to develop. If the patient develops cognitive symptoms early after the start of treatment, he will require several months for recovery. In some cases, cognition never returns to "baseline "after stoppage of treatment. Cognitive dysfunction rarely continue till reach advanced form of impairments, but the symptoms can disrupt the quality of life of patients <sup>(8)</sup>.

#### **Risk factor of cognitive dysfunction**

There are several risk factors which include a patient's characteristics, such as lifestyle, physiological, psychological and genetic parameters other than the impact of cancer and cancer treatments <sup>(9)</sup>. Psychological factors have also been associated with cognitive complaints <sup>(10)</sup>. Common modifiable risk factors include anxiety, depression or fatigue <sup>(11)</sup>. Few studies have described the association with post-traumatic stress symptoms <sup>(12)</sup>. Early detection of these psychological factors may allow interventions to reduce them and improve cognitive complaints <sup>(13)</sup>. The most frequent cognitive symptoms include disrupted functioning, work, and quality of life, but symptoms rarely reach the level of a severe impairment (ie, dementia) <sup>(14)</sup>.

#### **Hypothesis of cognitive dysfunction**

Hypothesis of cognitive dysfunction include increased systemic inflammation occurring as the result of cancer, chemotherapy, radiotherapy, and surgery. Neuronal mitochondrial dysfunction is implicated in the mechanism as well as disruption of plasticity of neurons. Inflammation can lead to disruption of neurons that could result in oxidative damage, toxic effects on neurons, and mitochondrial dysfunction in neurons that affect plasticity of neurons <sup>(15)</sup>. Also an emerging breast

cancer therapy, causes potential cognitive effects <sup>(16)</sup>. Endocrine therapy can affect cognition as estrogen has a role in the health of women's brain, and causes blocking activity or inhibits natural estrogen production <sup>(17)</sup>.

#### **Cognitive domain affected**

The most affected domains include executive function, learning and memory <sup>(18)</sup>. Specific structural brain changes which include the temporal cortices have been associated with these changes <sup>(19)</sup>. The role of hippocampus formation is encoded and consolidating memory content by transforming new information, received from multiple brain regions and has strong connections with other brain regions, including higher cortical brain structures <sup>(20)</sup>. The hippocampus is related to a default network, para hippocampal region in the cortex, mammillary bodies and anterior thalamus which share in process of memory retrieval <sup>(21)</sup>. Chemotherapy usually induces cognitive impairment which is characterized by impairment of complex attention, executive function, learning and memory <sup>(22)</sup>. Endocrine therapies also have an impact on cognition. Endocrine therapy was associated with impaired verbal learning/memory, which, assessed by cognitive tests <sup>(23)</sup>.

#### **Treatment of cognitive dysfunction**

No standard care is available for protection or for managing against cognitive impairment in breast cancer patients in the patient of breast cancer. Cognitive rehabilitation and behavioral therapies are the most promising interventions for cognitive decline <sup>(24)</sup>. There are pharmacologic agents that have been studied for treatment of cognitive dysfunction, including dementia medications, but without conclusive efficacy, and other research is needed <sup>(25)</sup>. Physical exercise is a suitable

intervention, but has not been efficiently evaluated<sup>(26)</sup>.

## Conclusion

Cognitive dysfunction is a common complication of breast cancer that can impair functioning and quality of life. The risk for development of cognitive decline includes cancer and cancer therapy. Screening for cognitive decline is needed for patients with breast cancer who have received chemotherapy and endocrine therapy using medical records and psychological testing. Management recommendations include Cognitive and behavioral therapy. More research is required for cognitive impairment in cancer patients to develop a suitable modern treatment.

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