

Neuropsychological Status of Patients with Chronic Irritable Bowel Syndrome

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Abstract

Patients with refractory IBS have cognitive impairments, including a tendency to pay attention to information with negative emotional connotations (negative cognitive bias) and information related to gastrointestinal symptoms, as well as increased sensitivity to pain and bodily sensations, which indicates the presence of cognitive bias in the perception of bodily sensationism.

Keywords: Irritable Bowel Syndrome; Cognitive Functions; Cognitive Deficit

Introduction

Irritable bowel syndrome (IBS) is a systemic disorder of the interaction of the microbiota-enteric axis and the central nervous system. Cognitive functions reflect the central affective and attentional processes, which are determined by genetic and epigenetic factors and affect the complex interactions of the central, enteric (intestinal) nervous systems [1,2]. These interactions include changes in the hypothalamic-pituitary-adrenal system and the autonomic nervous system caused by accumulated stress, restructuring of the immune system, and changes in the composition of the microbiota [3]. An increasing number of foreign colleagues are conducting research aimed at studying the relationship between IBS and cognitive functions, or rather the specifics of cognitive deficits [5]. Our colleagues suggest that IBS is associated with cognitive impairments, especially in executive functions, memory, and attention (Figure 1) [4-6].

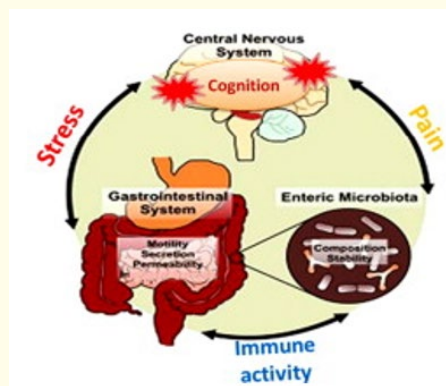


Figure 1: Neurobiological model of the connection of cognitive functioning with the enteric, central nervous system by

P. Kennedy, et al. (Kennedy, et al. 2012) [6].

Although it remains unclear how changes in the gastrointestinal tract affect the functioning of the nervous system, however, two theories have been proposed. First, the brain-gut axis theory suggests that there is a bidirectional, constant connection between the brain and the gastrointestinal tract, and this process involves neural, immune, endocrine, and metabolic signalling. Any dysregulation in the gastrointestinal tract can have a negative impact on the brain, leading to impaired early brain development, adult neurogenesis, and even dementia. The second theory suggests that patients with IBS may experience cognitive impairments due to their close association with anxiety and pain, which are common symptoms in patients with IBS [6]. Interestingly, the association between IBS and cognitive deficits was revealed even after taking into account psychological factors such as anxiety. This suggests that pathological changes in the gastrointestinal tract may have a direct effect on the nervous system, causing cognitive impairment. Studies evaluating the relationship between IBS and cognitive impairment are still under development. The available research focuses on various cognitive areas. For example, P. Kennedy, *et al.* IBS was found to be associated with impaired functioning of visual-spatial memory, and this relationship remained significant even after patients with concomitant mental illnesses were excluded from the analysis [5,6]. On the contrary, contradictory results were reported executive function [4]. Although there is increasing evidence that patients with IBS may have cognitive impairments, the current results of various foreign studies vary greatly. The wide variety of available tools for assessing cognitive abilities and the interconnected nature of cognitive domains do not allow researchers to draw unambiguous conclusions on this issue. Given the high prevalence of IBS and the serious impact that cognitive impairments can have on humans, we believe that a proper and systematic analysis of their relationship is needed.

Aim of the Study

The aim of the study was to study the specifics of cognitive functions in women with irritable bowel syndrome with a refractory course, i.e., whose symptoms became chronic and they did not respond to somatotropic gastroenterological treatment during 9-12 months of treatment.

Methodology

Study participants: 1) The main group consisted of 100 women, the average age was 35 years, ranging from 18 to 51 years, with IBS (K.58) in accordance with the Rome IV criteria, who underwent a full examination by a gastroenterologist with a colonoscopic examination and referred to a clinical psychologist for psychological examination and psychotherapy. 77% worked, 74% were in a relationship. The average duration of the disease is 35.1 ± 40.9 months, which indicates refractory IBS. The study participants were not taking either somatotropic or psychotropic therapy at the time of the study. 2) Control group the control group consisted of 100 women (average age 41.5 ± 12.2 years, 77% worked, 74% were in a relationship) who visited a gastroenterologist without the presence of functional and organic diseases of the gastrointestinal tract.

Results

The results of the study:

- The word recall test was used to evaluate selective memorization. The patients were asked to identify words from different categories, such as neutral, negative, positive, and words related to gastrointestinal symptoms, followed by a memorization task. As a rule, patients with IBS showed a selective tendency to memorize emotionally negative information or react to it. In addition, patients with IBS (with and without symptoms of depression) showed increased attention to emotionally negative words. These data indicate a tendency to memorize information with negative valence and increased vigilance in patients with IBS.
- The modified Stroop test, which included emotionally colored words and words related to gastrointestinal symptoms, showed selective information processing in patients with IBS as a distraction from the color of words. The effect was significant only for subconsciously presented words, suggesting that the cognitive process involved was beyond conscious processing. In patients with

IBS, personality anxiety and visceral anxiety were associated with a relieved reaction caused by situational threat words, indicating a shift in attention due to threat assessment.

- Visual-spatial memory. Patients with IBS had decreased performance.
- Attention. Patients with IBS were found to have shorter reaction times under alert and orientation conditions. These data suggest that in patients with IBS, impaired concentration may underlie anxiety, hyper-vigilance, and visceral hypersensitivity.
- Working memory was tested using a straight-digit spread task and a spatial working memory task from the University of Cambridge. No differences were found between patients with IBS and the control group.
- The traditional Stroop test was used to assess cognitive flexibility and reaction retardation, and it was found that there were no significant impairments in patients with IBS.
- However, patients with IBS have been found to have increased perceptual errors and difficulty maintaining recruitment (based on the Wisconsin Card Sorting Test), indicating decreased cognitive flexibility.
- In a number of patients with IBS, Wexler's verbal IQ was lower than in the control group, even after accounting for depressive symptoms and chronic IBS.

Discussion of the Results

Patients with refractory IBS have cognitive impairments, including a tendency to pay attention to information that has a negative emotional connotation (negative cognitive bias), as well as information related to gastrointestinal symptoms, as well as increased sensitivity to pain and bodily sensations, which indicates the presence of cognitive bias in the perception of bodily sensations. Data from our colleagues show the hypoactivity of the dorsolateral prefrontal cortex in patients with IBS [5], which is associated with impaired inhibitory control over pain, negative emotions, and attention, which are mediated by a complex cognitive-affective network. It is believed that related cognitive dysfunctions, such as impaired attitude change and inhibition, in patients with IBS are unable to suppress attention to irrelevant and distracting stimuli, which leads to a malfunction in working memory and selectivity in attention, a tendency to catastrophize (catastrophizing style of thinking and reaction), increased levels of anxiety and reaction for minor stress. The correlations of cognitive functions with intestinal symptoms and refractoriness that we have studied can provide insight into the degree of cognitive impairment, current disease activity, and the impact of chronic morbidity. As for cognitive abilities, we found no correlation between selective recognition/recall and indicators of intestinal symptoms in patients with IBS. However, we found that attention bias is associated with the severity of somatic symptoms and the behavior of patients with IBS. A positive correlation was found between executive dysfunction and the severity of intestinal symptoms. In the cognitive neurobiological model of IBS [6], cognitive deficits reflect the negative effects of various key pathophysiological processes in IBS, including stress response, immune activation, chronic pain, changes in microbiota composition, and aberrations in neural networks. We studied the effects of anxiety and depression on cognitive dysfunction in IBS, but no significant relationship was shown between them, suggesting that cognitive impairment in patients with IBS was not associated with anxiety and depressive symptoms.

Conclusion

Patients with refractive IBS have cognitive impairments, including a tendency to pay attention to information with negative emotional connections (negative cognitive bias) and information related to gastrointestinal symptoms, as well as increased sensitivity to pain and bodily sensations, which indicates the presence of cognitive bias in the perception of body sensationalism.

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