



Benefits of selenium in the treatment of depression and sleep disorders

Commentaries of the article “The selenium-containing compound 3-((4-chlorophenyl)selenyl)-1-methyl-1H-indole reverses depressive-like behavior induced by acute restraint stress in mice: modulation of oxido-nitrosative stress and inflammatory pathway”

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Selenium is a micronutrient with an important role in combating oxidative stress, being the main cofactor of a series of enzymes that ensure the proper functioning of the cardiovascular system and thyroid metabolism [1]. In the article in question, the authors [2] demonstrated another possible benefit of selenium by showing that a selenium-containing compound blocked stress-activated pathways as well as the production of nitric oxide and inflammatory mediators in the hypothalamus and hippocampus in an animal model of anxiety-like behavior [2]. The article is innovative in nature, as it suggests the use of selenium as a complementary therapy in the treatment of depression.

Depression is a very prevalent psychiatric disorder with one of its main symptoms being sleep disorders. It is estimated that 90% of individuals with depression present sleep complaints. Insomnia is one of the main sleep disorders in this population, leading to a clinical picture of sleep deprivation and negatively affecting the quality of life of individuals [3]. The reduction in total sleep time can increase the production of reactive oxygen species as well as several proinflammatory biomarkers such as interleukin 1 and tumor necrosis factor alpha, resulting in a neuroinflammatory picture in more severe cases [4]. Interestingly, the authors report that the

hippocampus and prefrontal cortex of animals submitted to an acute restraint protocol, followed by depressive-type behavior, presented increased reactive oxygen species and proinflammatory cytokines [2]. In view of this, we emphasize the importance of investigating sleep when dealing with depressive disorders, especially in clinical practice, and the promotion of complementary behavioral and pharmacological treatments that act on depression, sleep disorders and their consequences in oxidative stress pathways.

In this context, selenium stands out as a very important antioxidant. The article by Casaril and colleagues demonstrates its effectiveness in combating oxidative stress in animal models [2]. As previously mentioned, selenium is a cofactor of enzymes such as glutathione peroxidase and iodothyronine deiodinase, which prevents vascular inflammation and ischemia, and minimizes the oxidative stress caused by hypoxemia [5]. The article suggests that selenium plays an important role in the maintenance of a healthy central nervous system, and not only in the cardiovascular system, in which its action is better known. The results obtained from animal experimentation can bring direct benefits to humans. Considering the high prevalence rate of depression and sleep disorders, and the association between the two diseases, it is necessary to develop complementary therapies. These therapies, associated with specific pharmacological treatments when necessary and good life habits, will help improve the treatment of both depression and sleep disorders, two conditions that have a range of serious impacts on individuals as well as on society as a whole.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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References

1. Forceville X (2006) Seleno-enzymes and seleno-compounds: the two faces of selenium. *Crit Care* 10:180
2. Casaril AM, Domingues M, Bampi SR et al (2019) The selenium-containing compound 3-((4-chlorophenyl)selenanyl)-1-methyl-1H-indole reverses depressive-like behavior induced by acute restraint stress in mice: modulation of oxido-nitrosative stress and inflammatory pathway. *Psychopharmacology* In press
3. Franzen PL, Buysse DJ (2008) Sleep disturbances and depression: risk relationships for subsequent depression and therapeutic implications. *Dialogues Clin Neurosci* 10:473–481
4. Morris G, Stubbs B, Köhler CA, Walder K, Slyepchenko A, Berk M, Carvalho AF (2018) The putative role of oxidative stress and inflammation in the pathophysiology of sleep dysfunction across neuropsychiatric disorders: focus on chronic fatigue syndrome, bipolar disorder and multiple sclerosis. *Sleep Med Rev* 41:255–265
5. Benstoem C, Goetzenich A, Kraemer S, Borosch S, Manzanares W, Hardy G, Stoppe C (2015) Selenium and its supplementation in cardiovascular disease—what do we know? *Nutrients*. 7:3094–3118