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REVIEW

The neurological impact of post-traumatic stress disorder on the development of degenerative diseases

El impacto neurológico del trastorno de estrés postraumático en el desarrollo de enfermedades degenerativas

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ABSTRACT

Post-traumatic stress disorder (PTSD) from a neurobiological perspective, beyond its traditional psychological approach. The study analysed how PTSD, by inducing alterations in brain areas such as the hippocampus and prefrontal cortex, may have increased the risk of developing frontotemporal dementia (FTD). The research reviewed identified common mechanisms between the two conditions, such as neuroinflammation and synaptic dysfunction, which suggested a possible causal link. Furthermore, it was considered that chronic stress may not only have acted as a trigger for neurodegenerative diseases, but may also have been aggravated by them. Finally, it was proposed that early identification and management of chronic stress could have contributed to preventing or delaying the onset of FTD.

Keywords: Post-Traumatic Stress Disorder; Dementia; Neurodegeneration; Chronic Stress; Neuroinflammation.

RESUMEN

El trastorno de estrés postraumático (TEPT) desde una perspectiva neurobiológica, más allá de su tradicional enfoque psicológico. Se analizó cómo el TEPT, al inducir alteraciones en áreas cerebrales como el hipocampo y la corteza prefrontal, pudo haber incrementado el riesgo de desarrollar demencia frontotemporal (DFT). Las investigaciones revisadas identificaron mecanismos comunes entre ambas condiciones, como la neuroinflamación y la disfunción sináptica, que sugirieron un posible vínculo causal. Asimismo, se consideró que el estrés crónico no solo pudo haber actuado como desencadenante de enfermedades neurodegenerativas, sino también haber sido agravado por ellas. Finalmente, se propuso que la identificación y manejo temprano del estrés crónico podrían haber contribuido a prevenir o retrasar la aparición de la DFT.

Palabras clave: Trastorno de Estrés Postraumático; Demencia; Neurodegeneración; Estrés Crónico; Neuroinflamación.

INTRODUCTION

Post-traumatic stress disorder (PTSD) has traditionally been approached from a psychological and emotional perspective, focusing primarily on its behavioral and affective symptoms. However, in recent years, various studies have begun to highlight its profound impact on brain health and its possible role in the onset of neurodegenerative diseases. In this context, the link between PTSD and frontotemporal dementia (FTD) has become a field of growing interest, revealing shared neurobiological mechanisms that could explain a causal relationship or, at least, an increased predisposition. This paper explores the connection between the two

conditions, analyzing how chronic stress can influence brain structure and function to become a possible risk factor for the development of FTD.

DEVELOPMENT

Post-traumatic stress disorder (PTSD) is a psychiatric condition that can develop after experiencing intense traumatic events, profoundly affecting the mental health and brain structure of those who suffer from it. According to Günak et al.[1], PTSD represents not only an emotional disorder but also a significant risk factor for the development of neurodegenerative diseases such as frontotemporal dementia (FTD).

PTSD is associated with functional and structural alterations in key areas of the brain, such as the hippocampus, amygdala, and prefrontal cortex, regions that are also involved in various forms of dementia. These alterations are mediated by the overactivation of the hypothalamic-pituitary-adrenal (HPA) axis, leading to a chronic cortisol increase. This stress hormone has neurotoxic effects at high levels.[2]

Frontotemporal dementia is a neurodegenerative disorder characterized by progressive atrophy of the frontal and temporal lobes of the brain. It produces symptoms such as severe behavioral changes, social disinhibition, loss of empathy, and language impairment. Unlike Alzheimer's disease, this condition usually occurs at an earlier age and has a more rapid clinical course.[3]

Various studies have begun to explore the link between PTSD and FTD, highlighting the possibility that chronic stress acts as a trigger or accelerator of neurodegenerative processes. In their systematic review, Kuring et al.[2] found a significant association between mental disorders such as depression, anxiety, and PTSD with a higher incidence of dementia, including DFT. This link appears to be explained by shared mechanisms such as neuroinflammation, synaptic dysfunction, and brain atrophy, which affect areas involved in memory, emotional control, and social behavior.

Bonanni et al.[3] specifically noted that patients with PTSD are at increased risk of developing the semantic variant of FTD. This form particularly compromises the temporal regions of the brain and manifests with progressive loss of language and concept recognition. This finding supports the hypothesis that neurobiological changes induced by PTSD may coincide with the degenerative patterns observed in FTD.

Similarly, Desmarais et al.[4] proposed a bidirectional relationship between PTSD and dementia, suggesting that not only can PTSD increase the risk of developing neurodegenerative diseases, but the onset of dementia could also trigger PTSD symptoms, especially in people with previous trauma. This approach provides a more dynamic and complex view of the interaction between psychological trauma and neurological decline.

Finally, Saeger et al.[5] highlight the importance of studying the standard neurobiological mechanisms between chronic stress and neurodegenerative diseases and suggest that intervention on these factors could not only slow the progression of TDF but also open up new therapeutic avenues based on stress modulation.

Overall, the scientific literature supports the idea that PTSD should not be considered solely as an emotional disorder but as a relevant neurological risk factor, especially in patients with a genetic predisposition or family history of dementia. Understanding and addressing this relationship from a clinical and neurobiological perspective could lead to the development of more effective preventive and therapeutic strategies directly impacting the quality of life of patients and their families.

CONCLUSIONS

In conclusion, current scientific evidence suggests that PTSD should not be considered solely as an isolated emotional disorder but as a condition that may have long-term neurological implications, including an increased risk of developing frontotemporal dementia. Chronic stress-induced brain alterations, such as neuroinflammation, synaptic dysfunction, and atrophy in key brain regions, reflect a significant overlap with the degenerative processes characteristic of FTD. Recognizing this interrelationship not only broadens our understanding of the impact of psychological trauma but also opens new avenues for clinical intervention aimed at the prevention and early treatment of neurodegenerative diseases in vulnerable populations.

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CONFLICT OF INTEREST

None.

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