Inflammation and frailty: association of immunological biomarkers with physical and cognitive impairment in older adults

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Frailty is a clinical condition coined to describe the heterogeneity in health status among older individuals of the same chronological age, characterized by loss of physiological and cognitive reserves and increased susceptibility to adverse outcomes. Arising from a multifactorial and complex aetiology, it involves cumulative damage across physiological systems, progressively reducing the body's capacity to preserve homeostasis. Physical frailty is commonly assessed using the phenotype model established by Fried, which relies on five clinical criteria. An alternative approach, the Frailty Index (FI), offers a broader evaluation based on the accumulation of health deficits, encompassing clinical signs, functional limitations, and cognitive decline. In addition, the concept of cognitive frailty has emerged to describe the simultaneous presence of physical frailty and mild cognitive impairment, in the absence of overt dementia, representing a state of increased vulnerability to neurodegenerative processes. The immune system is suspected to play a fundamental role in the development of both physical and cognitive frailty. Thus, the aim of this study was to explore the potential association between immunological biomarkers and frailty status considering physical and cognitive components. To this end, a cross-sectional study was conducted involving 155 Spanish older adults (aged 65 and above). Frailty was evaluated according to the phenotype criteria and the FI, cognitive impairment was assessed using the Montreal Cognitive Assessment (MoCA) test, and circulating levels of the inflammatory markers IL-6, CRP, TNFα, sTNF-RII, GDF-15, and HTRA1 were determined. The results demonstrated significantly higher levels of CRP, TNFα, sTNF-RII, and GDF-15in the frail group compared to the non-frail group (both for phenotype frailty and FI). Regarding cognitive frailty, significant associations were found for all biomarkers, except for IL-6. Additional studies with a wider range of immunological biomarkers are essential to gain deeper insight into their contribution to both physical and cognitive frailty development.

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