Associations between frail phenotypes and inflammatory biomarkers and synergistic effects of black rice supplement and exercise intervention on physical performance, muscle strength and aging biomarkers among aging population

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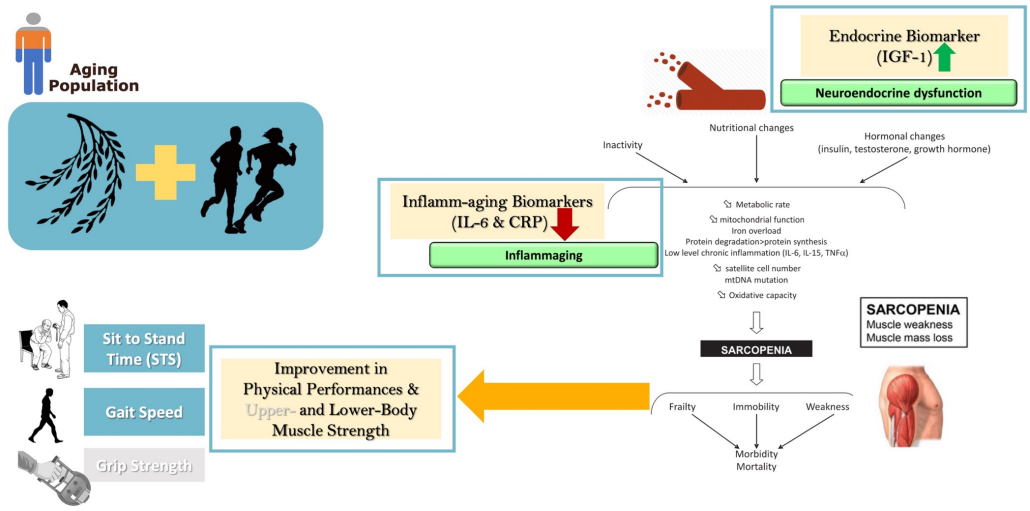
Abstract: Frailty older adults has a significant decline in health and physical function. Frailty is partially associated with the development of a prolonged sub-chronic inflammation, which is characterized by an increase in the inflammatory biomarkers' levels. The aims of this study were to investigate the frailty prevalence and to study the effectiveness of black rice supplement and exercise program intervention on frailty prevention in this aging population. Among 526 community dwellers (aged 65-74 years), the frailty prevalence was accounted for 15.0% (95%CI: 12.1-18.4), and the significant increase in serum levels of Interleukin-6 (IL-6) and C-reactive protein (CRP) was observed in frail older adults ($p < 0.05$). Regarding the clinical study (ethical code: COM-2561-05171), aging participants (n=122) were randomly assigned into 4 groups and received different interventions, including exercise program (EP), black rice germ and bran supplement (BGB), combined EP+BGB, and control group. The physical and biological parameters (Fried's frailty phenotypes, inflammatory-, endocrine biomarkers) were assessed at the specific timepoints upon receiving an intervention for the duration of 6 months. BGB alone or EP alone intervention significantly decrease CRP levels ($p<0.05$) and increase Insulin-like growth factor-1 levels after 6 months of intervention ($p<0.001$). Furthermore, the BGB+EP combined intervention significantly modulated those biomarkers above with the addition of the decrease in IL-6 levels ($p<0.05$). The significant improvement on muscle strength and physical performance were observed in combined BGB+EP group ($p < 0.05$). Overall, our data can encourage aging individuals to change their lifestyles that might lead to the health improvement of the elderly.

Graphical abstract:



Keywords: Aging; Chronic inflammation; Black rice germ and bran; Exercise program; Frailty phenotype; Aging Biomarker; Physical performance; Muscle strength

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