

## 5. DISRUPTION OF THE IMMUNE RESPONSE IN PATIENTS WITH OBESITY DURING COVID-19



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**Introduction.** Obesity was one of the frequent comorbidities in hospitalized patients with SARS-CoV-2 infection. The recent studies of Covid-19 outcomes have noticed a correlation between obesity and more severe clinical evolution followed by worse outcomes. The disruption of the immune response was described as one of the multiple pathochemical mechanisms resulting in the development of a worse outcome.

**Aim of study.** Aim of study was to evaluate the severity of disrupted immune response as a possible prognostic factor in patients with Covid-19.

**Methods and materials.** The scientific articles (clinical trials and case reports), published between 2019 and 2023 in PubMed and Google Scholar databases, were analysed critically by using the key-words obesity, cytokines, Covid-19, immune response.

**Results.** The dysfunction of the immune system in severe SARS-CoV-2 is characterized by reduced production of interferons by innate immune cells in early stages followed by excessive production of cytokines by the adaptive immune system in the later ones. This dysfunction is exacerbated in obese COVID-19 patients, where the immune system fails to mount an effective antiviral response. SARS-CoV-2 employs NSP3, NSP16, and NSP1 to suppress the immune system. Through NSP3, it inhibits the phosphorylation, nuclear translocation and dimerization of the transcription factors IRF3 and IRF7, thus suppressing innate immunity. NSP16 inhibits mRNA splicing, reducing the recognition of viral RNA by helicase receptors. NSP1 prevents the formation of IFN $\beta$ , enhancing the degradation of IFN- $\beta$  mRNA. As a result, the production of IFN-induced genes (ISGs) is significantly reduced in obesity, leading to impaired immune responses.

**Conclusion.** The severe forms of COVID-19 were characterized by the dysfunction of the immune system. The early stages were followed by low production of interferons, that was essential for initiation of antiviral response, while in the later ones an excessive production of cytokines was identified, leading to an uncontrolled inflammatory response. It was shown that obesity exacerbated this dysfunction, resulting in more severe disease outcomes.