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Leukocyte Telomere Length Changes in Hypoxic COVID-19 patients

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ABSTRACT

Background: Chronological age is a major risk factor for severe COVID-19, especially among elderly patients with comorbidities. Telomeres, nucleoprotein structures at the ends of chromosomes, are established biomarkers of aging, and their attrition may be accelerated by environmental stressors, including viral infections. However, the relevance of telomere length to COVID-19 severity remains underexplored. Aim: This study aimed to evaluate leukocyte telomere length (LTL) in normoxic and hypoxic COVID-19 patients using quantitative fluorescence in situ hybridization (Q-FISH). Correlations between LTL and age were also assessed within subgroups. Methods: LTL (arbitrary units, a.u.) was measured by Q-FISH in interphase nuclei of blood leukocytes from hospitalized COVID-19 patients stratified by peripheral oxygen saturation (SpO_2): hypoxic (SpO_2 <94%, n=30) and normoxic (SpO_2 >94%, n=30). Results: LTL was significantly shorter in hypoxic patients (199.77 ± 48.80 a.u.) compared to normoxic group (230.87 ± 61.30 a.u.). Significant inverse correlations between LTL and patient age were observed in the total cohort (r = -0.563), in normoxic (r = -0.509) and hypoxic (r = -0.625) subgroups. The overall LTL attrition rate was 1.68 a.u./year, with higher rates in hypoxic patients (2.37 a.u./year) compared to normoxic patients (1.33 a.u./year). Mean patient age did not differ significantly between normoxic (56.78 ± 23.30 years) and hypoxic (64.66 ± 12.85 years) groups. Conclusions: The observed telomere shortening in hypoxic COVID-19 patients, along with its inverse correlation with age, suggests that reduced LTL may reflect increased biological vulnerability under conditions of hypoxic stress. These findings highlight LTL as a potential indicator of disease severity. Further research is needed to determine its prognostic utility and to explore whether telomere attrition contributes to adverse COVID-19 outcomes or serves as a marker of underlying susceptibility.

Keywords: COVID-19, leukocyte telomere length, ageing

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