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Association of nutritional status with osteoporosis, sarcopenia, and cognitive impairment in hemodialysis patients

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Objectives: Inadequate nutrition in hemodialysis patients causes a number of complications. The purpose of this study was to investigate and confirm the nutritional-status variables affecting incidence of osteoporosis, sarcopenia, and cognitive impairment in hemodialysis patients.

Methods: We enrolled 131 patients. The Geriatric Nutrition Risk Index (GNRI) was calculated to assess nutritional status. The GNRI was divided into four quartiles, and nutritional status was found to be better with higher quartiles. Femur and lumbar spine T-score were measured to diagnose osteoporosis. The skeletal muscle mass index and handgrip strength (HGS) were measured to diagnose sarcopenia. The Korean version of the Montreal Cognitive Assessment (K-MoCA) was calculated to assess cognitive impairment. Hemoglobin, low-density lipoprotein-cholesterol, triglyceride, high-density lipoprotein-cholesterol, β2-microglobulin, HbA1, High-sensitivity C-reactive protein (hs-CRP), intact parathyroid hormone, albumin, and upper-arm circumference were measured to assess their association with osteoporosis, sarcopenia, cognitive impairment, and nutritional status.

Results: GNRI quantile 4, compared with quantile 1, had lesser incidences of osteoporosis and sarcopenia. Cognitive impairment did not show any difference according to GNRI quantile. The incidence of osteoporosis was higher with longer dialysis periods (OR 1.696, 95% CI 1.053-2.729) and higher intact PTH (Odds ratio [OR] 3.136, 95% confidence interval [CI] 1.781-5.518). Sarcopenia was less frequent for GNRI quantile 1 to 2 (OR 0.064, 95% CI 0.005-0.883), and the higher the HbA1c, the higher the frequency of sarcopenia (OR 3.728, 95% CI 1.033-86.4). Cognitive impairment was more frequent with lower hemoglobin levels (OR 0.585, 95% CI 0.360-0.950).

Conclusions: This study confirmed that the worse the nutritional status as assessed by GNRI, the higher the incidence of osteoporosis and sarcopenia. The relationships between various nutritional variables and osteoporosis, sarcopenia and cognitive impairment also were identified. Proper nutritional assessment and prevention of malnutrition in hemodialysis patients will improve the prognosis for those complications.

Figure 1. Distributions of sarcopenia status (normal, [pre] sarcopenia), osteoporosis status (normal, osteopenia, osteoporosis), and cognitive impairment (normal, cognitive impairment) are plotted by GNRI quantile.

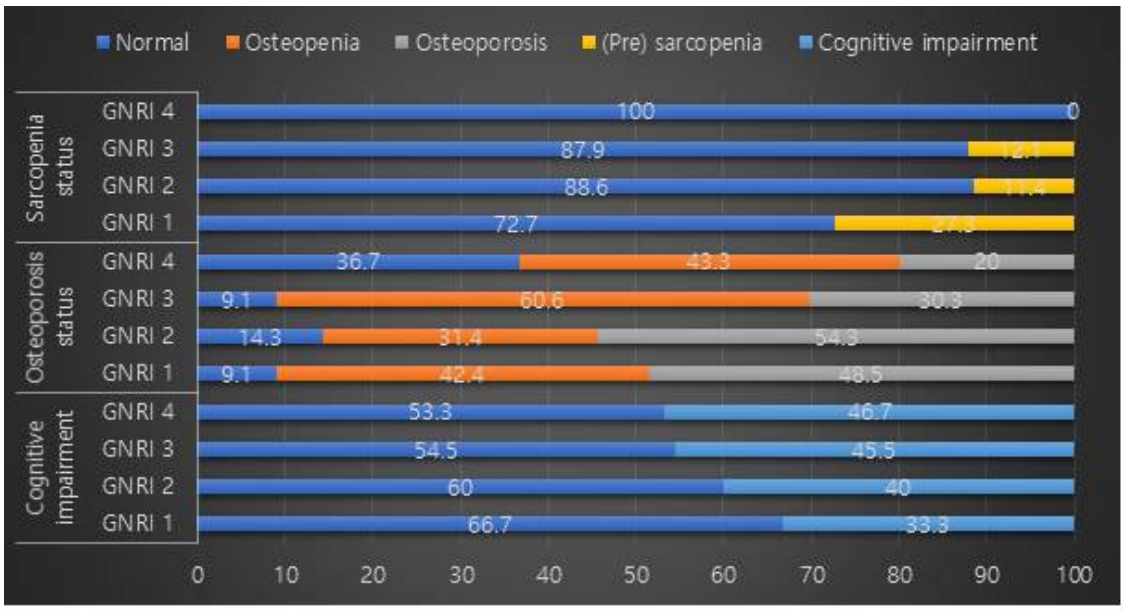

Figure 2. Factors associated with osteoporosis, sarcopenia, cognitive impairment.