EDITORIAL

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Is sarcopenia a real risk factor for mortality in patients undergoing hemodialysis?

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Sarcopenia is defined as a chronic condition characterized by slow and progressive decline in muscle mass and function [1]. Currently, owing to lack of unified tests and diagnostic criteria for uremic sarcopenia, the diagnosis of this condition is primarily based on diagnostic criteria established by the European Working Group on Sarcopenia in Older People [2]. Sarcopenia shows a high prevalence (14% to 63%) in patients with end-stage renal disease [3-5]. The pathogenesis of sarcopenia in patients undergoing hemodialysis (HD) remains unclear and is attributed to multiple contributors such as increased levels of pro-inflammatory cytokines, insufficient protein intake, and insulin resistance [6].

In the latest issue of the *Korean Journal of Internal Medicine*, Kim et al. [7] have reported that sarcopenia was strongly associated with long-term mortality and cardiovascular events in patients undergoing HD. The study included 142 prevalent HD patients who were followed-up prospectively over 4.5 years. Low muscle mass measured using bioelectrical impedance analysis (BIA) was defined as a lean tissue index (LTI) ≥ 2 standard deviations below the normal sex-specific mean for young adults. Low muscle strength was defined as handgrip strength (HGS) < 30 kg in men and < 20 kg in women. Sarcopenia was diagnosed in patients with reduced LTI and HGS. Low LTI and HGS were independently associated with mortality. The association between sarcopenia and mortality has been studied in several settings, including in patients with chronic kidney disease [8]. Interestingly, muscle strength and muscle mass (the two components of sarcopenia), do not share the same clinical relevance [9]. In fact, muscle mass is not the only determinant of muscle strength. During the aging process, the decline in muscle strength is significantly more rapid than the loss of muscle mass [10]. In contrast to studies reporting findings in the general population, a recent large-scale study observed that sarcopenia (based on most standard definitions and estimation of low muscle mass, regardless of indexing method), was not significantly associated with mortality after adjusting for covariates [11]. Notably, slow gait speed and low muscle strength were significantly associated with mortality in patients undergoing maintenance HD [11]. Several studies have demonstrated a significant association between sarcopenia and high mortality in patients undergoing dialysis [12-14]. The discrepancy across studies with respect to the as-

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sociation between sarcopenia and mortality in patients undergoing HD indicates that the assessment of muscle strength and mass may provide prognostic information regarding survival in patients undergoing HD. Accurate measurement of muscle mass and quality is technically difficult. Historically, the calf circumference was used to determine muscle mass; however, it was shown to be a poor marker of muscle mass with limited individual prognostic relevance [15]. BIA is a relatively inexpensive, quick, and simple technique; however, the patient's hydration status, the machine and the equations used can affect the results [16]. Dual-energy X-ray absorptiometry (DEXA) is the most common imaging-based method used in research and in clinical practice because it is a simple and widely available test that uses minimal quantities of ionizing radiation and is also accurate and easily reproducible [17]. However, DEXA can over or underestimate muscle mass depending on whether the appendicular lean mass is used for measurement [18]. Computed tomography and DEXA may more objectively evaluate skeletal muscle index; however, these tests are expensive and not always widely available. Thus, they are not easily applicable in routine clinical practice.

In conclusion, to identify variables that best detect sarcopenia and predict outcomes, the best tools for measuring each variable including muscle mass and muscle quality need to be determined.

Conflict of interest

No potential conflict of interest relevant to this article was reported.

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