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The Relationship between Nutritional Status and Latent Tuberculosis in Routine Hemodialysis

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Abstract

BACKGROUND: Malnutrition in chronic kidney disease (CKD) patients undergoing hemodialysis (HD) interferes with the natural and adaptive immune response, consequently, increasing the latent tuberculosis (TB) reactivation.

AIM: This study therefore aims to determine the relationship between nutritional status and latent TB in routine HD, using interferon gamma release assays (IGRA), to screen for latent TB.

METHODS AND STUDY DESIGN: This study has an analytical observation cross-sectional design, and was conducted on 120 CKD-HD patients aged 18 years and above, and has been undergoing HD twice weekly for over 3 months, without malignancy, human immunodeficiency virus/acquired immunodeficiency syndrome, history of TB, or radiological evidence at the HD Unit of the Dr. Hasan Sadikin Hospital, Bandung, Indonesia, between March and May 2020, and not currently receiving immunosuppressant or TB therapy. In addition, the age, gender, history of Bacille Calmette-Guerin vaccine, CKD etiology, length of HD, HD adequacy, TB contact history, number of family members, smoking status, body mass index, albumin, malnutrition inflammation score, triceps skinfold thickness (TST), biceps skinfold thickness, suprailiac skinfold thickness (SIST), mid-upper arm circumference (MAC), and normalized protein catabolic rate between positive and negative IGRA groups, of each patient, were determined.

RESULTS: In this study, all the patients met the inclusion and exclusion criteria. Based on the IGRA test, 47 patients (39.17%) tested positive, and 68 (56.67%) tested negative, while the results for the remaining 5 (4.16%) were indeterminate. The malnutrition inflammation score (MIS) score with positive IGRA 23.3 (20.0–26.7) was discovered to differ insignificantly (p value of 0.252) from the negative counterpart 20.0 (16.7–28.4). Meanwhile, in the HD adequacy assessment based on urea reduction rate, a statistically significant difference (p = 0.042) occurred between the positive 70.45 (65.70–76.61) and negative 74.15 (70.71–77.33) IGRA groups. In the smoking status, the positive and negative IGRA were discovered to differ significantly (30 (63.8% vs. 28 (41.2% p = 0.017) OR 2.521 (1.172–5.425). However, in the history of contact with TB patients, the positive and negative IGRA did not differ significantly (4.3% vs. 11.8% p = 0.160). Furthermore, there was a significant difference in TST and MAC, between MIS >5 and MIS ≤5 (p < 0.05).

CONCLUSION: The assessment of nutritional status level, TST, MAC, smoking status, and adequate HD is crucial for CKD patients with routine HD, as these factors present risks of latent TB.

Introduction

Chronic kidney disease (CKD) remains a global health problem, affecting 5–10% of the world's population, with increasing prevalence each year. According to the Global Burden of Disease Study in 2015, CKD is the 12 highest cause of death in the world, causing about 1.1 million deaths worldwide [1]. Meanwhile, tuberculosis (TB) is currently one of the top ten causes of death worldwide, and Indonesia has the highest prevalence of TB in the world (8%) after India (27%) and China (9%) [2].

The occurrence of TB is 10–25 times higher in people with CKD and up to 37 times higher in kidney recipients [3]. This is related to uremic retention in CKD causing impaired immune response due to decreased phagocytosis function of granulocytes and monocytes/macrophages, impaired antigen presentation capacity in antigen presenting cell (APC) cells, decreased number of antigen presentation on dendritic cell surfaces, decreased B lymphocyte production capacity, increased T lymphocyte apoptosis, and cell-mediated immunity (CMI) disorders [4].

In addition to infection in CKD patients, hemodialysis (HD) patients often suffer from protein energy wasting (PEW), and this malnutrition has a detrimental effect [5]. PEW has been shown to be an independent and strong predictor of mortality, life quality, and morbidity in people with CKD, and to be prevalent in about 18–75% of CKD-HD patients [6], [7]. Therefore,