

Association between the Ankle-Brachial Pressure Index and Geriatric Nutrition Risk Index in Hemodialysis Patients

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Received Date: August 30, 2018; Accepted Date: October 19, 2018; Published Date: October 29, 2018

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Abstract

Objective: The development of atherosclerosis in hemodialysis (HD) patients is associated with malnutrition. However, the relation between the ankle-brachial pressure index (ABI), as a diagnostic assessment tool for atherosclerosis obliterans (ASO), and nutritional indicators has not been well studied. The present study was performed to identify nutritional factors related to atherosclerosis by investigating the relationship between the ABI and various parameters, including the Geriatric Nutrition Risk Index (GNRI) as a nutritional indicator, in HD patients.

Methods: We measured the ABI of 47 HD patients and compared its relationship to patient characteristics (sex, age, and history of diabetes), laboratory parameters (white blood cell count, low-density lipoprotein cholesterol [LDL-C], and C-reactive protein [CRP]), and the GNRI. The patients were categorized into two groups according to whether their ABI value was above or below 0.9, with a low ABI being a diagnostic marker for ASO. The results from the two groups were then analyzed and compared.

Results: The percentage of patients with an ABI <0.9 was 66%. Linear regression analysis revealed that a low ABI was significantly associated with a low GNRI, low hematocrit, hemoglobin, and LDL-C levels, high levels of inflammatory parameters (CRP level and white blood cell count); and a high platelet count. Among the factors having significant association with ABI in linear regression analysis, those related to nutritional status and inflammation were selected and used as explanatory variables in multiple logistic regression analysis, where the dependent variables were the two groups. We found only GNRI was a significant predictive factor for ABI.

Conclusion: The ABI in HD patients was associated with indicators of the nutritional status. In the multivariate analysis, a low GNRI was a significant predictive indicator for a low ABI.

Keywords: Ankle-brachial pressure index; Geriatric nutritional risk index; Hemodialysis; Atherosclerosis; Peripheral arterial disease; Cardiovascular disease; Malnutrition inflammation atherosclerosis syndrome

malnutrition. The GNRI was developed by Bouillanne et al. [4] as a tool for predicting the risk of malnutrition-related morbidity and

Hemodialysis (HD) patients have a high prevalence of peripheral arterial disease (PAD) [1], such as arteriosclerosis obliterans (ASO), which is known to have a significant impact on patient morbidity and mortality.

The effectiveness of measuring the ankle-brachial pressure index (ABI) for diagnosing ASO has been well documented, and the guidelines recommend annual measurement of ABI for HD patients. A low ABI is associated with an increased risk of atherosclerosis and is known to predict morbidity and mortality due to cardiovascular disease (CVD) [2]. Many patients with an ABI of less than 0.9 have been observed to have malnutrition-inflammation-atherosclerosis syndrome (MIA syndrome) [1,3], in which malnutrition, inflammation and atherosclerosis are closely related and influence each other. This suggests there is a strong relation between atherosclerosis and

In this study, we enrolled 47 patients undergoing maintenance HD whose ABI was measured from April 2014 to April 2018 at Fukuoka Sanno Hospital in Japan. Patients with a history of lower limb amputation, an abnormally high ABI (>1.40), and low cardiac function (left ventricular ejection fraction of $<40\%$) were excluded. The ABI of each patient was measured in the supine position using the VS-1500N vascular screening system (Fukuda Denshi Co., Ltd, Tokyo, Japan). The ABI was measured on both lower limbs, and the lower value was used as the ABI value for each patient. We analyzed whether an association was present between the ABI and patient characteristics (sex, age, history of diabetes, time on HD, heart rate, and history of

and CRP had no predictive value when analyzed separately. As a result, a low GNRI value remained as a significant indicator (Table 3).

ABI data availability				
Parameter	Total, n(%)		ABI	P-Value
Overall		47 (100)	0.71 (0.64-1.02)	-
Sex	Male	35 (74.5)	0.73 (0.64-1.02)	<0.01
	Female	12 (25.5)	0.69 (0.63-0.84)	
Diabetes	No	15 (31.9)	0.81 (0.67-1.05)	<0.01
	Yes	32 (68.1)	0.69 (0.64-0.93)	
GNRI	<91.2	24 (51.1)	0.65 (0.61-0.77)	<0.01
	≥91.2	23 (48.9)	0.92 (0.70-1.09)	
Treatment of dyslipidemia	No	28 (59.6)	0.77 (0.67-1.04)	<0.05
	Yes	19 (40.4)	0.66 (0.64-0.87)	

ABI: Ankle Brachial Index; GNRI: Geriatric Nutritional Risk Index.

Table 1: Characteristics of the studied population according to in hospital ABI data availability.

Parameter		P-Value
Age	-0.006	NS
Duration of dialysis	-0.055	NS
Blood urea nitrogen	0.001	NS
Creatinine	0.019	NS
LDL-C		

CRP (mg/dL)

