Nutritional Status and First Hospitalization for HF in Stage B Patients

In the present study, we examined whether nutritional status could influence the transition from stage B to stage C as a possible non-cardiac factor, because undernutrition is well established not only as a prognostic risk factor in patients with HF but also as a major determinant of mortality after the onset of HF.[7–9]

Several previous studies have attempted to identify subjects at high risk for transition to symptomatic HF by using non-cardiac parameters. Velagaleti et al reported that the urinary albumin to creatinine ratio, as well as BNP, was a key factor for new-onset HF in 2,754 Framingham Heart Study participants.[15] Lam et al also reported that higher serum creatinine level, lower functional residual volume/forced vital capacity (FRV1/FVC) ratio, and lower hemoglobin level were associated with increased HF risk in the Framingham Heart Study's original cohort.[16] In all the study populations, no significant association was noted between CONUT score and risk of first hospitalization for HF, although patients with higher CONUT score had higher BNP levels as compared with those with lower scores. However, in patients aged 70 or older, higher CONUT score was associated with a 17% increase in first hospitalization for HF, whereas it was inversely associated with first hospitalization for HF in patients younger than 70 years (**Table 5**). This result suggests that the CONUT score is a useful predictor of conversion to stage C in elderly patients.

Although it is reasonable to note that undernutrition, which is more commonly observed in elderly patients, was associated with an increased incidence of HF hospitalization, caution is needed when interpreting the observation in patients younger than 70 years. One of the possible explanations is that overnutorition, rather than undernutrition, might be more influential on the development of HF in the younger generation. Accordingly, increased prevalence of overweight subjects in the younger population could be additional influencing factor, because obesity, especially abdominal obesity, is also an independent risk of HF and other cardiovascular diseases.[15–19] The differences in the medication use between younger and elderly populations should also be taken into consideration[20,21] (**Table S2**).

Comparison With Other Established Nutrition Assessments

Because the CONUT score is a relatively new index, it needs to be validated with established scores. Indeed, it has been shown that the CONUT score is in good agreement with 2 other classical methods: the Subjective Global Assessment (SGA) and the Full Nutritional Assessment (FNA).[11] In the present study, we also examined the prognostic impact of the CONUT score and the NRI and found that both scores have comparable prognostic significance. Thus, we used the CONUT score to evaluate the prognostic impact of nutritional status in stage B patients (**Figures S1A,B**).

Clinical Implications

The present study demonstrates that assessment of nutritional status by CONUT score is useful for risk stratification of stage B patients. Although patients with stage B are asymptomatic and thus their risks are less likely to be recognized and treated, the present study indicates that assessment of nutritional status with the CONUT score should be implemented in stage B patients.

Study Limitations

Several limitations should be mentioned for the present study. First, we used the classification of the CONUT score reported in a previous study[11] and did not assess the optimal cut-off levels of the 3 parameters (serum albumin level, total cholesterol level, and total lymphocyte count). Second, classification of HF staging was done by investigators at each institution and thus may have caused classification bias. However, because all the investigators were established cardiologists and data were prospectively collected, class assignment bias should be minimal. Third, although we assessed the relationship between the undernutrition and prognosis, we did not evaluate the relationship between overnutrition and prognosis in stage B patients. Fourth, we did not exclude stage B patients with liver cirrhosis, which might have influenced the serum levels of albumin and cholesterol in the present study.

Conclusions

In the present study, we were able to demonstrate that nutritional status was associated with increased incidence of death, indicating that the status is a key prognostic factor and thus should be assessed for risk stratification of stage B patients. A nutritional intervention trial in stage B patients is needed to confirm our findings.

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Supplementary Files

Supplementary File 1

Table S1. Baseline Characteristics of the Patients Without Information for a CONUT Score

Table S2. Baseline Characteristics of the Patients According to Age

Figure S1. (**A**) Correlation between CONUT score and the nutritional risk index (NRI).

Data S1. Appendix

Please find supplementary file(s);
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