The Relationship Between Intradialytic Nutrition and Gastrointestinal Symptoms Using a Modified Version of the Gastrointestinal Symptom Rating Scale

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Objective: Intradialytic nutrition has been shown to improve nutritional status in maintenance hemodialysis (HD) patients but remains controversial due in part to concerns over hemodynamic stability and gastrointestinal (GI) distress. There are limited data on the relationship between intradialytic nutrition and GI symptoms, possibly due to the lack of a validated tool. Therefore, we intended to validate a questionnaire to measure GI symptoms associated with a single HD treatment and determine the relationship between intradialytic nutrition and GI symptoms.

Design: Cross-sectional study. Forty-eight maintenance HD patients.

Main Outcome Measure: GI symptoms and dietary intake during HD treatment.

Results: In general, we found acceptable internal consistency (Cronbach's alpha >0.5, exception reflux domain) and repeatability in all 5 domains of a modified version of the Gastrointestinal Symptom Rating Scale. The prevalence of GI symptoms associated with a single HD treatment (generalized score greater than 1) was 54.2, 43.7, 6.2, 41.7, and 45.8% for the abdominal pain, indigestion, reflux, diarrhea, and constipation domains, respectively. More than two-thirds of patients chose to eat during treatment (168.6 ± 165.6 kcal) with the most commonly consumed items being candy, oral supplements, and cookies. There was no difference in GI symptoms among patients who did or did not eat ($P > .05$). However, the amount of total dietary fat and fiber consumed during treatment was associated with greater indigestion ($P < .05$) prior to accounting for outliers or multiple comparisons.

Conclusion: In this sample, the modified version of the Gastrointestinal Symptom Rating Scale was a generally valid tool for measuring GI symptoms associated with a single HD treatment. Patients who ate during treatment did not experience greater GI symptoms than those who did not; however, high amounts of fat and fiber may be associated with greater GI symptoms. Prospective trials should examine the relationship between GI symptoms and dietary intake during treatment in HD patients.

Introduction

THE CONSUMPTION OF food or nutritional supplements during hemodialysis (HD) has been associated with improved nutritional status[1-3] and possibly survival in maintenance HD patients.[4,5] However, this practice has remained controversial due to concerns that include hemodynamic instability and gastrointestinal (GI) symptoms.[6-8]. Despite frequently being cited as a reason to restrict intradialytic nutrition, there are minimal data on the relationship between dietary intake during HD and the development of acute GI symptoms.[6,9] The strongest evidence in support of this claim comes from intradialytic supplement studies that have excluded a small number of patients due to the development of GI distress.[10,11] This lack of data on intradialytic nutrition and the development of acute GI symptoms may be, in part, due to the lack of a tool specifically designed to measure these symptoms. Therefore, the purpose of this study was to validate a tool to measure acute GI symptoms associated with a single HD treatment and to assess the relationship between GI symptoms and intradialytic nutrient intake in maintenance HD patients.

Methods

We modified the American version of the Gastrointestinal Symptom Rating Scale (GSRS)[12] to measure GI symptoms associated with a single HD treatment (available online at www.jrnjournal.org). The GSRS contains 15

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questions in 5 domains (abdominal pain, reflux syndrome, indigestion syndrome, diarrhea syndrome, and constipation syndrome) scored on a 7-point Likert scale (1 = no symptoms and 7 = very severe symptoms). This version was modified by changing the wording of the questions within 3 domains (abdominal pain, reflux syndrome, and indigestion syndrome) to ask specifically about the time during a single HD treatment. Wording of the remaining 2 domains (diarrhea syndrome and constipation syndrome) were altered to ask patients about the time immediately following the specific HD treatment until the start of the following treatment. We sent this modified version of the GSRS to 5 renal dietitians around the United States for comment. Comments received more than once were discussed by the authors and considered for inclusion. Based on these expert comments, 1 additional modification to the wording in the questions was adopted.

Following this initial content validation, we recruited 50 maintenance HD patients who were above the age of 18 years and currently undergoing HD from clinics in central Illinois. One patient received a kidney transplant prior to initiating the study, and 1 patient was unavailable for follow-up, leaving 48 HD patients completing all time points and included in the analysis.

At the end of a midweek dialysis session (to minimize variability caused by the long interdialytic window), HD patients were asked about dietary intake and GI symptoms that occurred during that specific treatment. Additionally, we asked the first 5 patients to circle any words they found difficult to understand during the initial treatment, but this resulted in no changes to the questionnaire. Dietary intake was measured using dietary recall coupled with visual inspection of any cups, wrappers, or containers. Similarly, patients were asked about the symptoms they experienced from 3 domains of the modified GSRS (abdominal pain, reflux, and indigestion) during that specific treatment. At the start of the following treatment (48-72 hours later), participants were asked about symptoms from the final 2 domains (diarrhea and constipation syndromes) experienced since the end of the previous treatment. Three weeks later, this protocol was repeated to determine the repeatability of measures.[13]

Data were entered into SPSS version 24. Internal consistency of each of the 5 domains was analyzed using Cronbach's alpha. To determine repeatability, the correlations between GI symptom domains during the first and second treatment were analyzed using Pearson correlations. Prevalence of GI symptoms associated with a single HD treatment was determined by the proportion of participants with an average score greater than 1 on all of the questions within an individual domain of the first GSRS. Nutrient analysis was conducted using Nutritionist Pro (Axxya, Redmond, WA). GI symptoms were compared across demographics as well as in patients who ate during treatment (average energy intake >0 kcal) using independent samples t-test. Finally, the GSRS and dietary recall from the first and second treatment were averaged, and the relationship between nutrients of interest and GI symptoms were determined using additional Pearson correlations. When outliers were present, we reran our correlations after removing outliers. Outliers were identified by the method suggested by Hoaglin et al.[14] In short, we extended the values at the 25th and 75th percentile by a value 2.2 times the difference between the values at each of those quartiles. Significance for all analyses was set at an alpha of 0.05. This protocol was approved by the Institutional Review Board at the University of Illinois and conducted in accordance with the Declaration of Helsinki.

Results

Forty-eight HD patients completed the entire study protocol and were included in the analysis (Table 1). Internal consistency and repeatability of the 5 domains are presented in Table 2. In general, we found acceptable or questionable internal consistency and repeatability among each of the 5 domains with the exception of reflux.[15] In addition, the internal consistency of the indigestion syndrome domain was improved by removing the question related to burping. Therefore, this question was removed for all subsequent analyses.

The prevalence of GI symptoms during a single HD treatment (generalized score greater than 1) was 54.2% (mean generalized score, 1.60 ± 0.74), 43.7% (1.48 ± 0.67), and 6.2% (1.07 ± 0.31) for the abdominal pain, indigestion syndrome, and reflux syndrome domains, respectively. In the time following a specific midweek HD treatment, 41.7% (1.73 ± 1.24) and 45.8% (1.72 ± 1.09) reported a generalized score greater than 1 for the diarrhea and constipation syndromes, respectively. Patients with diabetes had higher constipation scores as opposed to those who did not report having diabetes (1.97 ± 1.39 vs. 1.36 ± 0.42, $P<.05$) in the time following HD treatment. Combined 77.1% of HD patients experienced symptoms in at least 1 domain. However, the severity of symptoms was low with a mean score of less than 2 for all domains.

Table 1. Demographics for Maintenance Hemodialysis Patients Included in Validation Study

Demographics	Value
Age (y)	56 ± 13
Vintage (mo)	53 ± 59
Gender (male/female)	30/18
Race (%)	
African–American	54.2
Caucasian	45.8
Hispanic (%)	8.3
Diabetes (%)	54.2
Smoke (%)	20.8
Digestive disorder (%)	18.8

Value ± SD.