ORIGINAL RESEARCH

Peritoneal Dialysis Patients Have Higher Prevalence of Gastrointestinal Symptoms Than Hemodialysis Patients

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Objective: Malnutrition is common in dialysis patients and is attributed to decreased food intake, and/or chronic systemic inflammation linked to dialysis-related comorbidities and complications. This study aimed to determine the prevalence of gastrointestinal (GI) symptoms in dialysis patients and whether this impacts food intake.

Design: Cross-sectional study.

Setting: Tertiary teaching hospital.

Participants: All consenting hospital peritoneal dialysis (PD) and hemodialysis (HD) patients.

Methods: Patients were interviewed by a dietitian regarding the prevalence and impact of GI symptoms (nausea, vomiting, bloating, early satiety, diarrhea, heartburn, fatigue, and weight changes). Serum levels of albumin were measured, and the use of medication known to cause GI symptoms was recorded.

Main Outcome Measure: Presence of GI symptoms.

Results: The PD (n = 122) and HD (n = 172) groups were similar in age, gender, and presence of diabetes. Serum albumin levels were lower for those on PD compared with HD (3.2 vs. 3.5 g/dL, $P < .001$). Eighty-five percent of the patients on PD reported at least 1 GI symptom, compared with 51% on HD. Compared with HD, more PD patients reported that GI symptoms were related to the onset of dialysis (55% vs. 12%, $P < .001$). A greater number of PD patients (compared with HD patients) reported a decrease in food intake (53% vs. 14%, $P < .001$) and that they had attempted dietary changes to alleviate symptoms (34% vs. 9%, $P < .001$).

Conclusion: These results should influence dietetic educational practice. In addition to the provision of adequate protein and energy, dialysis patients should be counselled regarding the management of GI symptoms and monitored for the prevalence and severity of these symptoms.

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MALNUTRITION IN CHRONIC kidney disease (CKD) is well documented and reported in significant numbers of chronic renal failure and dialysis patients.[1-4] Insufficient energy and protein intake is associated with an increase in morbidity and mortality.[5,6] Malnutrition has been classified into 2 main types: (*i*) occurring secondary to reduced food intake, and (*ii*) due to chronic systemic inflammation and linked to dialysis-related comorbidities and complications. These conditions can occur separately or overlap, and may be influenced by factors related to uremia and dialysis. Anorexia is commonly reported in patients with CKD.[7,8] It is reported to be associated with uremia[9,10] and may be related to inflammation, which can cause decreased gastric and intestinal motility, modification of gastric secretions, and taste aversions. Anorexia is known to contribute to or cause malnutrition in dialysis patients.

Gastrointestinal (GI) symptoms are reported in both peritoneal dialysis (PD) and hemodialysis (HD) patients; however, there are more reports of symptoms other than anorexia in PD rather than HD patients.[11,12] PD patients are also reported to have higher levels of malnutrition (20% to 50% compared with 10% to 50%),[11] although the ranges for both treatment modalities are large owing to discrepancies in the methods used to assess malnutrition. In PD patients,[3,13,14] the presence of GI symptoms has been inversely related to nutritional status.[15] Several mechanisms have been proposed as contributing to GI symptoms, including impaired gastric emptying time[16,17] and the composition of the dialysate,[13,18] but this is controversial.[15]

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PD fluid contains glucose, which may suppress appetite and promote GI symptoms.[19]

Establishing the incidence of GI symptoms and the impact on food intake in the 2 dialysis patient groups will enable dietitians to develop strategies to improve food intake in patients with these symptoms. The aims of this study were (*i*) to determine the prevalence of GI symptoms in PD and HD patients and (*ii*) to determine whether these GI symptoms affect food intake.

Method

Participants

All hospital PD patients (n = 132) and the HD patients (n = 172) dialyzing at 4 satellite centers on 10 separate shifts were eligible to be surveyed. This study was approved by Southern Health Ethics Committee 09104Q. Patients provided informed verbal consent.

Procedure

All patients participated in structured interviews by a registered dietitian. Interviews were performed in person or by phone and lasted approximately 10 minutes. Interpreters, carers, or family members were used for those who did not speak English. Questions were asked about the presence of GI symptoms, including nausea, vomiting, bloating, early satiety, poor appetite, constipation, diarrhea, heartburn, weight loss, and fatigue. Patients were asked "do you suffer from any of the following symptoms?" and the list of symptoms was read to the patient, with an answer recorded for each one. A yes or no answer was recorded.

The type of PD (continual ambulatory PD, which involves 4 bag changes daily, or automated PD, which is performed overnight) was recorded to determine whether this influenced symptoms, whether a bag in or out affected symptoms, whether the symptoms had commenced or worsened when dialysis was initiated, whether the symptoms had affected food intake, the use of commercial supplements, and whether the patient had tried to relieve the symptoms. HD patients were asked the same questions, omitting those relating only to the procedure of PD. The cause of renal failure, diagnosis or otherwise of diabetes, and the incidence of peritonitis, which is an infection of the peritoneum occurring in PD patients, were recorded.

Biochemistry, Anthropometry, and Medications

Serum albumin level (the most recent blood test before the survey, with no peritonitis) was assayed by pathology services (Southern Health, Clayton, Australia) using the bromocresol purple dye-binding assay. A small number of PD patients (6.5%) had their serum albumin levels checked at a different laboratory (Gippsland Pathology, Gippsland, Australia) using the bromocresol green dye-binding assay. Each patient's weight (at the time of survey and before commencing any dialysis) and height were recorded to allow for calculation of body mass index (BMI, kg/m^2) before dialysis was required and at the time of the survey. Measurements were performed in PD or HD hospital units at the commencement of dialysis, and other weights were recorded in outpatient clinics or daily at home by the PD patients or in HD units on dialysis days (same scales used for these serial weights). The use of Renagel (sevelamer) (Genzyme Therapeutics, Oxford, UK) or Sensipar (cinacalcet) (Amgen Inc., Newbury Park, CA), medications known to cause GI symptoms in some people, was also recorded.

Statistical Analysis

Normally distributed data are presented as mean and standard deviation (age, height, weight, BMI) or mean and range (total GI symptoms) and were analyzed using a Student *t* test. Nonparametric and ordinal data are presented as median and interquartile range (months on dialysis, albumin level, GI symptoms) and were analyzed using a Wilcoxon rank sum test. Binomial data are presented as number and percentage (sex, diabetes status, medication use, influences on GI symptoms) and were analyzed using a χ^2 test. $P < .05$ was considered significant.

Results

Sample Characteristics

At the time of the survey, there were 132 PD patients at the hospital. One patient was excluded owing to deafness. One hundred twenty-two of the remaining 131 patients were surveyed; the remaining 9 underwent a transplant, were shifted to HD, or could not be contacted despite multiple attempts. All HD patients (n = 172) undergoing dialysis at 4 satellite centers on 8 separate shifts were surveyed. No HD patient was excluded.

Sample characteristics are shown in Table 1. PD and HD groups were similar in gender, age, presence of diabetes, and current BMI. The mean number of months on the current dialysis modality was greater by 13 for the HD patients compared with the PD patients ($P < .001$). The mean BMI before the commencement of dialysis therapy was greater for the HD group compared with the PD group. At the time of the survey, there was no difference in BMI between the 2 groups. In the PD group, BMI was higher at the time of the survey compared with predialysis BMI (Table 1). More patients in the PD group gained weight (79%) than those in the HD group (29%). The PD group had significantly lower serum albumin levels than the HD group.

GI Symptoms

Significantly more PD, than HD, patients reported the presence of each of the GI symptoms, except constipation (Table 2). Eighty-five percent of PD patients reported GI symptoms, which increased to 91% when fatigue and weight loss were included, compared with 51% and 60%, respectively, for the HD patients (Table 2). Fatigue was the most commonly reported symptom in each group. For the PD group, there was no association of GI symptoms with peritonitis or the type of dialysis (continual

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