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Gastrointestinal symptoms in patients undergoing peritoneal dialysis

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ABSTRACT

Introduction: Gastrointestinal problems are common complications in the general population and also in end-stage renal disease. Such complications could be the result of increased serum urea, dialysis effect, intraperitoneal dialysis volume or any change in individual lifestyle and medications.

Objectives: The present study has focused on the prevalence of common gastrointestinal disorders among patients undergoing peritoneal dialysis.

Patients and Methods: This cross-sectional study conducted in three educational hospitals of Mashhad, Iran during one year. Patients who underwent peritoneal dialysis for at least three months enrolled in the study and filled Gastrointestinal Symptom Rating Scale (GSRS) questionnaire. Additionally, in the present study addiction has been defined as using any addictive substances including tobacco and opioids. The relationship between addiction and gastrointestinal symptoms was also investigated.

Results: Among 71 patients undergoing peritoneal dialysis, most of them were male (53.5%) with mean ± SD age of 48.15±16.62 years. The mean dialysis duration was six months and the maximum duration was 13 years (mean ± SD of 2.75±2.49 years). Among 15 domains of GSRS, only abdominal distention was significantly different before and after dialysis ($P=0.025$). Among the gastrointestinal symptoms, only increased flatus was associated with patients' gender ($P=0.04$). Addicted individuals were 15.5% among study population. Heartburn sensation, acid regurgitation, sucking sensation in epigastrium, abdominal flatus and abdominal distention were significantly related to addiction ($P=0.01$, $P=0.005$, $P=0.01$, $P=0.009$ and $P=0.016$, respectively).

Conclusion: Only abdominal distension had been affected by peritoneal dialysis according to GSRS. Additionally, addiction of patients had great effect on some gastrointestinal problems. This finding suggests the possible effect of managing addiction in patients undergoing peritoneal dialysis to reduce gastrointestinal symptoms.

Implication for health policy/practice/research/medical education:
The present study has focused on the prevalence of common gastrointestinal disorders among patients undergoing peritoneal dialysis. Our study revealed that only abdominal distention is affected by peritoneal dialysis according to the gastrointestinal symptom rating scale questionnaire.

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Introduction

Chronic kidney disease (CKD) is characterized by alteration in renal function and progressive decrease in glomerular filtration rate (1). This irreversible process will result in end-stage renal disease; where the accumulation of plasma toxins and electrolyte imbalance results in uremic syndrome and death if left untreated (1). CKD has great cost burden since the global prevalence of CKD has been reported to be approximately 12% (2). Unfortunately CKD patients have at least 30% lower survival rate compared to healthy individuals with the same age (1). Hemodialysis or peritoneal dialysis and kidney transplantation are the main treatment of this chronic disease. It has been reported that kidney transplantation is the treatment of choice in many

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aspects, including cognitive functions and mood state for CKD patients which can result in reduced mortality and increased quality of life (3,4). Approximately 280 and 65 individuals per million people are receiving dialysis and kidney transplantation. Sixty-five percent of patients who are undergoing dialysis are waiting for transplantation while only 25% receive the transplantation (1). Around 6% of patients who are candidate for transplantation will die during their awaiting period for suitable donor, too; those who receive transplantation may die if they don't receive appropriate treatment (1,5). Many of these deaths occur in developing countries like ours. These reports highlight the importance of proper dialysis and timely transplantation in patients with CKD. Whether we choose hemodialysis or peritoneal dialysis, each has its side effects. These complications vary from vascular problems in hemodialysis patients to peritonitis and local infections in peritoneal dialysis (6,7). Among those undergoing peritoneal dialysis, gastrointestinal disorders are frequent complications which are usually neglected. Gastroesophageal reflux disease (GERD), dyspepsia, nausea and vomiting as well as constipation are common gastrointestinal disorders which are both common in the general population and those who undergo peritoneal dialysis (8). By determination of the most frequent gastrointestinal disorder in patients undergoing peritoneal dialysis, management and planning lifestyle modifications for revealing such problems will become easier.

Objectives

The present study has focused on the prevalence of common gastrointestinal disorders among patients undergoing peritoneal dialysis.

Patients and Methods

Study design

The present cross-sectional study conducted between March 2017 and March 2018 in three educational hospitals in Mashhad. The study participants were chosen from patients who were referred for peritoneal dialysis. Every patient who enrolled in the present study has undergone dialysis for at least three months. The study questionnaires were filled when the peritoneal cavity was empty. All of these patients filled the Persian translated Gastrointestinal Symptom Rating Scale (GSRS). GSRS consists of 15 questions for evaluation of gastrointestinal disorders including abdominal pain, GERD, diarrhea, constipation and dyspepsia (Table 1).

Patients answer these 15 questions based on a Likert score ranging from 0 to 3 (9). It is noteworthy to mention that different languages of GSRS questionnaire have been reported to be good and provide acceptable validity and reliability (10). In the present study, dyspepsia has been considered based on having heartburn, sucking sensation in epigastrium, nausea and vomiting, as well as early fullness while taking a meal and fullness sensation after taking a meal which were graded from 0 to 3 (grade 0 as no symptoms and grade 3 as severe symptoms). The questionnaire symptoms and its scoring system have been summarized in Table 1. Those patients who had graded three of all the mentioned symptoms or a grade three in any of these symptoms considered to have dyspepsia. Additionally, in the present study addiction has been defined as using any addictive substances including tobacco and opioids. The relationship between addiction and gastrointestinal symptoms was also investigated.

After filling an informed consent, each patient received the Persian version of GSRS questionnaire and a questionnaire for demographic data. A researcher has explained the questionnaire for patients and filled the questionnaires for those patients who were not able to read or write. After peritoneal dialysis, the patients filled the same GSRS questionnaire again before discharge.

Ethical issues

Human rights were respected in accordance with the Helsinki Declaration 1975, as revised in 1983. The ethical committee of Mashhad University of Medical Sciences (Ethical code# IRMUMS.FM.REC.1395.171) approved the study. Informed consent was taken from the patients. Besides, this study was extracted from the MD thesis of Arezoo Naderzadeh (Thesis #941328) at this University.

Statistical analysis

The study data was then analyzed by SPSS 20 software. The chi-square test was used for analysis of variables between study groups. The non-parametric Kendall's tau-b test was used to assess the association of gastrointestinal symptoms with age, body mass index (BMI), and peritoneal dialysis volume. Mann-Whitney U test was applied to assess the relationship between addiction and gastrointestinal symptoms. A $P<0.05$ was considered as statistical significance.

Results

During the study period, 71 patients agreed to participate in the present study. Among them, 38 patients were male (53.5%) and others were female. The mean ± SD age of patients undergoing peritoneal dialysis was 48.15±16.62 years. Most of the patients (37 patients, 52.11%) have normal body mass index (BMI) (18.5<BMI<24.9 kg/m^2) and 28.16% (20 patients) were overweight (25 kg/m^2 <BMI<29.9 kg/m^2). The mean dialysis duration was six months since the maximum duration was 13 years (mean ± SD was 2.75 ± 2.49 years). The mean ± SD of dialysis fluid volume were 7.47 ± 1.59 L. Among abdominal pain, heartburn, acid regurgitation, sucking sensation in epigastrium, nausea and vomiting, borborygmus, abdominal distention, eructation, increased flatus, decreased passage of stool, increased passage of stool, loose

Table 1. Detailed information about the study questionnaire and scoring system

Gastrointestinal symptom	Score	Summary of response
Abdominal pain	0	No or transient pain
	1	Occasional pain interfering some daily activities
	2	Prolong pain which requires treatment and interfering many daily activities
	3	Severe pain interfering all daily activities
Heart burn	0	No or transient pain
	1	Occasional and short discomfort
	2	Frequent episodes which requires treatment
	3	Continuous discomfort only relieved by antacid medication
Acid regurgitation	0	No or transient pain
	1	Occasional regurgitation
	2	Regurgitation once or twice daily requiring treatment
	3	Regurgitation several times with transient relief by antacid
Sucking sensation in the epigastrium	0	No or transient discomfort
	1	Occasional short duration discomfort
	2	Frequent discomfort required taking meal or antacids between meals
	3	Continuous discomfort required taking meal or antacids between meals
Nausea and vomiting	0	No nausea
	1	Occasional nausea with short duration
	2	Frequent nausea without vomiting
	3	Continuous nausea with frequent vomiting
Borborygmus	0	No or transient borborygmus
	1	Occasional with short duration
	2	Frequent and prolonged episodes without impairing daily life
	3	Continuous borborygmus interfering daily life activities
Abdominal distension	0	No or transient distension
	1	Occasional with short duration
	2	Frequent and prolonged episodes which can be mastered by adjusting clothing
	3	Continuous distention interfering daily life activities.
Eructation	0	No or transient distension
	1	Occasional and troublesome
	2	Frequent and interfering some daily activities
	3	Frequent and interfering daily activities
Increased flatus	0	No increase
	1	Occasional and short duration
	2	Frequent and prolonged episodes interfering some daily activities
	3	Frequent and interfering daily activities
Decreased passage of stool	0	Once a day
	1	Every 3 days
	2	Every 5 days
	3	Every 7 days or less
Increased passage of stool	0	Once a day
	1	3 times a day
	2	5 times a day
	3	7 times a day or more
Loose stool	0	Normal consistency
	1	Somewhat loos
	2	Runny stool
	3	Watery stool
Hard stool	0	Normal consistency
	1	Somewhat hard stool
	2	Hard stool
	3	Hard and fragmented occasionally combined with diarrhea
Urgent need of defecation	0	Normal control
	1	Occasional filling of urgent defecation
	2	Frequent filling of urgent defecation interfering with social life activities
	3	Enable to control defecation
Felling of incomplete evacuation	0	Felling of incomplete evacuation without straining
	1	Somewhat difficult defecation with occasional felling of incomplete evacuation
	2	Difficult defecation with often felling of incomplete evacuation
	3	Extremely difficult defecation with regular felling of incomplete evacuation

stool, hard stool, urgent need for defecation and feeling of incomplete evacuation, only abdominal distention was significantly different before and after dialysis ($P=0.025$ for abdominal distension and $P>0.05$ for the rest of symptoms; Table 2).

Regarding gastrointestinal symptoms, the mean number and the mean severity of gastrointestinal symptoms in the studied patients were 4.8 ± 3.88, and 6.88 ± 6.92 respectively. The Kendall's tau b test has revealed that the prevalence of 15 mentioned gastrointestinal symptoms was not associated with patient's age, dialysis fluid volume and BMI. Among the gastrointestinal symptoms, only increased flatus was associated with patient's gender ($P=0.04$). Addicted individuals were 15.5% among study population. Mann-Whitney test revealed that acid regurgitation ($P=0.005$), increased flatus ($P=0.009$) and some other symptoms were significantly prominent in addict patients (Table 3). Kendall's tau-b test revealed that acid regurgitation ($P=0.005$), increased flatus ($P=0.009$) and some other symptoms which are summarized in Table 3 were significantly prominent in addict patients. According to the definition of dyspepsia in present study, 43.66% (31 patients) of the study population has dyspepsia.

Table 2. Abdominal distention before and after dialysis

GSRS items		Severity	Frequency	*P* value
Abdominal distension	Before dialysis	Grade 0	50	0.025*
		Grade 1	14	
		Grade 2	5	
		Grade 3	2	
	After dialysis	Grade 0	50	
		Grade 1	14	
		Grade 2	0	
		Grade 3	7	

Table 3. The relation between gastrointestinal symptoms and addiction among patients undergoing dialysis

Gastrointestinal symptoms	*P* value
Heart burn	0.01
Acid regurgitation	0.005
Sucking sensation in epigastrium	0.01
Abdominal pain	0.54
Nausea and vomiting	0.83
Abdominal flatus	0.009
Abdominal distention	0.016
Eructation	0.068
Borborygmus	0.58
Decreased passage of stool	0.72
Increased passage of stool	0.72
Loose stool	0.36
Hard stool	0.86
Urgent need for defecation	0.58
Feeling of incomplete evacuation	0.44

Discussion

The present study has focused on reporting the prevalence of common gastrointestinal disorders among patients undergoing peritoneal dialysis by using GSRS. According to the results, approximately half of our patients had dyspepsia and only abdominal distention was significantly changed after dialysis while other GSRS symptoms were not significantly changed after receiving dialysis. Also, addiction has great impact on gastrointestinal symptoms after dialysis. Age, dialysis fluid volume and BMI were not related to gastrointestinal symptoms in our study population.

There is growing body of evidence suggesting that gastrointestinal symptoms are prevalent among patients undergoing dialysis and researchers are focusing their attention toward determining the preventable causes as well as providing effective medications. The exact reason for the high prevalence of gastrointestinal symptoms in dialysis patients is still unclear (11). However, delayed gastric emptying, hemodynamic changes as well as inadequate dialysis has been considered as possible causes of developing gastrointestinal symptoms (12). Due to the importance of gastrointestinal disorders among dialysis patients, researchers focused on developing special tools for evaluation of this problem in such patients. Performing different types of imaging studies including endoscopy or using digital microcapsules, performing functional studies including malabsorption tests and esophageal manometry and questionnaires (8). The questionnaires are the most available and easy to perform tool for evaluation of gastrointestinal disorders in dialysis patients. Among available questionnaires, GSRS and Rome criteria's are the most frequently used tools which are available in different languages with favorable accuracy in detection of symptoms (8). In the present study we have chosen GSRS questionnaire as a questionnaire which is especially validated for the gastrointestinal symptoms of patients undergoing dialysis.

The gastrointestinal symptom of patients undergoing dialysis has been revaluated in many studies and various results have been reported according to different study protocols. Dong et al demonstrated that hemodialysis patients and peritoneal dialysis patients experience different gastrointestinal symptoms (12). They have stated that hemodialysis patients experience more gastrointestinal symptoms (12). Reflux and eating dysfunction are 2 common symptoms among peritoneal dialysis in contrast to hemodialysis (12). Lee et al reported that peritoneal dialysis patients mostly experience gastroesophageal reflux, intestinal obstruction and hernia while hemodialysis patients mostly develop peptic ulcer, diverticula and bleeding (13). Such differences can be explained in different ways. During peritoneal dialysis, the intra-abdominal pressure is increased following the entrance of dialysis solution. Back pain, hernias and

dialysate leak are some of the possible complications regarding to the increased intra-abdominal pressure (14). Regarding some gastrointestinal disorders such as gastroesophageal reflux, the effect of increased intra-abdominal pressure has considered as the cause of these complications (15). However, some studies such as Dejardin et al reported that increase in intra-abdominal pressure is not related to gastroesophageal reflux in peritoneal dialysis (16). Additionally, another study has suggested that peritoneal dialysis itself should not be considered as a cause of gastroesophageal reflux. Moreover, the prevalence of gastroesophageal reflux has been reported to be similar in both peritoneal and hemodialysis(17). In our study, the only symptom which was differed before and after dialysis was abdominal distension and the prevalence of acid reflux was not differed before and after dialysis. Abdominal distension after peritoneal dialysis has been reported as a complication of dialysis. Figueiredo et al reported that abdominal distension after losing appetite and constipation is frequent among dialysis patients and abdominal distension is the most frequent symptom related to therapy with peritoneal dialysis (18). Other studies reported that indigestion and eating dysfunction are common problems among peritoneal dialysis patients. Dong et al concluded that such symptoms are related to number of daily pills as well as history of corticosteroid therapy. Additionally, those who have residual renal function are less likely to develop symptoms (19). Our study has suggested a relation between addiction and gastrointestinal symptoms in peritoneal dialysis. Illicit drug dependence has been considered as an important factor causing premature mortality in end-stage renal disease patients (20). It has been reported that opioid use is associated with adverse outcomes even at lower doses in hemodialysis patients (21). Moreover, addiction to different substances such as alcohol, opioids or tobacco has been reported to have adverse effects on the gastrointestinal system (22). Alcoholic liver disease, pancreatitis or even various gastrointestinal cancers has been linked to alcohol abuse. In addition, tobacco use has been linked to development of gastroesophageal reflux and ulceration. Moreover, opioids negatively affect gastrointestinal movements and secretions, even inducing constipations (22,23). Regarding such effects of substance addiction, our study proposed that peritoneal dialysis will worsen some gastrointestinal symptoms including heartburn sensation, sucking sensation in epigastrium, abdominal flatus and abdominal distention.

Conclusion

Our study revealed that only abdominal distention is affected by peritoneal dialysis according to GSRS. Moreover, addiction will affect some gastrointestinal symptoms including heartburn sensation, acid regurgitation, sucking sensation in epigastrium, abdominal flatus and abdominal distention. The present study emphasizes the fact that managing addiction in patients undergoing peritoneal dialysis may alleviate gastrointestinal symptoms.

Limitations of the study

Lack of control group is one of the limitations of this study. A comparative study is recommended for hemodialysis and peritoneal dialysis patients.

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Conflicts of interest

The authors declare that they have no conflict of interest.

Ethical considerations

Ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the authors.

Authors' contribution

NA, AM, MM and HB; study concept and design, the data collection and preparation of the primary draft. HB edited the final draft. All the authors read and approved the paper.

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