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Prevalence Of Constipation In Patients With Advanced Kidney Disease

Anna Lee

Illawarra Shoalhaven Local Health District

Kelly Lambert

University of Wollongong, klambert@uow.edu.au

Pauline Byrne

Illawarra Shoalhaven Local Health District, pb868@uow.edu.au

Maureen A. Lonergan

Illawarra Shoalhaven Local Health District, maureenl@uow.edu.au

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Prevalence Of Constipation In Patients With Advanced Kidney Disease

Abstract

Background: For people on peritoneal dialysis (PD), constipation is associated with technique failure. For those on haemodialysis (HD), constipation has been associated with a reduction in quality of life.

Objectives: The objectives of this study were to (i) determine the prevalence of functional constipation; (ii) compare patient perception of constipation with Rome III criteria for functional constipation; (iii) describe the prevalence of constipation and stool form using Bristol Stool Form Scale (BSFS); (iv) determine differences in bowel habit and stool form between those on dialysis compared to pre-dialysis; and (v) determine the diagnostic accuracy of self-perception and the Rome III criteria against the BSFS. A cross-sectional group of pre-dialysis (eGFR < 15 ml/min) and dialysis patients were recruited. A total of 148 patients participated (98 HD, 21 PD and 21 pre-dialysis). **Participants:** Completed a questionnaire consisting of self-perception of the presence of constipation, simplified questions from the Rome III criteria for functional constipation, scored their stool form using the BSFS and reported laxative use.

Results: The prevalence of constipation using the Rome III criteria was 12.3%; patient perception 46.3% and 25.7% using the BSFS. Prevalence differed according to the tool used. **Conclusion:** No single method alone is sufficient for accurately determining if a patient is constipated. Relying on patients' self-perception may be unreliable. Ideally patient assessment of constipation should incorporate both the Rome III criteria and BSFS in a method such as the one designed as a result of this research. Further research is needed to assess its usability and practicality in clinical practice.

Disciplines

Medicine and Health Sciences | Social and Behavioral Sciences

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Prevalence of Constipation in Pre Dialysis and Dialysis Patients

Introduction

Constipation is a common medical condition associated with increased healthcare costs and impaired quality of life. There are numerous factors that contribute to constipation such as low fibre diet and low fluid intake, poor or low levels of mobility, lack of exercise, anxiety, depression, chronic medical conditions such as diabetes, medications such as opioids and increasing age. (Huether, 2006; Digestive Health Foundation, 2007; Johanson & Kralstein, 2007; JBI 2008; Selby & Corte,2010; Lee, 2011 Markland & Burgio,2013).

For people with Chronic Kidney Disease (CKD) constipation can be problematic especially for those on dialysis. In this patient group, constipation is compounded by diet and fluid restrictions, physical inactivity and medications such as phosphate binders and resins which all add to the problem (Adams, 1982; Chambers, 1983; Stone, 1977; Yasuda et al, 1995; Hung et al, 2007, JBI 2015).

For people on peritoneal dialysis (PD), constipation is associated with technique failure either due to peritoneal catheter migration, malfunction or peritonitis (Gokal *et al*, 1998, Li et al, 2010,Sutton et al 2014). In people on haemodialysis (HD) constipation has been associated with a reduction in quality of life and as a contributing factor to malnutrition (Hung et al 2007; Nakabayashi et al 2011). People on HD have a higher prevalence of and more severe constipation compared to those on PD (Zhang et al 2013; Dong et al 2014).The reasons for this remain unexplored. It may be possible that because constipation does not directly interfere with the HD procedure, it may be poorly reported.

The reliance on self reporting is difficult when diagnosing constipation, as people's perception may not accurately indicate the actual problem (Lee, 2011). This is a major negative aspect of research as people's perception of constipation or altered bowel function is not clearly defined nor are assessment tools consistently utilised. In some studies the use of assessment tools have found that the rate of constipation is considerably higher when based

on self reported definitions probably due to personal perception rather than the actual problem (Lee, 2011)

The Bristol Stool Form Scale (BSFS) and the Rome criteria are two validated methods that can be used to assess constipation. The BSFS describes stool form using seven (7) categories, with images as well as written descriptions (Lewis & Heaton 1997.)The Rome criteria (Garrigues *et al.*, 2004; Pappas *et al.*, 2008; Rome Foundation, 2010; Selby & Corte, 2010) are used to diagnose constipation and other bowel disorders. Constipation must include at least 2 of the following criteria, less than 3 defecations per week, straining during defecation, hard or lumpy stools, sensation of incomplete evacuation, manual manoeuvre to facilitate defecation or sensation of anal blockage during defecation. It can therefore be used as a clinical tool to define and identify functional and / or chronic constipation. The version used in this study is the Rome III. There are many causes of constipation but for the purpose of this study only functional constipation was assessed; that is constipation that has no underlying disease (Pare & Fedorak 2014)

Utilising a group of patients with CKD, the objectives of this study were to

1. determine the prevalence of functional constipation (as per Rome III criteria)
2. compare patient perception of constipation with Rome III criteria for functional constipation
3. describe the prevalence of constipation and stool form using BSFS
4. determine if there are differences in bowel habit and stool form between those on dialysis compared to pre dialysis
5. determine the diagnostic accuracy of self perception and the Rome III criteria against the BSFS

Methods

A cross sectional group of pre dialysis (eGFR < 15 ml/min) and dialysis patients were recruited from a large regional health service. Exclusion criteria included those patients under the care of a nephrologist with an eGFR \leq 15 mLs/min and opting for conservative management; those undertaking dialysis for less than three months; kidney transplant recipients; patients with a colostomy or ileostomy and those with inadequate English language skills to complete a written questionnaire.

Potential participants were approached and verbally informed of the project by either the principle investigator or a co investigator at a time of attending the renal service either for haemodialysis or a medical/nursing clinical appointment. A participant information sheet was provided and potential participants were encouraged to read the information and discuss the project with family or a carer. Participants were not required to attend outside their normal dialysis hours or follow up visit appointment minimising any inconvenience to them. Written consent was obtained from each participant.

Participants were asked to complete a questionnaire about their bowel habits. This consisted of a simple version of the questions contained in the Rome III criteria for diagnosis of functional constipation questions relating to self perception of the presence of constipation (Appendix 1) and scoring of their stool using the BSFS

(http://upload.wikimedia.org/wikipedia/commons/b/b4/Bristol_Stool_Chart.p)

Participants were also asked to document any laxatives or aperient used. Basic demographic data regarding age, duration of renal replacement therapy was recorded. Research Ethics approval was granted for this project from the relevant committee.

Statistical analysis was performed using SPSS Statistics for Windows version 21 (SPSS, Chicago, IL, USA). Normality was assessed using the Shapiro Wilk test. Differences between groups or in the proportions between groups were evaluated using either the ANOVA or Chi Square tests. Pearson's correlation was used to investigate the relationship between relevant variables and the presence of constipation. Sensitivity and specificity values were calculated to determine agreement between the presence of constipation (evaluated using the BSFS as the gold standard) and relevant variables. The kappa coefficient and receiver operator characteristic curves were calculated to determine the agreement and diagnostic accuracy of relevant variables compared to the BSFS. AUC values of <0.7 (poor test); 0.7-0.9 (fair to good test) and >0.9 (Excellent test) were used. A p value of <0.05 was considered significant for all analyses. Results were also interpreted for clinical importance, that is, were the results meaningful and of practical importance to clinicians.

RESULTS

A total of 157 individuals were approached to participate in the study. One hundred and forty (89%) agreed to participate. The groups consisted of 98 haemodialysis patients, 21 peritoneal dialysis patients and 21 pre dialysis patients. There were no significant differences between the three groups for age, sex or proportion of patients with diabetes. Mean dialysis vintage was longer in the HD group 8.45 years compared to 5.32 years in the PD group (table 1, $p=0.001$). Diabetic nephropathy was the primary cause of renal failure in both the HD group and pre dialysis group, whereas in the PD group diabetic nephropathy and hypertension were equally reported. Demographic and clinical profile can be seen in tables 1 and 2. There was no statistical difference between groups in laxative use (table 1, $p=0.39$). The most common types of laxatives used are seen in table 3 and overall the use of these was low.

Prevalence of constipation

Constipation was present in all three groups, however the prevalence of constipation differed according to the method used to measure constipation (Table 4). The prevalence of constipation using the Rome III criteria was 12.3%; patient perception 46.3% and 25.7% using the BSFS. There were also variations in which group had the highest prevalence according to the tool used. PD patients had the highest prevalence of constipation using the Rome III criteria; pre dialysis patients had highest prevalence using self-perception and HD patients had highest prevalence of constipation using the BSFS.

Diagnostic accuracy of tools to assess constipation

For the purposes of this analysis, the BSFS was considered the gold standard for diagnosis of constipation. This is because the tool is easy to administer, reliable and commonly available in our health service for nursing staff to use. In this study, the most sensitive methods for detecting those most likely to be constipated were questions 3 and 4 of the Rome III criteria; then Rome III total score (see table 5). The method with the greatest specificity was question 2 (asking how often have hard/lumpy stools in last 3 months). The kappa value scores for agreement between the BSFS and most variables were all in the poor to fair agreement range (0.17-0.33) and only one was statistically significant (question 3 and 4 combined). When not using the BSFS, then the next best diagnostic test for constipation would be completion of the total Rome III score; followed by question 4. These are both good to excellent tests as evidenced by the good to excellent AUC scores (AUC values of 0.88 and 0.81 respectively) (table 5).

Factors associated with constipation

A number of factors (table 6) were strongly associated with constipation using the Rome III criteria. These included question 3 of the Rome criteria (straining during bowel movement) ($r= 0.9$, $p<0.0001$). Other factors strongly associated with total Rome III score included question 6 (how often in last 3 months had sensation of stool that could not be passed) ($r=0.87$, $p<0.0001$) and question 4 (how often have hard stools in last 3 months) ($r=0.85$, $p <0.0001$)

Multivariate analysis as seen in table 7, indicated that question 4 (how often have hard lumpy stools) was the only statistically significant predictor of constipation. Those with a high score for question 4 were 2.72 times more likely to be constipated (95% CI 1.02-7.27)

DISCUSSION

The aim of this study was to describe the bowel habits of people with CKD using three different methods. This study found that constipation was common. Regardless of what tool was used there were no differences in the prevalence of constipation between either of the three groups. This differs from other studies where the prevalence of constipation was found to be higher in patients receiving HD using Rome III criteria (Zhang et al 2013;) and in both HD and PD patients compared to those not on dialysis using Rome II criteria (Cano et al 2007). Interestingly in our study, HD patients had highest prevalence of constipation using BSFS not Rome criteria, the reason for this is not clear.

In this study the significant finding was that the prevalence of constipation differed markedly depending on the tool used and that prevalence of constipation was highest when assessed

by self-perception. This is in line with other literature where self-reporting and perception of constipation is high and possibly over reported (Jones et al 2002; Wu et al 2004; Garrigues et al 2004; Lee 2011, Dong et al 2014). Clearly relying on perception alone will not give a clear indication of whether or not the patient is constipated, and this can make patient assessment difficult.

Despite many patients reporting constipation, the surprising finding was that laxative use in all three groups was minimal. Increased laxative use has been reported in both HD and PD patients (Cano et al 2007; Sutton et al 2014) therefore the reason for this finding is unclear. Laxatives are not routinely prescribed to PD or HD patients in this unit. For PD patients in this unit prescribing of laxatives occurs when constipation is suspected due to a dialysis issue.

There are several limitations to our study. These include the cross sectional nature and small sample size due to missed recruiting opportunity. However, the strength lies in the fact that all three tools were completed simultaneously by participants and complete data obtained on all subjects. Those with poor English language skills were not included due to the nature and possible sensitivity of the questions. Further research is required on larger sample sizes to confirm our findings that variations exist in the prevalence of constipation depending on the tool used.

Application to clinical practice

A bowel management assessment guide was developed as a result of our research findings. It is envisaged that this will be used to assist in patient management health care staff. It is also aimed for use by patients to assist in self managing constipation, particularly to indicate when laxative use may be beneficial. This assessment guide was developed to

incorporate questions from the Rome III criteria and the BSFS (see appendix 3) therefore combining the two tools.

The management guide uses three coloured sections to guide either the patient or nurse as to the appropriate action required to maintain good bowel function, in particular prompting the need for laxative use. The green coloured section indicates adequate bowel function, yellow and orange sections indicate need for laxatives, especially if no laxative is used. Red sections indicates that laxative use is required and recommended. This patient management guide aims to be proactive in the management of constipation and is envisaged to be most useful for PD patients where constipation can actually affect the dialysis process. Further research is required to assess its usefulness and practicality in clinical practice.

Conclusion

The results of our study indicate that constipation is a common problem, and in our study was not predominated by one type of renal replacement modality. Results from our study indicate that no single method alone is sufficient for accurately determining if a patient is constipated. The common method used by health professionals of relying on the patients' self-perception may give an overestimation of the problem. Ideally patient assessment of constipation should incorporate both the Rome III criteria and BSFS in a method such as the one that has been designed as a result of this research. Further research will be required to assess its usability and practicality in clinical practice.

Table 1 Demographics

Participant Demographics	HD (n=98)	PD (n=21)	PRE (n=21)	Total (n=140)	P value
Mean age in years (SD)	66.6 (13.6)	69.1 (15.6)	64.2 (13.5)	66.6 (13.9)	0.52
Years on dialysis (SD)	8.45 (7.7)	5.32 (2.6)	N/A	6.71 (6.45)	0.001
Gender, n males (%)	59 (60.2)	13 (61.9)	10 (47.6)	82 (58.6)	0.54
Diabetes, n (%)	38 (38.8)	9 (42.9)	8 (38.1)	55 (39.3)	0.94
Laxative use ^, n (%)	30 (30.6)	9 (42.9)	5 (23.8)	44 (31.4)	0.39
No laxatives, n (%)	65 (66.3)	12 (57.1)	16 (76.1)	107 (76.4)	0.39
Docusate	2 (2.0)	2 (9.5)	1 (4.8)	5(3.6)	
Docusate and senna	12 (12.2)	3 (14.3)	0 (0)	15 (10.7)	
PEG	5 (5.1)	1 (4.8)	2 (9.5)	8 (5.7)	
Other	7 (7.1)	2 (9.5)	2 (9.5)	11 (7.9)	

HD: Haemodialysis; PD: Peritoneal Dialysis; PRE: pre dialysis

^ indicates use of at least 1 laxative

Table 2 Primary Cause Renal Failure

	HD (n=98)	PD (n=21)	PRE (n=21)	Total (n=140)
Diabetic Nephropathy	28	4	6	38
Glomerular Nephritis	14	2	1	17
Hypertension	3	4	3	10
Polycystic Kidney Disease	3	0	5	8
Reflux Nephropathy	6	2	0	8
Analgesic Nephropathy	3	2	0	5
Renal Cell Carcinoma	5	0	0	5
Other	25	3	6	34
Uncertain	11	4	0	15

HD: Haemodialysis; PD: Peritoneal Dialysis; PRE: pre dialysis

Table 3. Laxatives Used

	HD (n=98)	PD (n=21)	PRE (n=21)	Total (n=140)
Laxative use#, n (%)	30 (30.6)	9 (42.9)	5 (23.8)	44 (31.4)
Most common laxative n (%)	Docusate (18 %)	Docusate & Senna (22%)	Polyethylene glycol (5%) Polyethylene glycol & Wheat dextrin (5%) Docusate (5%) Sennosides (5%) Senna (5%)	
Next most common laxative n (%)	Polyethylene glycol (7%)	Polyethylene glycol (11%)		

represents participants who consumed at least one laxative

HD: Haemodialysis; PD: Peritoneal Dialysis; PRE: Predialysis

Table 4. Prevalence of constipation

	HD (n=98)	PD (n=21)	PRE (n=21)	Total (n=140)	P value
Functional constipation using Rome III total score, n (%)	13 (13.5)	3 (14.3)	1 (4.8)	17 (12.3)	0.52
Using BSF, n (%)	28 (28.6)	4 (19.0)	4 (19.0)	36 (25.7)	0.50
Using self-perception, n (%)	41 (43.6)	9 (42.9)	13 (61.9)	63 (46.3)	0.30
P value	<0.0001	0.02	0.005	<0.0001	-

HD: Haemodialysis; PD: Peritoneal Dialysis; PRE: pre dialysis

Table 5. Sensitivity/ Specificity and Diagnostic Accuracy of relevant variables

	Sensitivity (%)	Specificity (%)	Kappa value	Kappa P value	AUC (95% CI)
Q1 asking / patient perception	72.7	63.0	0.28	0.07	0.68 (0.56-0.78)
Q2 how regular open bowels	16.7	96.1	0.17	0.08	0.56 (0.45-0.68)
Q2 and Q4 combined	91.7	43.3	0.23	0.05	0.68 (0.58-0.77)
Q3 do you strain	91.7	46.2	0.26	0.06	0.69 (0.60-0.78)
Q4 are the stools hard or lumpy score	91.7	45.6	0.25	0.06	0.81 (0.73-0.90)
Q3 and Q4	94.4	32.7	0.17	0.04	0.64 (0.54-0.73)
Q5 incomplete evacuation score	80.6	50.0	0.22	0.06	0.69 (0.6-0.79)
Q6 sensation can't pass stool score	74.3	67.0	0.33	0.08	0.70 (0.6-0.8)
Q7 manual evacuation	40.0	84.6	0.26	0.09	0.63 (0.52-0.75)
Q9 do you take a laxative	78.8	55.6	0.33	0.09	0.67 (0.56-0.78)
Rome III total score > 10	94.2	31.4	0.31	0.09	0.88 (0.72-0.89)

Table 6. Factors Associated with Constipation

	R value	P value
Age	0.13	0.13
Dialysis vintage	0.10	0.24
Q3 score how often do you open your bowels in last 3 months	0.90	<0.0001
Q 4 score how often have hard stools in last 3 months	0.85	<0.0001
Q5 score how often had feeling of incomplete evacuation in last 3 months	0.79	<0.0001
Q6 score how often in last 3 months had sensation of stool that could not be passed	0.87	<0.0001
Q7 score how often in last 3 months manually evacuate stool	0.72	<0.0001

Table 7. Multivariate predictors of constipation

	B	P value	Odds Ratio	95% CI
Q 2 less than 3 times week	2.03	0.11	7.62	0.64-91.31
Q 3 score >2	1.42	0.28	4.14	0.31-55.54
Q4 score	1.00	0.04	2.72	1.02-7.27
Taking any laxative	1.17	0.07	3.22	0.90-11.49
Total score Rome III	-0.11	0.58	0.61	0.46-10.99

Appendix 2. Bowel Management Assessment Chart

Bowel Management Assessment Chart

Date Of Assessment:

NAME
DOB
MRN
PHYSICIAN:

Bowel Management	Daily	2 nd Daily		< 3 bowel movement per week
How often do you generally have a bowel movement?				
	Never/Rarely	Sometimes	Often	Always
How often do you need to strain during bowel movement				
Are your stools hard or lumpy				
Do you have a feeling of incomplete emptying after a bowel movement				
Do you have a sensation that stool cannot be passed				
Select appropriate Stool Form from the Bristol Stool Form Scale (BSFS)	3-4	1-2-3-4- 5-6-7	1-2-3-4- 5-6-7-	1-2
Do you take laxatives? If yes please list				
Management Options	BSFS 3-4 Continue current bowel management plan	On Laxative Continue current regime	On Laxative Increase dose.	On Laxative Maximise dose
		Not on Laxative consider Senekot 1-2 daily or Coloxyl & Senna 1-2 daily or Movicol 1 satchet daily	Not on Laxative start Movicol 1 satchet daily for 1-2 days and increase to 2 satchets daily if stool form not improved Or commence preferred laxative	Not on Laxative Commence Movicol 1 satchet TDS for 1-2 days and increase by 1 satchet daily until stool form 3-4 on BSFS OR Commence preferred laxative at maximum dose

Action Plan and follow Up:

Name:

Signature:

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