

ORIGINAL ARTICLE

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The role of bowel diaries in a “real-life” setting

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ABSTRACT – Background – Despite the potential advantages of patients’ self-recordings of bowel habits in lower digestive disorders, few studies evaluate the relevance of clinical information obtained through bowel diaries in clinical practice. **Objective** – The main objective of this study was to evaluate the role of bowel diaries as an auxiliary diagnostic tool in lower gastrointestinal disorders consultations. **Methods** – In this cross-sectional study, at the end of their gastroenterology consultation, patients were questioned about their bowel habits and gastrointestinal symptoms. The bowel diary was then filled by the patients at home for 2 weeks. The data collected from the clinical interview and from the bowel diaries were analyzed. **Results** – Fifty-three patients participated in the study. Patients underestimated the number of their bowel movements (BM) in the interviews compared with the bowel diaries ($P=0.007$). There was a poor agreement between stool consistencies described in the interviews and recorded in the diaries ($k=0.281$). Patients overestimated their straining during evacuation in the interviews compared with the diaries ($P=0.012$). Regarding the subgroups’ analysis, patients with proctological disorders described less BM in their interviews ($P=0.033$). Straining during evacuation was higher in the interviews of patients without proctological disorders ($P=0.028$) and in the interviews of more educated patients ($P=0.028$). **Conclusion** – Overall, there were discrepancies between the clinical interview and the bowel diary regarding the number of BM, the stool consistency and straining. Bowel diaries are therefore a relevant instrument as a complement to the clinical interview to objectify patients’ complaints and treat functional gastrointestinal disorders more adequately.

Keywords – Bowel diary; defecation; gastrointestinal symptoms.

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INTRODUCTION

Just as a photograph of a certain moment cannot concretely describe the experience behind it, so too the retrospective description of bowel habits (BH) and associated gastrointestinal (GI) symptoms by patients in a clinical interview may not be the most reliable method to properly evaluate their complaints. Lower GI disorders, particularly functional gastrointestinal disorders (FGIDs), are common diseases characterized by digestive symptoms in the absence of an obvious anatomical and/or physiological alteration^(1,2). Therefore, it is important to use appropriate tools that objectify the patient's complaints in order to adequately diagnose and manage these conditions. Usually, data referring to human behavior or to experienced symptoms are collected through interviews, questionnaires, or less frequently, through daily recordings. Although interviews and questionnaires can gather useful information obtained in a short amount of time, the nature of this information is retrospective and relies on the patient's memory of past events. Furthermore, the occurrence of certain symptoms and behaviors may be overestimated when it happens frequently, or otherwise underestimated if the events are more sporadic or are not deemed as important by the subject⁽³⁾. Besides, BH are often hidden or difficult to report by the patients, due to their private nature, negative connotation, and culturally rooted shame associated with the defecation act^(3,4).

The recording of a patient's BH (and associated symptoms) in a bowel diary, may be crucial to securely reach a correct diagnosis, and therefore provide the best possible therapeutic options. Bowel diaries enable a greater privacy for patients recording their BH and can even be compiled anonymously in the case of epidemiologic studies. Additionally, diaries do not require the patient to summarize or estimate the frequency of past events, therefore avoiding the bias of human memory^(3,5). Another advantage of bowel diaries is that they translate the day-to-day and individual variations of BH and GI symptoms, which are often present in lower GI disorders mainly in FGIDs such as irritable bowel syndrome (IBS)⁽⁶⁾.

Despite the potential advantages that this tool

enables, few studies evaluate the relevance of clinical information obtained through bowel diaries in clinical practice⁽⁴⁾. Attending to the high prevalence of these pathologies, it appears pertinent to assess the role of bowel diaries as a complement to the clinical interview in these patients. The main objective of this study was to evaluate the role of the bowel diaries as an auxiliary diagnostic tool in a Gastroenterology consultation dedicated to lower GI disorders.

METHODS

Type of study and population

This was a cross-sectional study, targeting the patients with GI symptoms followed in scheduled proctological/lower digestive disorders and general GI consultations in the Department of Gastroenterology of Braga Hospital. A convenience sample was used, by inviting patients to participate in the study at their scheduled consultations, from October to December of 2018.

Inclusion and exclusion criteria

This study included patients with 18 years of age or older followed in the Department of Gastroenterology of Braga Hospital, who were literate and understood both the informed consent and the bowel diaries. Exclusion criteria were the following: patients with dementia or mentally disabled; patients non-fluent in the Portuguese language; patients without the motor skills to fill in the bowel diaries; patients with organic GI pathologies.

Data collection

Study participants were approached at the end of their scheduled appointment. If the patient agreed to participate in the study, an informed consent would be obtained. The patients were interrogated about their medical and surgical background, medication, BH and GI symptoms. At the end of the structured clinical interview, the patients were instructed on how to correctly fill in the bowel diaries and requested to fill them at home for 2 weeks and return it to our department in the next visit to the hospital (FIGURE 1).

Bowel Diary


Sex _____
Age _____
Date of first record: ____ / ____ / ____

Instructions

Whenever you evacuate, fill in the respective square in the grid below with the letter corresponding to what happened in that evacuation plus the number of the Bristol chart corresponding to the consistency of feces.

N – Normal evacuation
I – Fecal incontinence episode
C – Change of underwear or pants
E – Excessive effort to evacuate
D – Digital maneuvers to defecate
M – Medication (laxative / loperamide)

Bristol Stool Chart



Type 1 Separate hard lumps

Type 2 Lumpy and sausage like

Type 3 A sausage shape with cracks in the surface

Type 4 Like a smooth, soft sausage or snake

Type 5 Soft blobs with clear-cut edges

Type 6 Mushy consistency with ragged edges

Type 7 Liquid consistency with no solid pieces

1st week

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
07h00							
08h00							
09h00							
10h00							
11h00							
12h00							
13h00							
14h00							
15h00							
16h00							
17h00							
18h00							
19h00							
20h00							
21h00							
22h00							
23h00							
00h00							
01h00							
02h00							
03h00							
04h00							
05h00							
06h00							

FIGURE 1. Example bowel diary.

Statistical analysis

The statistical analysis was performed using the software Statistical Package for the Social Sciences (SPSS®, Chicago, Illinois, USA version 24.0 for Microsoft® Windows). Categorical variables are presented as frequencies and percentages. Continuous data are presented as mean and standard deviation as normality was verified. To determine the differences between the data collected through the clinical interviews and the data registered in the bowel diaries, two tests were used, the Wilcoxon Signed Rank Test, applied to categorical ordinal variables, and the Cohen's Kappa Statistic, applied to categorical nominal variables. Results were considered statistically significant for a *P* value <0.05.

Ethical considerations

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki De-

claration and its later amendments or comparable ethical standards. The study was approved by the Ethics Subcommittee for Life and Health Sciences of University of Minho and by the Ethics Committee of Braga Hospital. Informed consent was obtained from all individual participants included in the study.

RESULTS

Structured clinical interviews

From the total number of 74 patients interviewed, 21 patients were excluded as they did not complete their bowel diary or could not return it. Fifty-three patients were included in the study, 32 females (60.4%), and 21 males (39.6%), with an average age of 54.4±12.3 years. Regarding the level of education of the participants, most had 12 or less years of schooling (n=36, 67.9%), with an important part with only up to 4 years of education (n=21, 39.6%). Concerning patients' occupation, 47.2% of the patients (n=25) were either retired or unemployed (TABLE 1).

TABLE 1. Socio-demographic and clinical characteristics of included patients.

Socio-demographic and clinical data	
Age, mean (SD), years	54.4 (12.3)
Gender, n (%)	
Female	32 (60.4%)
Male	21 (39.6%)
Current occupation, n (%)	
Employed	28 (52.8%)
Unemployed	8 (15.1%)
Retired	17 (32.1%)
Level of schooling, n (%)	
4 years of schooling or less	21 (39.6%)
5 to 12 years of schooling	22 (41.5%)
College degree	10 (18.9%)
Proctological disorders, n (%)	
Hemorrhoids	13 (24.5%)
Rectocele	4 (7.5%)
Anal fissure	3 (5.7%)
Past surgery	
Abdominal or anorectal, n (%)	21 (39.6%)
Hysterectomy, n (% of female patients)	4 (12.5%)
Correction of pelvic organ prolapses, n (% of female patients)	2 (6.3%)
BMI, n (%)	
Normal (18–25 kg/m ²)	26 (49.1%)
Overweight (25–30 kg/m ²)	16 (30.2%)
Obesity (>30 kg/m ²)	11 (20.7%)
Current Medication with laxative or constipating effect, n (%)	
No medication	34 (64.2%)
Anticonvulsivants	6 (11.3%)
Calcium channel blockers	5 (9.4%)
>1 constipating drug	8 (15.1%)

In the clinical interview, patients were asked about their medical and surgical history as well as medication that could influence their bowel movements or potentiate GI symptoms. Twenty patients (37.7%) had a history of proctological disorders – hemorrhoids (n=13, 24.5%), rectocele (n=4, 7.5%) and anal fissure (n=3, 5.7%). Six patients (11.3%) had a background of psychiatric disorders. Twenty-one patients (39.6%) had an abdominal or anorectal surgery. Regarding medication with potential to affect bowel movements, most patients (n=34, 64.2%) did not consume any medication, and eight patients (15.1%)

took more than one type of constipating drug. Many patients (50.9%, n=27) were overweight or obese (BMI ≥ 25 kg/m²). The average of the patients' Body Mass Index (BMI) was 26.5 ± 4.5 kg/m².

Regarding GI symptoms, 32 (60.4%) subjects denied any fecal urgency preceding bowel movements (BM), 25 (47.2%) patients denied ever having the feeling of an incomplete evacuation after each BM, and 39 (73.6%) patients stated they had no abdominal pain. Additionally, the subjects were asked about their habits while in the toilet. While 15 (28.3%) people had no specific habits, 14 (26.4%) patients used some form of entertainment in the toilet with a book or magazine or with the cell phone (playing games, reading the news or interacting in social media). Regarding personal hygiene, 19 (35.8%) subjects claimed they washed themselves after going to the toilet and 5 (9.4%) people would clean themselves with wet wipes. Eleven (20.8%) patients reported a recent modification of their eating habits to improve their BM.

Bowel diaries

Concerning the information on the bowel diaries, 24 (45.3%) patients described they had BM more than once a day, while 9 (17%) patients had bowel movements once a day. Of the remaining patients, 16 (30.2%) patients had 3 to 6 bowel movements per week, and only 4 (7.5%) patients had less than three evacuations per week. Regarding the consistency of stools, three patients did not fill in the number of the Bristol Stool Scale corresponding to the consistency of their stools. Of the remaining 50 patients, 5 (9.4%) patients recorded evacuating hard stools (Bristol Stool Scale score 1–2), 13 (24.5%) patients registered defecation of soft stools (Bristol Stool Scale score 5–7), five patients stated they evacuated stools with a normal consistency (Bristol Stool Scale score 3–4), and 27 (50.9%) patients recorded a variable stool consistency. Nine (17.1%) patients recorded feeling the need to strain during evacuation, 6 (11.4%) patients had to resort to digital disimpaction in order to have a BM. Nine (17.1%) patients remembered having experienced fecal incontinence, of which 5 (9.4%) patients had to change their underwear or their pants. Eleven (20.7%) patients recorded taking medication to regulate their BM.

Comparing the clinical interviews and the bowel diaries

There was a significant difference in the number of BM reported in the clinical interview compared to those recorded in the bowel diaries ($Z=-2.703$, $P=0.007$). Additionally, there was a poor agreement between the stool consistencies described in the clinical interviews and those recorded in the bowel diaries ($\kappa=0.281$). The need to strain during evacuation depicted in the interviews was also significantly different than the need to strain recorded in the bowel diaries ($Z=-2.515$, $P=0.012$). There were no statistically significant differences between the answers given in the clinical interviews and those recorded in the bowel diaries regarding digital disimpaction ($Z=-0.724$, $P=0.469$), fecal incontinence ($Z=-0.618$, $P=0.537$) and frequency of medication for regulation of BH ($Z=-1.126$, $P=0.260$).

Comparing the clinical interviews and bowel diaries by subgroups of patients

Subgrouping patients, patients with proctological pathologies tend to describe having a single daily BM in the interview, while in the diaries they registered having more than one BM per day ($Z=-2.138$, $P=0.033$) as shown in TABLE 2. Regarding the consistency of the stools, there was a poor

agreement between the answers in bowel diaries and clinical interviews regarding both patients with ($\kappa=0.398$) and without ($\kappa=0.208$) proctological disorders (TABLE 3). Regarding strain, patients with no proctological disease responded differently in the clinical interviews and in the bowel diaries ($Z=-2.191$, $P=0.028$; TABLE 4).

There were significant differences between the answers about the frequency of BM in the clinical interviews and the bowel diaries in the overweight/obese group ($Z=-1.968$, $P<0.05$; TABLE 2). There was a poor agreement between the stool consistency described in clinical interviews and bowel diaries by both patients with normal BMIs ($\kappa=0.233$) and overweight/obese patients ($\kappa=0.323$; TABLE 3).

Patients with a history of abdominal or rectal surgery, are more reliable in the description of the frequency of BM (no difference between interviews and diaries ($Z=-1.000$, $P=0.317$) than patients without history of abdominal or rectal surgeries that overestimated the frequency of BM ($Z=-2.236$, $P=0.025$). Again, it was shown a poor agreement between the stool consistencies described in the interviews and recorded in the bowel diaries, of both patients with history of abdominal/rectal surgery ($\kappa=0.257$) and patients without that surgical background ($\kappa=0.298$).

Regarding the subgroup of patients with six or

TABLE 2. Frequency of bowel movements reported in the interviews and bowel diaries per subgroup of patients.

	Frequency of BM								No. of patients	Wilcoxon Signed Rank test
	More than once a day		Once a day		3–6 BM per week		<3 BM per week			
	Interview	Diaries	Interview	Diaries	Interview	Diaries	Interview	Diaries		
Normal weight	2	8	13	4	6	11	5	3	26	Z=-1.291 P=0.197
Obese/ overweight	5	16	18	5	1	5	2	1	27	Z=-1.968 P<0.05
No surgical history	5	16	20	8	4	5	3	3	32	Z=-2.236 P=0.025
Previous abdominal/ anorectal surgery	2	8	11	1	4	11	4	1	21	Z=-1.000 P=0.317
<6 years education	4	12	15	4	1	5	1	0	21	Z=-1.164 P=0.244
>6 years education	3	12	16	5	7	11	6	4	32	Z=-2.183 P=0.029
No proctological pathology	4	12	20	8	5	11	4	2	33	Z=-1.279 P=0.201
Proctological pathology	3	12	11	1	3	5	3	2	20	Z=-2.138 P=0.033

BM: bowel movements.

TABLE 3. Stool consistency in the clinical interviews and bowel diaries of patients with and without proctological pathologies.

	Stool consistency								Cohen's Kappa
	Hard		Normal		Soft		Variable		
	(Bristol Stool Scale 1–2)		(Bristol Stool Scale 3–4)		(Bristol Stool Scale 5–7)				
	Interview	Diaries	Interview	Diaries	Interview	Diaries	Interview	Diaries	
No proctological pathology	5	3	13	3	9	8	6	17	k=0.208
Proctological pathology	4	2	8	2	5	5	3	10	k=0.398

TABLE 4. Strain during evacuation in the clinical interviews and bowel diaries of patients with and without proctological pathologies.

	Strain										No. of patients	Wilcoxon Signed Rank test
	No strain		Rarely (<3 BM/week)		Sometimes (3–4 BM/week)		Frequently (5–6 BM/week)		Every time they have a BM			
	Inter-view	Diaries	Inter-view	Diaries	Inter-view	Diaries	Inter-view	Diaries	Inter-view	Diaries		
No proctological pathology	21	29	5	1	2	1	3	2	2	0	33	Z=-2.191 P=0.028
Proctological pathology	11	15	5	1	1	2	0	0	3	2	20	Z=-1.186 P=0.236

more years of education, a significative difference was found between the clinical interviews and the bowel diaries regarding the frequency of BM ($Z=-2.183$, $P=0.029$). Regarding the consistency of the stools, there was a poor agreement between answers given in the interviews and written in the diaries of both patients with lower levels of education ($\kappa=0.307$) and patients with higher levels of education ($\kappa=0.258$). The description of the need to strain during defecation given in the interviews changed significantly to what was registered in the bowel diaries by the patients with at least 6 years of schooling ($Z=-2.198$, $P=0.028$).

DISCUSSION

FGIDs are highly prevalent with a worldwide estimated prevalence of 12%, and can cause a great impact on patients' quality of life, not only because of the GI symptoms themselves, but also because of the stigma associated to these symptom-based disorders^(1,2). Very few studies delve into the usefulness of instruments like the bowel diaries in accurately recording valuable clinical information that can be essential as a complement to the clinical interview for the management of lower digestive disorders and

particularly, FGIDs in the Gastroenterology consultation^(4,7-9). This study was designed to tackle that issue.

We had a response rate of 71.6%, comparable to other studies with similar methodologies⁽⁴⁾. The simplicity of the bowel diary might explain the good adherence. Demographic data of the study sample such as gender was consistent with other published data with more than half of the population consisting of females^(3,4,7,10). The age of the population was tendentially superior to that of previously published data, what may be explained by the small sample size and the convenient sampling^(3,4).

Our study demonstrates a general significant discrepancy between the data collected in the clinical interviews and recorded by the patients in the bowel diaries, in categories such as frequency of BM, consistency of stools, and straining during defecation. These findings are concordant with published studies^(3,6,11). This shows the recall bias characteristic of the human memory, which can be present during clinical interviews in consultations. It could also translate the difficulty felt by patients in approaching their BH when face to face with another person, without the comfort of anonymity. No significant differences were found between the clinical interviews and bowel diaries regarding the need to resort to digital

disimpaction to evacuate, episodes of fecal incontinence, and frequency of medication to regulate BM. These aspects can be disruptive to a person's life, and therefore memorable enough for people to describe them with more accuracy in clinical interviews than frequency of BM or stool consistency.

The sample was categorized to evaluate the usefulness of the bowel diaries in specific groups of people. There were significant differences regarding frequency of BM between the clinical interviews and the bowel diaries of patients with benign proctological disorders as hemorrhoids, rectocele, and anal fissure. Many proctological pathologies are derived from and also a cause of abnormal bowel habits^(12,13). Therefore, patients will tend to be more irregular in their BH, thus making their testimonies in clinical interviews not as reliable as patients without these disorders, with regular BH. The bowel diary can be particularly useful to assess BH of these patients and response to treatments, as part of a conservative therapeutic approach^(12,14). The stool consistency proved to be differently described in the interviews and diaries of both patients with and without proctological disorders, as both showed a poor agreement between the diagnostic tools. This can be attributed to the fact that the consistency of stools can be very variable between individuals, and so it requires a daily recording method such as the bowel diaries to be accurately described. The significant difference in the registries of the need to strain during evacuation in the global analysis was not verified when evaluating proctological patients. Medical lifestyle advice including correct toilet habits (like spending less time in the toilet during evacuation and avoid straining) are repetitively recommended to these patients⁽¹⁴⁾. So maybe they are more self-conscious about their straining frequency than healthy subjects, and are therefore more reliable in describing it during the consultation.

The frequency of BM was differently described in the clinical interviews and bowel diaries of overweight or obese patients. Studies have demonstrated that high intra-abdominal pressure, as can be found in patients with high BMIs, contributes to pelvic floor disorders and faecal incontinence^(15,16). Our study is in accordance with the literature, as seven in the nine patients that recorded faecal incontinence in their

diaries have BMIs over 25 kg/m². As these patients tend to have irregular BM, frequency of BM can be difficult to account precisely in clinical interviews, hence the usefulness of the bowel diaries in these patients.

There were no significant differences regarding BM frequency between the clinical interviews and bowel diaries of patients who had history of abdominal or rectal surgery. Some studies show that BH can change drastically after an abdominal or rectal surgery⁽¹⁶⁻¹⁸⁾. This makes these patients more self-aware of their BH and GI symptoms which affect their daily lives, so they can report them more accurately in a Gastroenterology consultation.

More educated patients (over 6 years of schooling) had significantly different assessments by the two methods, regarding frequency of BM, and strain. This could mean that they understood better the correct way of filling in the bowel diaries, which may represent this tool to be more reliable in more literate patients.

The main limitations of this study were the small sample size and the short amount of time in which the bowel diaries were registered. As BH are highly variable, a longer period would be more suitable for a better understanding by the physician of the patients' BH, GI symptoms and their fluctuations, allowing a higher accuracy in future diagnosis. Yet, the two-weeks period may be more acceptable for patients than longer periods of recordings. Furthermore, the patients were not instructed to maintain the same diet, hydration and physical activity and eleven patients reported recent changes in their eating habits. Additional GI symptoms, like urgency and the feeling of incomplete evacuation could be assessed in further studies, as long as the bowel diary's structure is maintained simple. Despite these limitations, this study makes a valuable contribution to highlight the relevance of symptom-based clinical information recorded in real-time, overcoming the recall bias inherent to human memory. In a time when health care evolves towards more patient centered clinical approaches, a simple and inexpensive tool like the bowel diary, where clinical information can be recorded in a more objective and reliable fashion can be a valuable resource in a gastroenterology consultation.

CONCLUSION

Our findings show significant discrepancies between clinical interviews and bowel diaries in evaluating patients' BH and GI symptoms such as frequency of bowel movements, consistency of stools, and straining during evacuation. It can be used in the general population with a potential added interest in specific groups of subjects, like patients with proctological disorders or overweight/obese patients. Further studies with larger sample sizes and with longer periods of bowel diary recordings are important to confirm these findings and help refine symptom-based diagnostic instruments.

Authors' contribution

Mendes SS collection and/or assembly of data, data analysis and interpretation, manuscript writing; Matos-Silva M collection and/or assembly of data, data analysis and interpretation, manuscript writing; Leal T data analysis, manuscript writing; Gonçalves R manuscript writing; Caetano AC conception and design, data analysis and interpretation, manuscript writing.

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RESUMO – Contexto – Apesar das potenciais vantagens do diário intestinal como complemento à entrevista clínica, raros estudos avaliam a relevância da informação clínica obtida a partir de diários intestinais na prática clínica. **Objetivo** – Os principais objetivos deste estudo foram avaliar o papel do diário intestinal como ferramenta diagnóstica numa consulta dedicada a patologia digestiva baixa. **Métodos** – Foi realizado um estudo transversal, num período de 3 meses, em que no final das consultas os pacientes foram entrevistados relativamente a dados demográficos, antecedentes clínicos e hábitos e sintomas intestinais. Em seguida, foi solicitado o auto-preenchimento de um diário intestinal durante 2 semanas. Foram comparadas as respostas obtidas na entrevista clínica com os registos dos diários intestinais. **Resultados** – Cinquenta e três pacientes participaram no estudo. A frequência de evacuações reportada nas entrevistas clínicas e nos diários intestinais dos pacientes foi significativamente diferente ($P=0,007$). Verificou-se apenas uma concordância mínima entre a consistência das fezes descrita nas entrevistas e registada nos diários ($\kappa=0,281$). Em relação ao esforço evacuatório os pacientes sobrestimaram o seu esforço ao evacuar nas entrevistas ($P=0,012$). Adicionalmente, verificou-se que pacientes com doenças proctológicas descreveram menos evacuações nas suas entrevistas ($P=0,033$). A descrição do esforço durante a evacuação foi superestimada nas entrevistas de pacientes sem distúrbios proctológicos ($P=0,028$) e de pacientes com um nível mais elevado de educação ($P=0,028$). **Conclusão** – Globalmente verificaram-se discrepâncias entre a entrevista clínica e o diário intestinal dos pacientes em relação ao número de defeções, à consistência das fezes e ao esforço evacuatório. Assim, esta ferramenta revelou-se uma potencial mais-valia na prática clínica diária, permitindo objetivar as queixas e consequentemente tratar os pacientes de forma mais adequada.

Palavras-chave – Diário intestinal; defecações; sintomas gastrointestinais.

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