



UNIVERSITÀ  
DEGLI STUDI  
FIRENZE

## FLORE

# Repository istituzionale dell'Università degli Studi di Firenze

### **An extended assessment of bowel habits in a general population.**

Questa è la Versione finale referata (Post print/Accepted manuscript) della seguente pubblicazione:

*Original Citation:*

An extended assessment of bowel habits in a general population / Bassotti G, Bellini M, Pucciani F, Bocchini R, Bove A, Alduini P, Battaglia E, Bruzzi P; Cianchi F, Italian Constipation Study Group.. - In: WORLD JOURNAL OF GASTROENTEROLOGY. - ISSN 1007-9327. - STAMPA. - 10(2004), pp. 713-716.

*Availability:*

This version is available at: 2158/773153 since:

*Terms of use:*

Open Access

La pubblicazione è resa disponibile sotto le norme e i termini della licenza di deposito, secondo quanto stabilito dalla Policy per l'accesso aperto dell'Università degli Studi di Firenze (<https://www.sba.unifi.it/upload/policy-oa-2016-1.pdf>)

*Publisher copyright claim:*

(Article begins on next page)

# An extended assessment of bowel habits in a general population

Gabrio Bassotti, Massimo Bellini, Filippo Pucciani, Renato Bocchini, Antonio Bove, Pietro Alduini, Edda Battaglia, Paolo Bruzzi, Italian Constipation Study Group

**Gabrio Bassotti**, Sezione di Gastroenterologia ed Epatologia, Dipartimento di Medicina Clinica e Sperimentale, Università di Perugia  
**Massimo Bellini, Pietro Alduini**, Sezione di Gastroenterologia, Dipartimento di Medicina Interna, Università di Pisa

**Filippo Pucciani**, Clinica Chirurgica Generale e Discipline Chirurgiche, Università di Firenze

**Renato Bocchini**, UO di Medicina Polispecialistica, Azienda Sanitaria Locale, Cesena

**Antonio Bove**, UO di Gastroenterologia ed Endoscopia Digestiva, Azienda Ospedaliera "A. Cardarelli", Napoli

**Edda Battaglia**, Dipartimento di Fisiopatologia Clinica, Università di Torino

**Paolo Bruzzi**, Struttura Complessa di Epidemiologia Clinica, IST Genova, Italy

Italian Constipation Study Group (the list of all participating members of the Italian Constipation Study Group is given at the end of the paper)

**Correspondence to:** Dr. Gabrio Bassotti, Strada del Cimitero, 2/a, 06131 San Marco (Perugia), Italy. gabassot@tin.it

**Telephone:** +39-75-5847570

**Received:** 2003-09-15 **Accepted:** 2003-11-06

## Abstract

**AIM:** Bowel habits are difficult to study, and most data on defecatory behaviour in the general population have been obtained on the basis of recalled interview. The objective assessment of this physiological function and its pathological aspects continues to pose a difficult challenge. The aim of this prospective study was to objectively assess the bowel habits and related aspects in a large sample drawn from the general population.

**METHODS:** Over a two-month period 488 subjects were prospectively recruited from the general population and asked to compile a daily diary on their bowel habits and associated signs and symptoms (the latter according to Rome II criteria). A total of 298 (61%) participants returned a correctly compiled record, so that data for more than 8 000 patient-days were available for statistical analysis.

**RESULTS:** The average defecatory frequency was once per day (range of 0.25-3.25) and was similar between males and females. However, higher frequencies of straining at stool ( $P=0.001$ ), a feeling of incomplete emptying and/or difficult evacuation ( $P=0.0001$ ), and manual manoeuvres to facilitate defecation ( $P=0.046$ ) were reported by females as compared to males.

**CONCLUSION:** This study represents one of the first attempts to objectively and prospectively assess bowel habits in a sample of the general population over a relatively long period of time. The variables we analyzed are coherent with the criteria commonly used for the clinical assessment of functional constipation, and can provide a useful adjunct for a better evaluation of constipated patients.

Bassotti G, Bellini M, Pucciani F, Bocchini R, Bove A, Alduini P, Battaglia E, Bruzzi P, Italian Constipation Study Group. An extended assessment of bowel habits in a general population. *World J Gastroenterol* 2004; 10(5): 713-716

<http://www.wjgnet.com/1007-9327/10/713.asp>

## INTRODUCTION

Bowel habits are a difficult function to study objectively because of their highly private nature and negative associations. Therefore, it is not surprising that they represent one of the least understood aspects of human behaviour<sup>[1]</sup>. In the past, most knowledge of bowel habits was drawn from limited data on small groups of subjects (nurses, jail prisoners, elderly people, students)<sup>[2-5]</sup>. More recently, studies aimed generically at investigating functional gastrointestinal disorders<sup>[6-10]</sup> have yielded data on large numbers of subjects by means of telephone interviews or mailed questionnaires<sup>[11-14]</sup>. However, these studies and other reports have all been retrospective in nature and based on the subjects' assertions regarding their recent bowel function<sup>[11,15,16]</sup>. More objective investigations have assessed small groups of subjects for limited periods of time (*e.g.* one week)<sup>[17]</sup>.

Prospective studies on bowel habits conducted over an adequate period of time in the general population are still lacking. The aim of our prospective study was to objectively assess the frequency and characteristics of defecation in a sample of the general population over a longer period of time.

## MATERIALS AND METHODS

During a two-month period a questionnaire was consecutively distributed to 488 relatives or friends of patients attending the outpatient gastrointestinal clinic in six centres located in different regions of Italy (two in the north, two in the centre, and two in the south). A total of 259 women and 229 men received the form. To obtain the most objective possible data on bowel habits, the questionnaire took the form of a diary covering a period of 4 wk in which "yes-no" responses were to be given daily to six questions (Table 1). Drawing upon the Rome II criteria for functional constipation<sup>[18]</sup>, data on the following symptoms and signs were recorded each day, namely number of bowel movements, straining during bowel movements, feeling of incomplete emptying and/or difficult evacuation, manual manoeuvres to facilitate defecation, lumpy or hard stools. In addition, the use of laxatives was recorded.

The questionnaires were anonymous, and the only personal information the participants were required to give was their age and sex. All subjects received an exhaustive explanation about the aim of the study and the structure of the questionnaire.

Each centre received approval from the local ethics committee, the written consent of all subjects was obtained after they had been given a complete explanation of the aims of the study and the nature of the questionnaire, and the study was conducted in accordance with the Helsinki Declaration (Edinburgh revision, 2000).

For each subject, an overall score for each variable was computed as follows. The average number of bowel movements per day was obtained by taking the total number of defecations reported by the participants and divided by the total number of days in the study period (*i.e.*, 28). The frequency in the use of laxatives was computed in the same way. The frequency of the four variables associated with defecation (straining, feeling of incomplete evacuation, need of manual help, lumpy/hard stools) was evaluated as the ratio between the total number of episodes recorded by the individual and the total number of bowel movements during the study period.

**Table 1** Four-week daily diary (Patients giving yes-no responses and number of bowel movements/day were recorded)

Questions	Time						
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
<b>FIRST WEEK</b>							
Bowel movements (number/day)							
Straining at defecation							
Feeling of incomplete defecation and/or difficult evacuation							
Manual manoeuvres							
Lumpy or hard stools							
Use of laxatives							
<b>SECOND WEEK</b>							
Bowel movements (number/day)							
Straining at defecation							
Feeling of incomplete defecation and/or difficult evacuation							
Manual manoeuvres							
Lumpy or hard stools							
Use of laxatives							
<b>THIRD WEEK</b>							
Bowel movements (number/day)							
Straining at defecation							
Feeling of incomplete defecation and/or difficult evacuation							
Manual manoeuvres							
Lumpy or hard stools							
Use of laxatives							
<b>FOURTH WEEK</b>							
Bowel movements (number/day)							
Straining at defecation							
Feeling of incomplete defecation and/or difficult evacuation							
Manual manoeuvres							
Lumpy or hard stools							
Use of laxatives							

### Statistical evaluation

All group means and standard deviations (SD) were calculated by averaging the individual scores. Comparisons among groups were carried out using the chi-square test or non-parametric tests. Correlations between pairs of variables were assessed by means of the non-parametric Spearman's correlation coefficient. *P* values <0.05 were chosen for rejection of the null hypothesis. Data are presented as mean±SD.

### RESULTS

A total of 298 adult subjects (163 women (54.7%), mean age 42.5±15.5 yr and 135 men (45.3%), mean age 42.4±15.9 yr) returned the completed questionnaire. The mean response rate was 61.1 % (females 62.9 %; males 58.9 %, n.s.). Therefore, data for 8 344 d were available for statistical analysis.

The distribution of the participating subjects by age and sex is shown in Table 2. Table 3 reports the frequency of defecation, expressed as the average number of evacuations per day, the frequency of pathological features and sensations at defecation, and the use of laxatives per day. Overall, the frequency of bowel movements averaged one per day (range 0.25-3.25), and was similar between males and females. No significant intra-personal variation in the parameters under examination was detected over the four-week period. Higher frequencies of straining at stool (*P*=0.001), feeling of incomplete emptying and/or difficult evacuation (*P*=0.0001),

and manual manoeuvres to facilitate defecation (*P*=0.046) were reported by females as compared to males.

**Table 2** Distribution for age and sex of population under investigation

years	Women	Men	Total
<20	3 (1.8)	3 (2.2)	6 (2)
21-30	32 (19.6)	39 (28.9)	71 (23.8)
31-40	59 (36.2)	32 (23.7)	91 (30.5)
41-50	22 (13.5)	21 (15.6)	43 (14.4)
51-60	21 (12.9)	20 (14.8)	41 (13.8)
61-70	19 (11.7)	13 (9.6)	32 (10.7)
>70	7 (4.3)	7 (5.2)	14 (4.7)

Table 4 shows the correlations between pairs of defecatory variables. Bowel movement frequency was negatively correlated with other features of defecation and the use of laxatives. Straining, a sensation of incomplete/difficult evacuation, manual manoeuvres, lumpy/hard stools and the use of laxatives were positively correlated with each other.

Concerning the relative weights of the single variables, it might be noted that 15 (5%) subjects showed a low frequency (<3/wk) of defecations, 35 (11.7%) straining during >¼ defecations, 32 (10.7%) incomplete/difficult evacuation during >¼ defecations, 2 (0.7%) manual manoeuvres during >¼ defecations, and 18 (6%) lumpy/hard stools during ¼ defecations.

**Table 3** Defecatory frequency and defecation-related variables in our population sample (data are expressed as mean±SD)

Sex	No. of defecations/day	Straining at stool/defecation	Feeling of incomplete emptying/defecation	Manual help for evacuation/defecation	Lumpy/hard stools/defecation	Use of laxatives/day
Total	1.00±0.4	0.06±0.1	0.06±0.15	0.0090±0.07	0.07±0.2	0.07±0.2
Men	1.03±0.34	0.05±0.13	0.03±0.09	0.0008±0.001	0.06±0.2	0.02±0.1
Women	0.97±0.4	0.12±0.21	0.09±0.2	0.0170±0.09	0.08±0.2	0.09±0.2
<i>P</i> (between sexes)	n.s.	0.001	0.0001	0.046	n.s.	0.001

**Table 4** Correlations among bowel habits

	Bowel mov/day	Straining	Incomplete/difficult evacuation	Manual manoeuvres	Lumpy/hard stools	Laxatives
Bowel movements (per day)	1	-0.365 <sup>a</sup>	-0.246 <sup>b</sup>	-0.123 <sup>b</sup>	-0.218 <sup>b</sup>	-0.356 <sup>b</sup>
Straining		1	0.562 <sup>b</sup>	0.293 <sup>b</sup>	0.592 <sup>b</sup>	0.416 <sup>b</sup>
Incomplete/difficult evacuation			1	0.327 <sup>b</sup>	0.558 <sup>b</sup>	0.273 <sup>b</sup>
Manual manoeuvres				1	0.303 <sup>b</sup>	0.233 <sup>b</sup>
Lumpy/hard stools					1	0.300 <sup>b</sup>
Laxatives						1

<sup>b</sup>*P*<0.01.

## DISCUSSION

Most studies on bowel habits have been based on phone interviews and on the assumption that people would report accurately, but there has been good evidence that bowel movement frequency might be misreported<sup>[19,20]</sup>. Indeed, it is very difficult to remember and report accurately one's bowel habits over recent months in a 20 min interview. Studies have shown marked discrepancies between recalled data and data that was recorded daily<sup>[19,21,22]</sup>. Moreover, people without a telephone or who were not at home when contact was attempted would be excluded from any given survey<sup>[23]</sup>. Another source of bias was the possibility that symptomatic individuals would be more keen to complete the survey process than asymptomatic subjects, which might lead to an overestimation of the frequency of symptoms.

Validated and universally accepted criteria are definitely needed if functional bowel disorders are to become a formally recognized disease entity by physicians, patients, and society<sup>[24]</sup>.

In order to circumvent some of the methodological biases discussed above, for this study a questionnaire designed to elicit the most objective possible data on individual bowel habits was drawn up. With this instrument bowel movement frequency, and sensations and characteristics related to each bowel movement were prospectively recorded by nearly 300 subjects on a daily basis for 4 wk. Moreover, to obtain a geographically representative sample of our population, participants were recruited from different parts of the country.

It may be stressed that the 61% response rate could be considered relatively high, given the nature of the data being sought. Studies employing telephone interviews or mailed questionnaires have yielded a response rate ranging from 19% to 80%. We believe that our high response rate can be attributed to the simplicity of the questionnaire (which examined only six items) and its complete anonymity. A daily dial-in service might have been more reliable, but this is costly to implement and potentially dependent on the socio-cultural environment in which the study is conducted.

It must be pointed out that due to the recruiting procedure used, the individuals who participated in this study were not selected with respect to factors such as social status, education, occupation and, possibly, the prevalence and type of bowel habits reported. However, they were prospectively recruited and not selected based on the basis of factors such as the presence/absence of pathological symptoms. Nevertheless, in light of the high participation rate, it seems reasonable to

postulate that the results of this study provide an acceptable approximation of the prevalence and type of symptoms in a general sample of Italian adults.

We are certain of our findings to be underlined. Firstly, there was a relatively large variation in bowel movement frequency, with an average of one per day, but a range of one evacuation every 4 d to about 3 bowel movements per day, with no differences in distribution between the sexes. It might also be noted that 5% of the participants reported less than 3 evacuations/week. Secondly, the number of subjects who reported abnormal features during >1/4 defecations was low, in particular, the incidence of manual manoeuvres to facilitate defecation was almost nil (0.7%). However, these variables showed a positive correlation with one another. Thirdly, the prevalence of defecation-related variables (except for the presence of lumpy/hard stools) was significantly different between the sexes, with a higher frequency in women, and interestingly, all of these are variables related with pelvic floor function. The use of laxatives was also rare (5% of the population sample), but much (*P*=0.0001) more frequent among women.

The variables analysed in this study could be helpful in the clinical assessment of functional constipation. Our data furthermore suggest that different symptoms and signs should be attributed to different weights in the evaluation of constipation scores<sup>[25,26]</sup>. For instance, a value of less than one defecation per week or the use of manual manoeuvres to facilitate defecation could represent clinically important indications for the diagnosis of constipation.

In conclusion, this study represents one of the first attempts to prospectively assess bowel habits in a general population sample over a long period of time. Further studies in "normal" subjects will obviously be needed to confirm these observations.

The following researchers of the Italian Constipation Study (ICS) Group participated in the study: Bassotti G, Chistolini F, Morelli A (Perugia); Bellini M, Alduini P, Mammìni C, Rappelli L, Costa F, Stasi C, Mumolo MG, Berni I, Giorgetti S, Marchi S (Pisa); Pucciani F, Iozzi L, Cianchi F, Cortesini C (Firenze); Bocchini R, Cimatti M, Fornasari L, Montaletti I, Pazzi P (Cesena/Forlì); Bove A, Balzano A (Napoli); Battaglia E, Dughera L, Emanuelli G (Torino); Bruzzi P (Genova).

## REFERENCES

- 1 **Heaton KW**, Radvan J, Cripps H, Mountford RA, Braddon FE, Hughes AO. Defecation frequency and timing, and stool form in the general population: a prospective study. *Gut* 1992; **33**: 818-824

- 2 **Hardy TL.** Order and disorder in the large intestine. *Lancet* 1945; **i**: 519-524
- 3 **Rendtorff RC,** Kashgarian M. Stool patterns of healthy adult males. *Dis Colon Rectum* 1967; **10**: 222-228
- 4 **Milne JS,** Williamson J. Bowel habit in older people. *Gerontol Clin* 1972; **14**: 56-60
- 5 **Sandler RS,** Drossman DA. Bowel habits in apparently healthy young adults not seeking health care. *Dig Dis Sci* 1987; **32**: 841-845
- 6 **Everhart JE,** Go VLW, Johannes RS, Fitzsimmons SC, Roth HP, White LR. A longitudinal survey of self-reported bowel habits in the United States. *Dig Dis Sci* 1989; **34**: 1153-1162
- 7 **Drossman DA,** Li Z, Andruzzi E, Temple RD, Talley NJ, Thompson WG, Whitehead WE, Janssens J, Funch-Jensen P, Corazziari EUS. Household survey of functional gastrointestinal disorders. Prevalence, sociodemography and health impact. *Dig Dis Sci* 1993; **38**: 1569-1580
- 8 **Talley NJ,** Weaver AL, Zinsmeister AR, Melton LJ. Functional constipation, and outlet delay. A population-based study. *Gastroenterology* 1993; **105**: 781-790
- 9 **Stewart WF,** Liberman JN, Sandler RS, Woods MS, Stemhagen A, Chee E, Lipton RB, Farup CE. Epidemiology of constipation (EPOC) study in the United States: relation of clinical subtypes to sociodemographic features. *Am J Gastroenterol* 1999; **94**: 3530-3540
- 10 **Pare P,** Ferrazzi S, Thompson WG, Irvine EJ, Rance L. An epidemiological survey of constipation in Canada: definitions, rates, demographics, and predictors of health care seeking. *Am J Gastroenterol* 2001; **96**: 3130-3137
- 11 **Chen LY,** Ho KY, Phua KH. Normal bowel habits and prevalence of functional bowel disorders in Singaporean adults-findings from a community based study in Bishan. *Singapore Med J* 2000; **41**: 255-258
- 12 **Boekema PJ,** van Dam van Isselt EF, Bots ML, Smout AJ. Functional bowel symptoms in a general Dutch population and associations with common stimulants. *Neth J Med* 2001; **59**: 23-30
- 13 **Icks A,** Haastert B, Enck P, Rathmann W, Giani G. Prevalence of functional bowel disorders and related health care seeking: a population-based study. *Z Gastroenterol* 2002; **40**: 177-183
- 14 **Walter S,** Hallbook O, Gotthard R, Bengmark M, Sjdahl R. A population-based study on bowel habits in a Swedish community: prevalence of faecal incontinence and constipation. *Scand J Gastroenterol* 2002; **37**: 911-916
- 15 **Levy N,** Stermer E, Steiner Z, Epstein L, Tamir A. Bowel habits in Israel. A cohort study. *J Clin Gastroenterol* 1993; **16**: 295-299
- 16 **Olubuyide IO,** Olawuyi F, Fasanmade AA. Frequency of defaecation and stool consistency in Nigerian students. *J Trop Med Hyg* 1995; **98**: 228-232
- 17 **Aichbichler BW,** Wenzl HH, Santa Ana CA, Porter JL, Schiller LR, Fordtran JS. A comparison of stool characteristics from normal and constipated people. *Dig Dis Sci* 1998; **43**: 2353-2362
- 18 **Thompson WG,** Longstreth GF, Drossman DA, Heaton KW, Irvine EJ, Müller-Lissner SA. Functional bowel disorders and functional abdominal pain. *Gut* 1999; **45** (Suppl 2): II43-II47
- 19 **Drossman DA,** Sandler RS, McKee DC, Lovitz AJ. Bowel patterns among subjects not seeking health care. Use of a questionnaire to identify a population with bowel dysfunction. *Gastroenterology* 1982; **83**: 529-534
- 20 **Manning AP,** Wyman JB, Heaton KW. How trustworthy are bowel histories? Comparison of recalled and recorded information. *BMJ* 1976; **3**: 213-214
- 21 **Whitehead WE,** Drinkwater D, Cheskin LJ, Heller BR, Schuster MM. Constipation in the elderly living at home. Definition, prevalence and relationship to lifestyle and health status. *J Am Geriatr Soc* 1989; **37**: 423-429
- 22 **Ashraf W,** Park F, Lof J, Quigley EM. An examination of the reliability of reported stool frequency in the diagnosis of idiopathic constipation. *Am J Gastroenterol* 1996; **91**: 26-32
- 23 **Thompson WG,** Irvine EJ, Pare P, Ferrazzi S, Rance L. Functional gastrointestinal disorders in Canada. First population-based survey using Rome II criteria with suggestions for improving the questionnaire. *Dig Dis Sci* 2002; **47**: 225-235
- 24 **Drossman DA.** The Rome criteria process: diagnosis and legitimation of irritable bowel syndrome. *Am J Gastroenterol* 1999; **94**: 2803-2807
- 25 **Thompson WG.** And the Working Team for functional bowel disorders. Functional bowel disorders and functional abdominal pain. In Drossman DA, Richter JE, Talley NJ, Thompson WG, Corazziari E, Whitehead WE, eds. The functional gastrointestinal disorders. Diagnosis, pathophysiology, and treatment. *Little Brown and Company Boston* 1994: 115-173
- 26 **Whitehead WE,** Bassotti G, Palsson O, Taub E, Cook EC, Drossman DA. Factor analysis of bowel symptoms in U.S. and Italian populations. *Dig Liver Dis* 2003; **35**: 774-783

**Edited by Wang XL Proofread by Zhu LH**