

Original Research Article

Questionnaire Survey of Bowel Habit in Japanese Medical Personnel

Kotaro Maeda¹⁾, Yoshikazu Koide²⁾, Hidetoshi Katsuno³⁾, Tsunekazu Hanai²⁾, Koji Masumori²⁾, Hiroshi Matsuoka²⁾, Tomoyoshi Endo³⁾ and Yeong Cheol Cheong²⁾

1) International Medical Center Fujita Health University Hospital, Toyoake, Japan

2) Department of Surgery, Fujita Health University School of Medicine, Toyoake, Japan

3) Department of Surgery, Fujita Health University Okazaki Medical Center, Okazaki, Japan

Abstract

Objectives: This study aims to clarify the bowel habit, change of bowel movement throughout the cycle of menstruation, and toilet use in Japanese medical personnel.

Methods: A questionnaire survey was completed by Japanese medical personnel after listening to lectures on bowel disorders. Constipation was defined according to Rome III criteria, whereas diarrhea was defined as Bristol stool form scale type 6 and 7.

Results: In total, 463 persons (mean age, 35.6 years, range 20-91, male/female/no answer: 132/324/7) have completed the questionnaire. Constipation was significantly more often observed in females (male/female: 3%/31%, $p > 0.001$, Chi-squared test), while diarrhea was noted to be less in females (male/female: 1%/7%). Constipation was observed in 20% of participants in their 20s, and the constipation rate was observed to gradually increase with age. It was observed in 45% of participants in their 70s or older. Bowel movement changed to constipation around menstruation in 18% of females and changed to diarrhea in 43% of females. Constipation often occurred before menstruation and diarrhea during menstruation. Only 2% of participants used a Japanese-style toilet, and 5% of participants claimed that they were unable to pass a stool on a Japanese-style toilet.

Conclusions: Constipation was significantly more frequent in females and increased with age among female Japanese medical personnel. Change of bowel movement occurred in 61% of females around menstruation. Five percent of participants were unable to pass stools on a Japanese-style toilet.

Keywords

bowel habit, menstruation, Japanese population, constipation, Japanese-style toilet

J Anus Rectum Colon 2021; 5(3): 297-305

Introduction

The prevalence of constipation was reported in 2-5% of the Japanese population according to the 2016 Comprehensive Survey of Living Conditions conducted by the Japanese Ministry of Health, Labour and Welfare[1]. However, the actuality of bowel habits in the Japanese population according to Rome criteria[2,3] has little been documented[4-6], while

many epidemiological studies have been conducted in Europe and the USA[7-11]. Furthermore, epidemiology of diarrhea in the Japanese population is rarely reported[1].

Change in bowel movement across the menstrual cycle is well documented in Europe and the USA[12-16], but few studies have been undertaken using the Japanese population[17]. Furthermore, chronological associations between bowel habits and menstruation have not been determined

Table 1. Questionnaire in Bowel Habit.

1, Age 2, Gender 3, Occupation	
4, What is your usual bowel movement pattern?	Normal/constipation/diarrhea
5, During menstruation, does your bowel movement change?	Constipation/diarrhea/unchanged
6, Change in bowel movement occurs (before/during/after) menstruation.	
7, Defecation and urination (must be done at the same time/can be done separately).	
8, You usually use a (Japanese-style toilet/western-style toilet) when defecating.	
9, You (can/can't) pass a bowel movement on a Japanese-style toilet?	
10, Have you ever had gynecologic surgery (only applicable to removal of ovarian and/or uterus) ?	Yes/No
11, Have you ever had a colorectal disease and/or surgery?	Yes/No
12, The colorectal diseases/surgery was ().	
13, Have you ever had an anal disease?	Yes/No
14, Have you previously had anal surgery?	Yes/No
15, The anal surgery was ().	
16, Do you undergo any treatment for systemic disease?	Yes/No
17, The treatment is for ().	

among the younger population of Japan. Thus, investigating these associations may contribute to establishing a pathological diagnosis of abnormal bowel habits for younger female patients in Japan. It has often been said that younger members of the population are unable to pass stools on a Japanese-style toilet after western-style toilets became popular. However the actual situation remains to be unclear. "The Thinker" position seems to be a more efficient method for defecation than the sitting position[18]. "The Thinker" position is the position used on a Japanese-style toilet. The popularity of a western-style toilets could affect the bowel habit. Men usually pass water and stool separately. However, some women cannot defecate and urinate separately. The actual figures of excretion style are unclear. Investigating these figures might provide useful information to doctors for when they are asked by patients whether or not simultaneous defecation and urination is abnormal. Furthermore, the prevalence of anal incontinence has been rarely documented using the Japanese population[19,20].

Therefore, we conducted a questionnaire survey on a Japanese sample to examine their bowel habit, toilet use, anal incontinence, and other conditions. In this current study, we analyzed bowel habits, change of bowel movement due to the menstruation cycle, defecation and urination patterns, and toilet use, in order to clarify these conditions in Japan.

Methods

A questionnaire survey was completed by Japanese medical personnel after listening to lectures on bowel disorders between 2007 and 2019. Medical personnel were selected to complete this questionnaire survey because they had a good understanding of bowel disorders and the meaning of this current study. The lectures included anatomy, physiology

concerning defecation, definition, epidemiology, pathophysiology, diagnosis, and treatment for bowel disorders and incontinence. The lectures were held 12 times in total for 502 participants by KM, including 8 times for 12 to 35 participants, and 4 times for 70 to 100 participants. The questionnaire was distributed by a clerk to all 502 participants prior to the lecture. The questionnaire concerning this study is shown in Table 1. Constipation was essentially defined according to Rome III criteria[2,3] and diarrhea was defined as Bristol stool form scale type 6 and 7[21] in the lecture. Only those who provided approval for the use of de-identified data were asked to participate in the questionnaire. The questionnaire surveys were collected immediately after the lecture by a clerk. All the collected data was summarized and analyzed with the approval of the institutional review board of Fujita Health University (HM20-197), and the study was performed in accordance with the 1964 World Medical Association's Declaration of Helsinki and its later amendments.

Wilcoxon rank-sum test, Fisher's exact test, and Chi-squared test were used for statistical analysis, and differences were considered significant at $p < 0.05$.

Results

In total, 463 out of the 502 persons (response rate 92.2%) participated in this survey. Age and gender distribution of the respondents are shown in Table 2. Twelve participants did not provide their age. The mean age of the remaining 451 participants was 35.6 years (range 20-91). The mean age of females (39 years, range 20-91) was significantly higher than that of males (28 years, range 20-70) ($p < 0.0001$, Wilcoxon rank-sum test). Male/female/no answer ratio was 132:324:7. Moreover, 224 participants (48%) were students, 120 (26%) were nurses, 96 (21%) answered others,

and 23 (5%) did not provide their occupation.

Usual bowel habit

Normal bowel movement was confirmed in 339 of the 456 participants (74.3%), constipation in 103 participants (22.6%), and diarrhea in 12 participants (2.6%); meanwhile, 2 participants (0.4%) did not respond to this question. Normal bowel movement was observed in 118 of 132 males (89.4%) and in 221 of 324 females (68.2%), constipation in 4 males (3.0%) and in 99 females (30.6%), and diarrhea in 9 males (6.8%) and 3 females (0.9%). Constipation was significantly more frequent in females than in males ($p < 0.001$, Chi-squared test), and diarrhea was significantly more frequent in males than in females ($p = 0.022$, Fisher’s exact test). When analyzed for the participants of 20 to 39 years of age (Figure 1), constipation was also significantly of higher frequency in females than in males (52/183 females (28.4%), 4/117 males (3.4%), $p < 0.001$ Chi-squared test), whereas diarrhea was more common in males (6/117 males (5.1%), 2/128 females (1.6%), $p = 0.083$, Fisher’s exact test).

When analyzing bowel habit according to age group, con-

stipation was observed in 19.5% and 16.3% of participants in their 20s and 30s, respectively, and the constipation rate was noted to gradually increase with age. It was observed in 45.5% of participants in their 70s or older. Constipation was significantly more frequent in participants over 60 than in younger participants ($p = 0.029$, Chi-squared test). On the other hand, diarrhea was observed only in participants younger than 50 years with the occurrence of 1-3% of the participants. In females, constipation was observed in the range of 22.6-30.8% of female participants who are between 20 and 59 years, and the constipation rate increased to 47.6% for females in their 60s or older (Figure 2).

Bowel movement changes due to menstruation

Bowel movement changes due to menstruation are shown in Figure 3. Bowel movement changes due to menstruation occurred in 196 of 324 females (60.5%), with diarrhea in 139 females (42.9%) and constipation in 57 females (17.6%). No bowel movement changes occurred after menstruation. Change to constipation occurred before menstruation in 43 of 56 females (76.8%) and during menstruation in 13 females (23.2%), while change to diarrhea occurred before menstruation in 61 of 138 females (44.2%) and during menstruation in 77 females (55.8%) (Figure 4). Change to constipation patterns occurred significantly more often before menstruation than during menstruation ($p < 0.001$, Chi-squared test). When comparing the changes of bowel movement before and during menstruation, diarrhea occurred significantly more often during menstruation than before menstruation ($p < 0.001$, Chi-squared test, Figure 5).

In 221 females with usually normal bowel movement, bowel movement changes due to menstruation occurred in 129 females (58.4%), with changed to constipation in 43 females (19.5%) and to diarrhea in 86 females (38.9%). On

Table 2. Age and Gender Distribution of 463 Respondents.

Age (years)	Male	Female	No answer	Total
20–29	90	130	0	220
30–39	27	53	0	80
40–49	7	53	0	60
50–59	2	47	4	53
60–69	2	13	1	16
≥70	1	21	0	22
No answer	3	7	2	12
Total	132	324	7	463

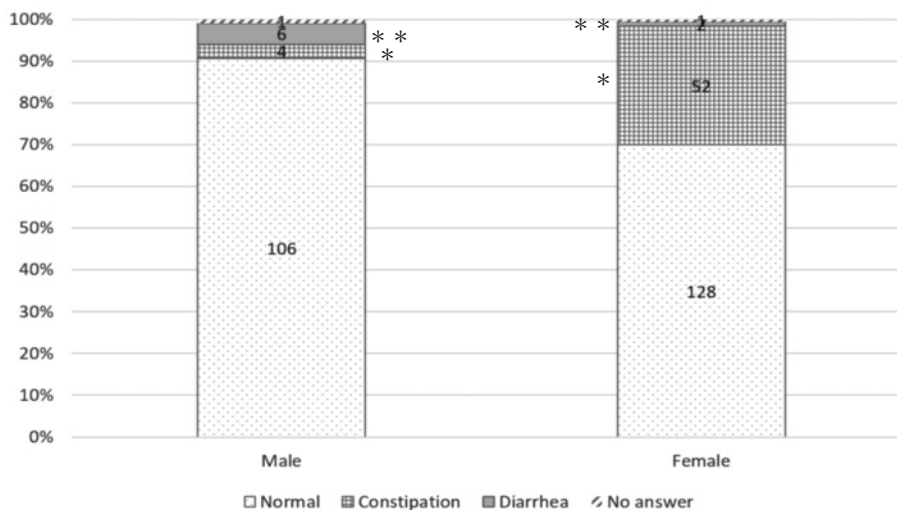


Figure 1. Bowel habit according to gender in persons of 20 to 39 years old (n = 300) (* $p < 0.001$, Chi-squared test, ** $p = 0.083$ Fisher’s exact test).

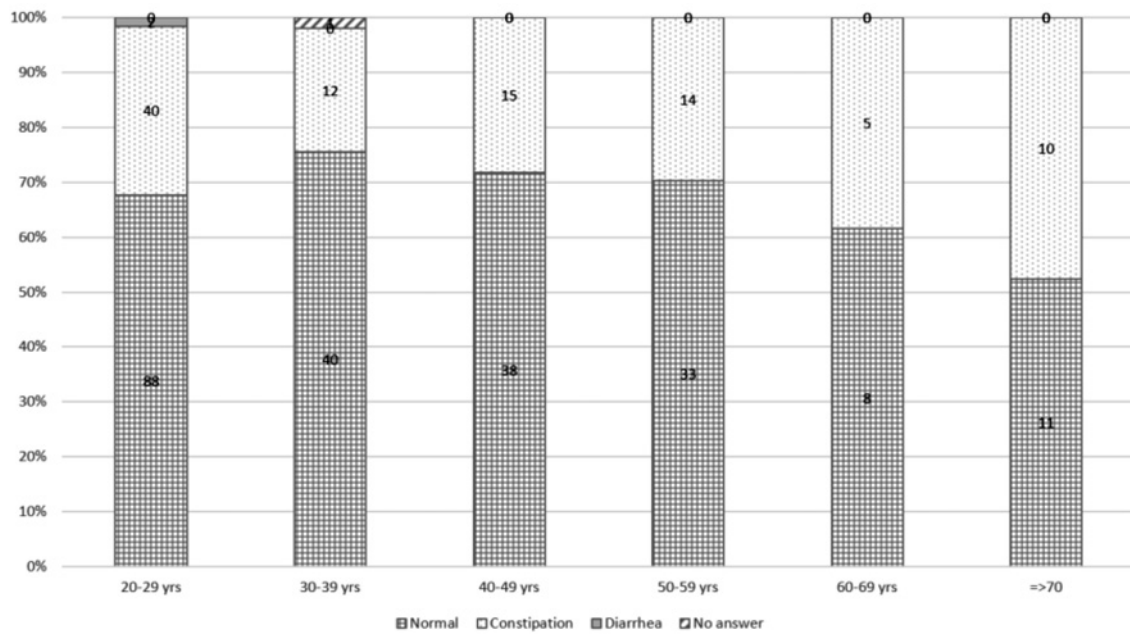


Figure 2. Female bowel habit according to age group (n = 317).

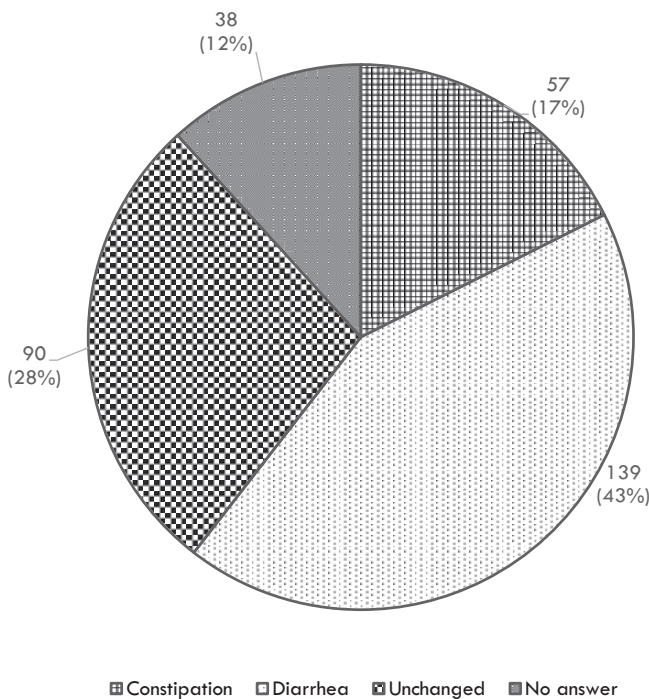


Figure 3. Bowel movement changes due to menstruation (n = 324).

the other hand, bowel movement changes due to menstruation occurred in 64 of 99 females usually with constipation (64.8%), with changed to constipation in 14 females (14.1%) and to diarrhea in 50 females (50.5%) (Figure 6). Changes of bowel movement due to menstruation occurred before menstruation in 77 of 129 females (59.7%), with usu-

ally normal bowel movement, and the changes occurred during menstruation in 52 females (40.3%). On the other hand, the changes occurred before menstruation in 25 of 64 females (39.0%) usually with constipation, and the changes occurred during menstruation in 37 females (57.8%) usually with constipation (Figure 7). Changes of bowel movement before menstruation occurred significantly more often in females with usually normal bowel movement than in females who usually experience constipation (p = 0.012, Chi-squared test).

Defecation and urination

Defecation and urination had to be done at the same time in 81 of 463 participants (19.5%) and could be done separately in 371 participants (80.1%), while 11 participants (2.4%) did not respond to this question. Meanwhile, 14 of 132 males (10.6%) and 67 of 325 females (20.7%) had to defecate and urinate at the same time. Simultaneous defecation and urination was significantly more able among females than males (p = 0.007, Chi-squared test). When analyzed for the participants between 20 and 39 years, 12 of 117 males (10.3%) and 33 of 183 females (18.0%) had to defecate and urinate at the same time (Figure 8). Simultaneous defecation and urination was slightly more able among females than males (p = 0.063, Chi-squared test).

Toilet style and toilet use

In total, 450 of the 463 participants (97.2%) usually use a western-style toilet, and only 10 participants (2.2%) use a Japanese-style toilet; meanwhile, 3 participants did not respond to this question. Further, 23 of 463 participants

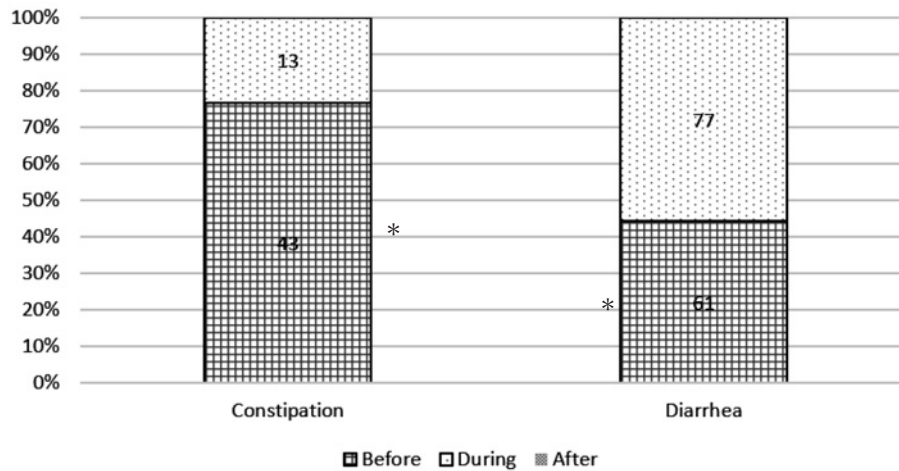


Figure 4. Bowel movement changes and timing due to menstruation according to bowel habit (n = 194)
 (* p < 0.001, Chi-squared test).

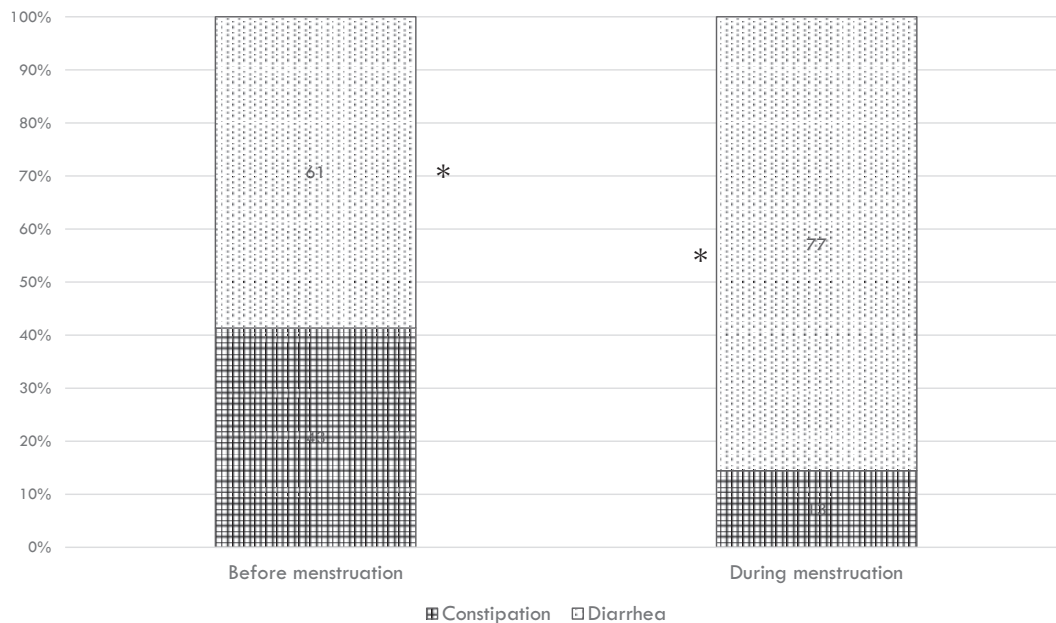


Figure 5. Bowel movement changes and timing due to menstruation according to menstrual cycle (n = 194)
 (* p < 0.001, Chi-squared test).

(5.0%) cannot pass a bowel movement on a Japanese-style toilet, while 435 participants (94.0%) can, and 5 participants did not respond to this question. Five in 132 males (3.8%) and 16 in 324 females (4.9%) cannot pass a bowel movement on a Japanese-style toilet. The inability rate to pass a bowel movement on a Japanese-style toilet according to age group was 4.1% (9/220 participants) of those in their 20s, 1.3% (2/80 participants) of those in their 30s, 5.0% (3/60 participants) of those in their 40s, 5.7% (3/53 participants) of those in their 50s, 0% (0/16 participants) of those in their 60s, and 22.7% (5/22 persons) of those who are 70 or older.

Past history and constipation

As per our findings, 20 of 324 females (5.2%) underwent gynecological surgery previously. Constipation was confirmed in 7 of these 20 females (35.0%) with a history of gynecological surgery, and in 90 of 290 females (31.0%) without the history. No significant difference was confirmed in the rate of constipation between females with or without previous gynecological surgery.

Furthermore, 13 of 463 participants (2.8%) experienced a colorectal disease and/or surgery previously. The most fre-

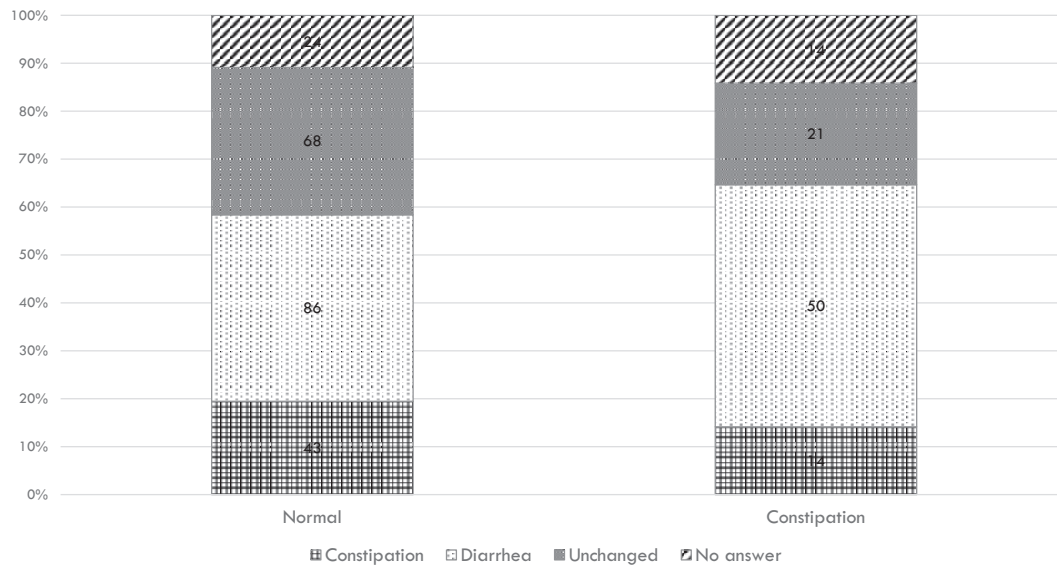


Figure 6. Bowel movement changes due to menstruation according to usual bowel habit (n = 320).

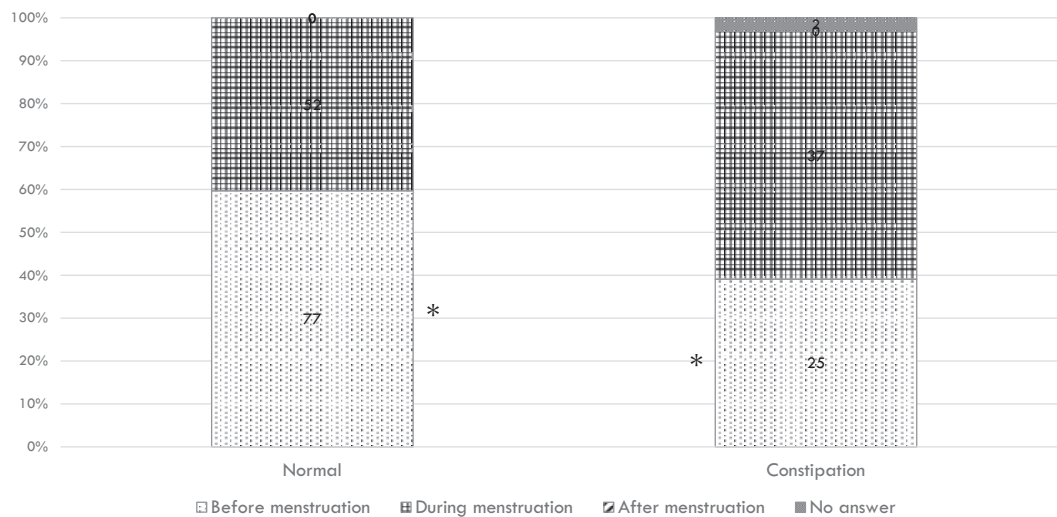


Figure 7. Timing of bowel movement changes due to menstruation according to usual bowel habit (n = 193)

(* p = 0.012, Chi-squared test).

quent colorectal disease and/or surgery was colorectal polyp (n = 4), followed by intussusception (n = 2), irritable bowel syndrome (n = 2), and so on. Constipation was confirmed in 3 of 13 participants (23.1%) with a history of colorectal disease and/or surgery and in 100 of 439 persons (22.8%) without the history. Previous colorectal disease and/or surgery did not affect the occurrence of constipation.

Twenty-nine of 455 participants (6.4%) had an anal disease previously. Constipation was confirmed in 7 of 29 participants (24.1%) with a history of an anal disease and in 97 of 426 participants (22.8%) without the history. Previous anal disease did not affect the occurrence of constipation.

Six of 449 participants (1.3%) previously had anal sur-

gery for hemorrhoids. Constipation was confirmed in 3 of 6 participants (50%) with a history of anal surgery and in 99 of 443 people (22.3%) without the history.

Forty-two of 463 participants (9.1%) underwent any treatment for systemic disease. The most frequent disease was hypertension (n = 13), followed by hyperlipidemia (n = 5), allergic dermatitis (n = 4), diabetes mellitus (n = 3), and so on. Constipation was confirmed in 12 of 42 participants (28.6%) with a history of a systemic disease and in 87 of 406 participants (21.4%) without the history. No significant difference was confirmed in the occurrence of constipation between people with and without systemic disease.

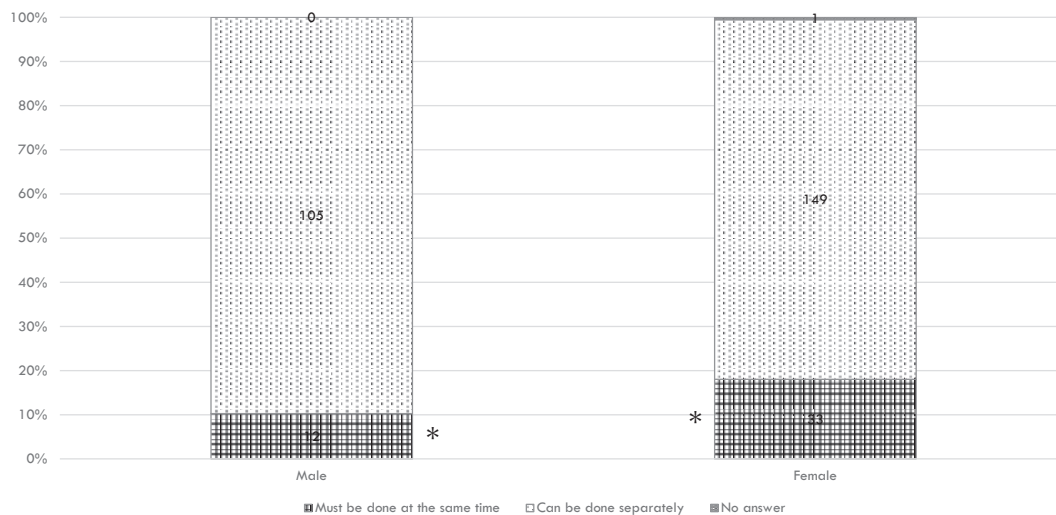


Figure 8. Defecation and urination according to gender (n = 456)
(* p = 0.063, Chi-squared test).

Discussion

The prevalence of constipation differs widely according to the definition, and relevant groups need to be classified. The prevalence of self-recognized constipation in the Japanese population by Internet survey has been reported to be 28.4% and 51.5%[6,22]. Kawamura et al.[5] reported that the prevalence of functional constipation and constipation-predominant irritable bowel syndrome (IBS-C) by the Rome III criteria was 8.73% and 4.97%, respectively, in 3,000 Japanese respondents under 70 years who were randomly extracted according to the population composition ratio of the Ministry of Internal Affairs and Communications Statistics Bureaus metropolis and districts of Japan. The frequency of functional constipation according to the Rome III criteria was 6.1%, as reported by Ono et al.[7]. Tamura et al.[6] reported that the prevalence of constipation was 28.0% according to the Rome III criteria among 5,155 Internet survey respondents (2,542 males and 2,613 females, mean age 48.8 years (range 20-79)). In this study, constipation was observed in 22.6% of all 456 people (132 males and 324 females, mean age 35.6 years (range 20-91)) and 18.6% (56/300 people) in those in their 20s and 30s, respectively, according to the Rome III criteria. Actually, functional constipation and IBS-C are not strictly separated in the current questionnaire; therefore, the prevalence of constipation on our report (22.6%) by the Rome III criteria was considered to be in between Kawamura's report (13.7%) and Tamura's report (28.0%). This difference in prevalence might be due to the difference in age groups and the number of male/female participants included. The prevalence of constipation in the USA is reported at around 15%[8,10].

Constipation is documented to be more frequent in females than in males[1,3,8,22]. This is consistent to the cur-

rent study even when analyzing the younger population (Figure 1). Constipation is reported to increase with age in males and females[3,11,22,23]. However, Nakaji et al.[24] reported that the tendency for constipation correlated positively with age in males (p = 0.013), although this trend was not observed in females (p = 0.641). Constipation increased in females in their 60s or older in this current study, which was consistent to the 2016 Comprehensive Survey of Living Condition in Japan[1,3]. However, the prevalence of constipation in each age group was much higher in this study than that in the 2016 Comprehensive Survey of Living Condition. The association of the prevalence of constipation with age group was not analyzed for males in this current study due to the small sample size for males over 40 years.

Significant association of constipation to age, sex, and past histories or complications of diabetes, hemorrhoids, and cerebrovascular diseases was documented in the multivariate analysis of the Internet survey in the Japanese population[22]. The association of constipation to past histories or complications of gynecological surgery, colorectal disease and/or surgery, anal disease, anal surgery, and systemic disease was not confirmed in this current study due to the small number of responses to the relevant questions.

The prevalence of diarrhea was 2.6% of participants, which is consistent with the prevalence in the 2016 Comprehensive Survey of Living Condition in Japan[1]. Diarrhea was significantly more frequent in males (6.8%) than in females (0.9%). However, due to the fact that this data includes fewer numbers of males in higher age groups, diarrhea was compared in the range of 20 to 39 years. Actually, diarrhea was slightly more common in males (5.1%) than in females (1.6%) (p = 0.083, Fisher's exact test). This tendency has not been well documented.

Most women perceive changes in their bowel habit in re-

lation to menstruation[25,26]. Celik et al.[12] reported that 67% of the 230 apparently healthy premenopausal females reported an alternation in their bowel habit during any phase of the menstrual cycle. This figure is consistent with this current report (60.5%). It is documented that the majority of women reported loose stools during menses, and a minority reported constipation[14,16,25,26]. In this current study, diarrhea was observed in 42.9% of 324 females, while constipation was observed in 17.6%. The previous study with small number of cases shows that most females report hard stools at the luteal phase and loose and more frequent stools during menses[25]. In the current study, constipation occurred significantly more often before menstruation (76.8%) than during menstruation (23.2%) (Figure 4). On the other hand, diarrhea (85.6%) occurred significantly more often than constipation (14.4%) during menstruation (Figure 5). The physiological basis for change in bowel habits associated with menses remains to be unclear[12]. Wald et al.[27] reported that delayed gastrointestinal transit time was the cause for the hard consistency of stool during the luteal phase. However, alternations in motility could not be confirmed in most of these studies[26,28]. The association of prostaglandins' production is suggested in relation to the loosening of stools during menstruation[29,30].

Fukuda et al.[17] reported bowel habits before and during menses in Japanese women of climacteric age and concluded that the changes in the bowel habit of women of climacteric age at menstruation are greater for those suffering constipation than those who are not, though the difference was not significant. In this current study, changes of bowel habit around menstruation did not differ so much between females with usually normal bowel habit (58.4%) and females who are usually constipated (65.6%). However, changes of bowel habit occurred more often before menstruation than during menstruation in females with usually normal bowel habit; on the other hand, these changes occurred more often during menstruation in females with constipation. This might be because females with usually normal bowel habits more often experienced change to constipation (19.5% in usually normal bowel movement, 14.1% in usually constipation) and females who are usually constipated experience change to diarrhea (38.9% in usually normal bowel movement, 50.5% in usually constipation).

No reports have shown the frequency of the inability of people to pass stools and water separately. It was shown that even 10.6% of males could not pass stools and water separately; furthermore, this excretion style was more common in females (20.7%).

There is little documented concerning usual toilet use in the Japanese population, though a lot of data exists relating to usage by junior high school students[31]. This current study showed that participants usually used a western-style toilet (97.2%) and that 5% of participants cannot pass stools

on Japanese-style toilets. It was expected that the younger generation would not be able to pass stools on Japanese-style toilets, but the frequency was almost equal to participants in their 20s through to their 60s. Participants over 70 could not pass stools on Japanese-style toilets due to the trouble with their legs. The relationship between toilet style and bowel habit was not evaluated because only 10 participants (2.2%) used a Japanese-style toilet.

The limitation of this study is that the questionnaire was undertaken over a long period of time and that it had a limited sample size. The survey was mainly completed by a younger population, and the number of male participants was limited. The majority of the participants were student and nurses, and the survey lacked other professionals. Definitions of concerning constipation, chronic constipation, and IBS-C were not strictly separated in this study. While more participants were intended to be invited to complete the questionnaire, the chance of conducting lectures to the target cohort was limited. However, the analysis of each survey questions were not impacted by different sample sizes (100 cases and 300 cases). Therefore, it is believed that this report shows the actual state of bowel habits in the Japanese young females, especially in relation to bowel habits around the menstruation cycle.

In conclusion, constipation was significantly more frequent in females than in males, and increased with age for female Japanese medical personnel in their 60s or older. Changes of bowel movement occurred in 60.5% of females around menstruation, mainly to instances of diarrhea (42.9%). Instances of diarrhea often occurred during menstruation and instances of constipation occurred before menstruation. Defecation and urination had to be done at the same time in 19.5% of participants. Five percent of participants cannot pass stools on a Japanese-style toilet.

Acknowledgements

We would like to thank Ms. Fusae Nojima for her secretarial work and English language editing.

Conflicts of Interest

There are no conflicts of interest.

Author Contributions

All authors contributed to the study conception and design. Material preparation, data collection, and analysis were performed by Kotaro Maeda. The first draft of the manuscript was written by Kotaro Maeda, and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Approval by Institutional Review Board (IRB)

Fujita Health University HM20-197

Disclaimer

Hidetoshi Katsuno is one of the Associate Editors of *Journal of the Anus, Rectum and Colon* and on the journal's Editorial Board. He was not involved in the editorial evaluation or decision to accept this article for publication at all.

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