

# Difference in Defecation Desire Between Patients With and Without Chronic Constipation: A Large-Scale Internet Survey

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**INTRODUCTION:** Defecation desire (DD) is an important physiological component of normal defecation. However, knowledge of DD in the general population and in individuals with chronic constipation (CC) is lacking. We aimed to assess the prevalence of DD in the general population and individuals with CC and to understand the impact of treatment on DD among individuals with CC.

**METHODS:** We conducted an online questionnaire survey targeting the Japanese general population in 2019. DD was reported as never, rarely, usually, or always. Individuals who self-reported constipation and met the Rome IV criteria for functional constipation but did not for irritable bowel syndrome were included in the CC group, while the same number of age-/sex-matched controls who met neither functional constipation nor irritable bowel syndrome criteria was included in the non-CC group. Individuals who reported DD as rarely or never were defined as having loss of DD (LODD).

**RESULTS:** Of the 20,986 participants, 2,587 were included in the CC group (12.3%). LODD was significantly higher in the CC individuals than in the non-CC controls (57.4% vs 8.3%, respectively,  $P < 0.001$ , odds ratio 14.84 [95% confidence interval 12.65–17.42]). Satisfaction with treatment for constipation was lower in individuals with persistent LODD (25.9%) compared with those with improved LODD (56.5%) on treatment ( $P < 0.001$ , odds ratio 2.48 [1.39–4.43]).

**DISCUSSION:** LODD is common in CC and is associated with decreased satisfaction to treatment. Greater attention should be paid to DD when treating patients with CC.

**SUPPLEMENTARY MATERIAL** accompanies this paper at <https://links.lww.com/CTG/A370>, [links.lww.com/CTG/A371](https://links.lww.com/CTG/A371), [links.lww.com/CTG/A381](https://links.lww.com/CTG/A381)

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## INTRODUCTION

Chronic constipation (CC) is a common functional bowel disorder with a high prevalence of 2%–27% worldwide (1). The prevalence of CC increases with age in both men and women (2); thus, the number of individuals with CC is expected to increase with the rapidly aging population in Japan. Individuals with CC often have a marked decrease of health-related quality of life in both physical and mental components. Belsey et al. (3) reported that impairment in health-related quality of life among patients with CC was comparable with conditions such as rheumatoid arthritis and ulcerative colitis. CC is also a decrease in work productivity and is associated with an increased burden on health care resources (4).

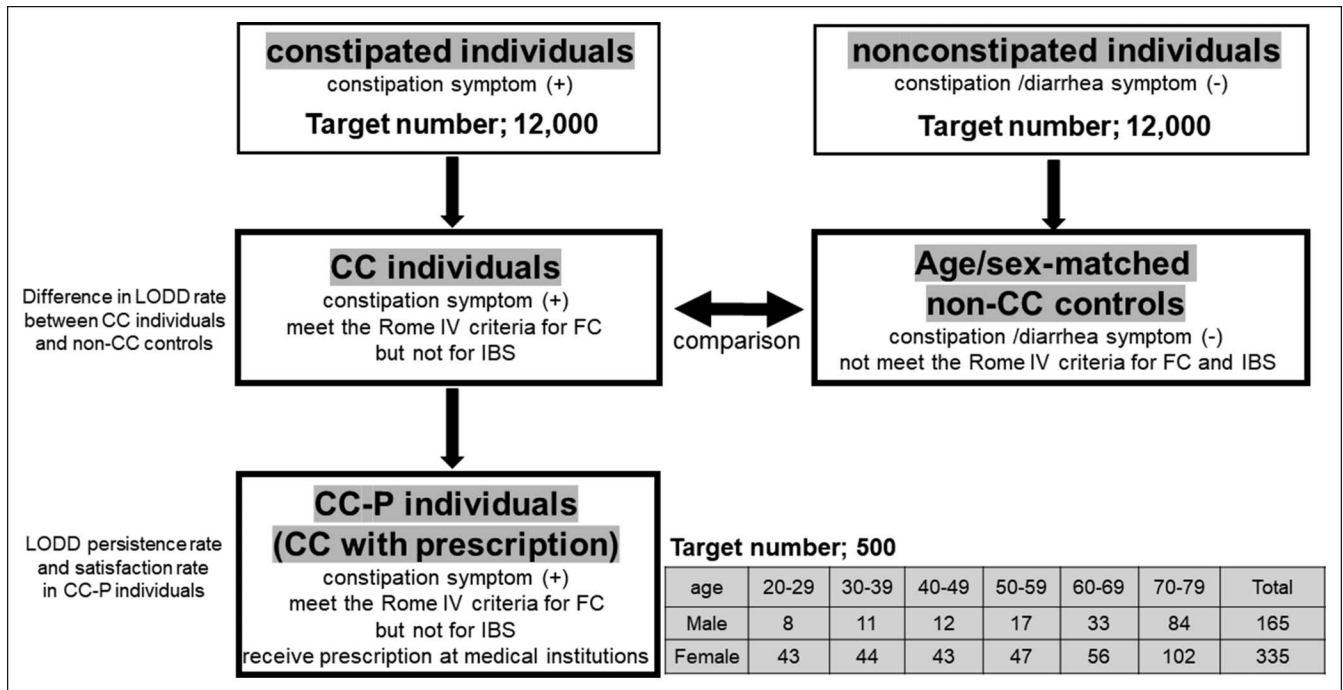
Treatment for CC is still inadequate. An online survey conducted in the United States found nearly half of individuals with CC were dissatisfied with their current therapy (5). Although similar surveys have not been conducted, it is likely that people with CC in Japan are also unsatisfied with their treatment. In addition, many individuals in Japan with CC self-treat with over-the-counter medications, and those who do seek care from a physician often receive empiric treatment that is not based on clinical guidelines.

Defecation desire (DD), the sensation that occurs on distension of the rectal wall, is an important component of normal defecation. Individuals with constipation frequently report the loss of DD (LODD), which may be due to impairment of rectal sensation (6). To date, no surveys have evaluated the prevalence

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**Figure 1.** Study flow. CC, chronic constipation; CC-P, CC with prescription; FC, functional constipation; IBS, irritable bowel syndrome; LODD, loss of defecation desire.

of LODD and its relationship with treatment satisfaction in CC or healthy individuals. We hypothesized that LODD is common in patients with CC and related to low treatment satisfaction.

The aim of this study was to evaluate, in the general Japanese population, (i) the prevalence of DD in individuals with and without CC and (ii) the prevalence of LODD among individuals with CC who are receiving treatment for their CC and its relationship with treatment satisfaction.

## MATERIALS AND METHODS

We performed an internet questionnaire survey from February 27, 2019, to March 8, 2019, targeting the Japanese monitors registered in the large-scale website panel owned by Rakuten Insight, Inc, Tokyo. After giving informed consent, monitors were asked to answer the online questionnaire.

### Ethics

The Institutional Ethics Committee approved this single-center observational study. Informed consent was obtained electronically from all participants before answering the questionnaire.

The clinical trial was registered through the University Hospital Medical Information Network (UMIN000036006).

### Eligibility

Japanese monitors aged 20 years and older and younger than 80 years were included. Those engaged in the pharmaceuticals or medical devices industries, the advertisement or broadcasting industries, and research or consulting industries were excluded.

### Questionnaire items

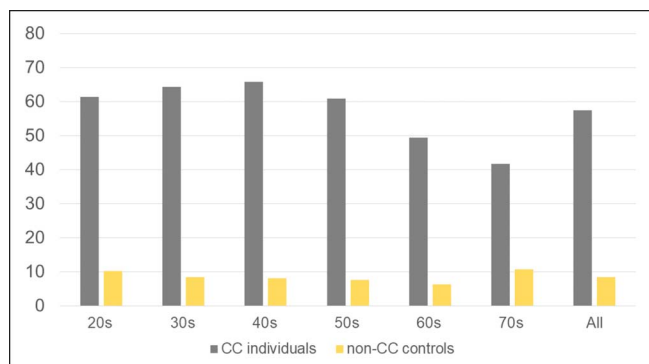
All participants were asked to answer the following questions. Participants receiving treatment for constipation were asked to recall their bowel symptoms before initiation of treatment. Questions included (i) demographics (e.g., age and sex), (ii) self-report of constipation symptoms in daily life, (iii) frequency of DD: never, rarely, usually, and always, (iv) most often observed Bristol Stool Form Scale grade in daily life (a graded visual scale of stool type from type 1 [hard lumps] to type 7 [watery diarrhea]), (v) frequency of bowel movements (BMs) in daily life, (vi) frequency of difficulty with defecation in daily life, (vii) frequency of

**Table 1.** Difference of LODD between CC individuals and non-CC controls

	CC N = 2,587	Non-CC controls N = 2,587	P value	OR (95% CI)
Age <sup>a</sup>	51.0 (39.0, 63.0)	51.0 (38.0, 63.0)	0.178	
Sex (male/female)	1,036/1,551	1,036/1,551	1.000	
LODD	1,484 (57.4%)	215 (8.3%)	<0.001	14.84 (12.65–17.42)

CC, chronic constipation; CI, confidence interval; LODD, loss of defecation desire; OR, odds ratio.

<sup>a</sup>Age is expressed as mean (first quartile, third quartile).

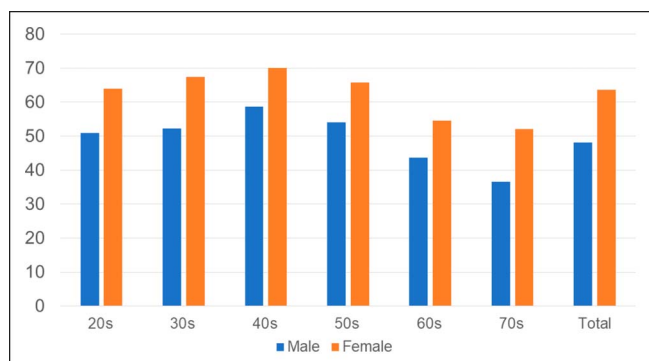


**Figure 2.** Difference of LODD rate in CC individuals and non-CC controls (%). CC, chronic constipation; LODD, loss of defecation desire.

incomplete evacuation in daily life, (viii) frequency of abdominal pain in daily life, (ix) Rome IV criteria for functional constipation (FC) (7), (x) Rome IV criteria for irritable bowel syndrome (IBS) (7), and (xi) whether receiving medical treatment or not. Individuals who reported that they were currently taking medical treatment for CC also were asked to answer the additional questions: (i) type of treatment, (ii) frequency of DD: never, rarely, usually, and always, in the previous 1 week on treatment, (iii) Bristol Stool Form Scale grade in the previous 1 week on treatment, (iv) frequency of BMs in the previous 1 week on treatment, (v) frequency of difficulty with defecation in the previous 1 week on treatment, (vi) frequency of incomplete evacuation in the previous 1 week on treatment, (vii) frequency of abdominal pain in the previous 1 week on treatment, and (viii) satisfaction with treatment (satisfied, somewhat satisfied, somewhat dissatisfied, and dissatisfied).

### Study flow

A flow chart of the study can be found in Figure 1. Individuals who self-reported constipation symptom were assigned to constipated individuals, and those who denied constipation or diarrhea were assigned to the nonconstipated individuals. Among constipated individuals, those who met the Rome IV criteria for FC and did not meet the Rome IV criteria for IBS were assigned to the CC individuals. The same number of age-/sex-matched controls who met neither FC nor IBS criteria (non-CC controls) was randomly chosen from the nonconstipated group. Differences in the rates of LODD between CC individuals and non-CC controls were



**Figure 3.** LODD rate by age/sex in CC individuals (%). CC, chronic constipation; LODD, loss of defecation desire.

analyzed. Next, among CC individuals, those who received prescribed medication for constipation at medical institutions, not including over-the-counter drugs, were extracted as the CC with prescription (CC-P) individuals. We investigated the rates of LODD persistence (rate of individuals whose LODD was still present on treatment condition) and satisfaction with treatment in CC-P individuals.

Individuals reporting the frequency of DD as never or rarely were defined as LODD, while individuals reporting DD as usually or always were defined as DD. Individuals reporting the degree of satisfaction with treatment as satisfied or somewhat satisfied were defined being satisfied with treatment, whereas those who reported being somewhat dissatisfied or dissatisfied with treatment were considered to be dissatisfied.

### Participant selection

We prospectively enrolled participants such that each age group (20s, 30s, 40s, 50s, 60s, and 70s) and sex (M/F) had equal number of participants (i.e., approximately 1,000 participants in each group). In addition, the number of CC-P individuals was targeted at 500. The target number of CC-P individuals in each age group and sex was based on national statistical reports of Japan (8) (Figure 1).

### Statistical analysis

The data were analyzed using logistic regression. A *P* value of 0.05 or less was considered statistically significant.

## RESULTS

### Rates of LODD in individuals with and without CC

A total of 20,986 participants were included during the 10 days of our survey. Of these, 2,587 participants (1,036 men and 1,551 women, mean age of 51.0 years) met the Rome IV criteria for FC but not for IBS and were included in the CC group. The same number of age-/sex-matched participants who did not meet the Rome IV FC and IBS criteria and did not report either constipation or diarrhea was randomly included in the non-CC control group. The rate of LODD in the CC group was significantly higher than in the non-CC control group (57.4% vs 8.3%,  $P < 0.001$ ; odds ratio [OR] 14.84 [95% confidence interval 12.65–17.42]) (Table 1). The rate of LODD was higher in CC individuals than non-CC controls in all age groups (Figure 2).

In the CC group, LODD was higher in female participants. Individuals in their 40s had the highest rate of LODD, whereas individuals in their 70s had the lowest rate (Figure 3).

### Impact of treatment in LODD and satisfaction

A total of 443 participants in the CC group were receiving treatment for their constipation and were included in the CC-P group. Of the total 443 individuals in the CC-P group, 285 (64.3%) reported LODD before initiation of treatment. The rate of LODD on treatment was 27.1% (120/443) (Table 2).

Only 48.3% of CC-P individuals stated that they were satisfied or somewhat satisfied with treatment. More than half were not satisfied with their current treatment (i.e., dissatisfied or somewhat dissatisfied) (Table 3). Among the CC-P individuals who reported LODD before initiation of treatment, the satisfaction rate was significantly lower in those with persistent LODD (25.9%, 28/108) than those with improved LODD (56.5%, 100/177) on treatment condition ( $P < 0.001$ , OR 2.48 [1.39–4.43]). As well, the number of BMs ( $\geq 3$ /wk) was significantly lower in those with persistent

**Table 2.** LODD rates before initiation of treatment and on treatment in CC-P individuals

	LODD (+) on treatment	LODD (-) on treatment	
LODD (+) before initiation of treatment	108	177	285 (64.3%)
LODD (-) before initiation of treatment	12	146	158 (35.7%)
	120 (27.1%)	323 (72.9%)	443

CC-P, CC with prescription; LODD, loss of defecation desire.

LODD (32.4%, 35/108) than those with improved LODD (77.3%, 136/177) on treatment ( $P < 0.001$ , OR 6.31 [5.23–7.61]) (Table 4).

Other results are shown in Supplementary (see Table 5, Supplementary Digital Content 1, <http://links.lww.com/CTG/A370>, see Table 6, Supplementary Digital Content 2, <http://links.lww.com/CTG/A371>).

## DISCUSSION

LODD can lead to infrequent BMs, hard stools, and abdominal bloating, the main complaints of individuals with constipation (see Supplementary, Supplementary Digital Content 3, <http://links.lww.com/CTG/A381>). This study, which is the first survey focusing on the DD, is of great clinical importance. We found the prevalence of LODD was more common in CC individuals than non-CC controls (OR 14.8), and the rate of LODD was lower in individuals receiving treatment for CC (CC-P) than CC individuals who were not receiving treatment. However, more than half of CC-P individuals were not satisfied with treatment. Satisfaction is especially low among persistent-LODD individuals regardless of treatment. Improvement of DD is associated with treatment satisfaction and increased BMs.

The rectum is normally an empty lumen. Once the stool is transported from the sigmoid colon to the rectum, rectal wall distension triggers signals that are transmitted to the brain, ultimately producing DD (9), which is essential as a trigger for evacuation. Therefore, reduced fecal transport to the rectum, increased rectal compliance, and/or rectal hyposensitivity (RH) can cause LODD (10). Depending on the pathophysiology, CC is classified according to 3 types: normal transit constipation, slow transit constipation (STC), and defecation disorder (DeD). Of these, STC,

which occurs most commonly in young women, is especially associated with a reduction of fecal transport to the rectum because of the severely delayed colonic transit (11,12). Therefore, STC may cause LODD. However, recent rectal balloon expulsion and manometry study proved an association with DeD and RH, but not with delayed colonic transit and RH (13). Other balloon study showed the relationship between RH and higher thresholds for inducing recto-anal reflexes and abnormal characteristics of sensorimotor response (10). Considering these findings, individuals with LODD may be more likely to have DeD than STC.

More than half of CC-P individuals were dissatisfied with their current treatment, although the rate of LODD had improved because of medical treatment. Therefore, in clinical practice, it is important to carefully consider the reasons why patients with CC cannot obtain satisfaction with current treatment (e.g., stool hardness, infrequent BMs, inability to evacuate despite the presence of DD, and so on). However, this study confirms that low treatment satisfaction is certainly related to a lack of improvement in DD because the satisfaction rate was particularly low in individuals with persistent LODD than in those with improved LODD. Therefore, improvement in LODD is essential for treatment satisfaction.

Some limitations exist in this study. First is the lack of pathophysiological classification; specific examinations including radiopaque marker studies, anorectal manometry, and defecography are necessary for pathologic differentiation. However, this was a simple online questionnaire study, and we did not perform these investigations; therefore, pathophysiological classification was impossible. Second is the fewer number of CC-P individuals than targeted. In this study, we set the target number of CC-P individuals before enrollment, based on the national statistical report. However, as a result, fewer participants aged 70 years and older than planned were included. The reason for this is presumed to be that older people, especially women, are less familiar with the Internet than younger and male participants. Third is the CC-P individuals' unreliable recall of their bowel symptoms before initiation of treatment. Some part of CC-P individuals might have had to recall their bowel symptoms of many years ago, which could be unreliable. Fourth is the possibility of selection bias among participants. In this study, we preferentially enrolled participants who would be assigned to CC-P individuals, to ensure sufficient number of CC-P participants. Therefore, CC individuals (individuals with self-report of constipation symptom and met the FC criteria) may include more participants who received treatment at a medical institution than real-world populations. However, as a result, we were able to perform an effective survey of CC-P individuals in which the population was nearly consistent with current trends in Japan.

**Table 3.** Satisfaction with treatment in CC-P individuals

	Satisfied	Slightly satisfied	Slightly dissatisfied	Dissatisfied	Total
	Satisfaction		Dissatisfaction		
Male	17 (10.4%)	61 (37.2%)	62 (37.8%)	24 (14.6%)	164
Female	44 (15.8%)	92 (33.0%)	103 (36.9%)	40 (14.3%)	279
Total	61 (13.8%)	153 (34.5%)	165 (37.2%)	64 (14.4%)	443
	214 (48.3%)		229 (51.7%)		

CC-P, CC with prescription.

**Table 4.** Difference in the satisfaction rate and BMs between persistent LODD and improved LODD in CC-P individuals

	Persistent LODD n = 108	Improved LODD n = 177	P value	OR (95% CI)
Satisfaction rate	25.9% (28/108)	56.5% (100/177)	<0.001	2.48 (1.39–4.43)
BMs (≥3/w)	32.4% (35/108)	77.3% (136/177)	<0.001	6.31 (5.23–7.61)

Persistent LODD, LODD persisted in treatment condition.  
Improved LODD, LODD improved in treatment condition.  
BM, bowel movement; CC-P, CC with prescription; CI, confidence interval; LODD, loss of defecation desire; OR, odds ratio.

In conclusion, LODD was more common in CC individuals than non-CC controls, and treatment decreased the LODD rate in individuals with CC. However, satisfaction is very low among persistent-LODD individuals, so improvement in LODD is essential for treatment satisfaction. In clinical practice, we should pay more attention to DD when treating patients with CC.

### CONFLICTS OF INTEREST

**Guarantor of the article:** Atsushi Nakajima, MD, PhD.

**Specific author contributions:** H.O. designed this study and wrote the manuscript. T.T., T.Y., N.M., K.A., A.F., T.M., T.H., H.M., and T.O. were responsible for the data collection. K.Y. was responsible for statistical analysis. A.L. reviewed the manuscript. A.N. supervised the study.

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**Potential competing interests:** H.O. received research funding from Mochida Pharmaceutical Co., Ltd.

## Study Highlights

### WHAT IS KNOWN

- ✓ Treatment satisfaction is low among individuals with CC.
- ✓ DD is a key component of defecation physiology.
- ✓ Little is known of DD prevalence rate in health and in individuals with CC or its relationship with treatment satisfaction.

### WHAT IS NEW HERE

- ✓ LODD is common in CC.
- ✓ Satisfaction was significantly lower in CC with persistent LODD than those with improved LODD after treatment.
- ✓ Improvement in LODD seems to be an important component of treatment satisfaction.

### TRANSLATIONAL IMPACT

- ✓ DD will be used as a novel treatment endpoint in future clinical practice.

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