

ORIGINAL ARTICLE

Management of bowel dysfunction in the community after spinal cord injury: a postal survey in the Republic of Korea

JY Kim¹, ES Koh¹, J Leigh¹ and H-I Shin^{1,2}

Study design: A cross-sectional postal survey.

Objectives: To describe defecation stimulation methods and their outcomes, and to investigate the impact of bowel dysfunction on the quality of life (QoL) in community-dwelling persons with spinal cord injury in South Korea.

Setting: Community-based, Korea.

Methods: A cross-sectional postal survey was conducted. Questionnaires were sent to 459 chronic spinal cord injury (SCI) patients who were registered as members of the Korean Spinal Cord Injury Association. Defecation stimulation methods and their outcomes, the impact of bowel dysfunction on the QoL were investigated.

Results: A total of 388 subjects (44.5 ± 10.8 year of age; men, 76.0%; duration of time since the onset of SCI, 14.2 ± 9.5 years) responded. Bowel-related general, social and home QoL deterioration was found in >60%. Suppositories (Supp) were most frequently used, followed by digital rectal stimulation (DRS). The mini enema (ME), which is exclusively used in Korea, was utilized in 18.8%. A defecation time of 30 min was more frequently reported in patients who stimulated defecation with Supp than in those who used DRS.

Conclusions: The use of MEs and warm-water irrigations were newly identified in Korea. Bowel care-related factors that greatly deteriorate the QoL were fecal incontinence, time in one defecation >60 min, perianal skin problem, flatus incontinence and hemorrhoids. Alleviating these factors might help to improve the QoL. In particular, stimulation methods to reduce time for defecation might be recommended to persons with chronic SCI.

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Keywords: spinal cord injury; neurogenic bowel; quality of life; defecation; enema

INTRODUCTION

Bowel dysfunction and the associated problems in persons with spinal cord injury (SCIPs) have been increasingly recognized as important factors in community reintegration and quality of life (QoL).^{1–4} In community-dwelling spinal cord injury (SCI) in the United Kingdom, bowel dysfunction exerts even greater impact on the QoL than bladder function, wheelchair use and pain.²

Managements of neurogenic bowel include facilitating defecation by chemical or physical stimulations, positioning and preparing for defecation. Stimulations consist of digital rectal stimulation (DRS), manual evacuation, suppositories (Supp), and small- or large-volume enemas (LVEs).⁵

Defecation stimulation including DRS is usually started during acute rehabilitation; however, various other stimulation methods are used by chronic SCIPs. In Korea, DRS, manual evacuation and Supp were reported to be used in 34.7, 18.1 and 15.1% of such patients.⁶

Surveys on the methods of bowel care are limited and rare in Korea.⁶ Furthermore, the impact of defecation stimulation methods on the QoL may be influenced by society's socioeconomic and cultural aspects.

The purpose of this study was to describe defecation stimulation methods, their outcomes and the impact of bowel dysfunction on the QoL in community-dwelling persons with chronic SCI in Korea.

METHODS

A postal cross-sectional survey was conducted in Korea in 2008. All community-dwelling SCIPs registered at the Korean Spinal Cord Injury Association at the start of survey were included. Questionnaires were sent to 459 patients, and 388 responded (response rate, 84.5%). The demographic characteristics of the subjects are shown in Table 1.

A self-reported questionnaire was sent to each patient by mail. It included questions on demographic characteristics, bowel stimulation methods, their outcomes and impact of bowel dysfunction on the QoL. Ten patients were randomly selected, and questionnaire was tested. Subjects were asked to point out unclear expressions or unrealistic questions and answers. Test–retest validation was performed in another 10 subjects. Face-to-face and telephone interview were performed in each patient in order to investigate whether results from the two interviews were congruent with each other. There was no incongruence in any items in the questionnaire.

Demographic characteristics

Age, sex, types of SCI and duration of time since injury were recorded. The types of SCI were categorized as motor complete tetraplegia, motor incomplete tetraplegia, motor complete paraplegia and motor incomplete paraplegia.

Defecation stimulation methods

DRS, Supp, mini enema (ME), LVE, finger evacuation (FE) and normal defecation without any procedures were given as choices of defecation stimulation methods. Respondents who use other methods were asked to specify and describe them. Pictures of a ME (Figure 1) and a LVE, those could be purchased

¹Department of Rehabilitation Medicine, Seoul National University College of Medicine, Seoul, Republic of Korea and ²Seoul National University Bundang Hospital, Seongnam, Republic of Korea

Correspondence: Professor H-I Shin, Department of Rehabilitation Medicine, Seoul National University College of Medicine, Seoul National University Bundang Hospital, 166 Gumi-ro, Bundang-gu, Seongnam, Gyeonggi-do 463-802, Republic of Korea.

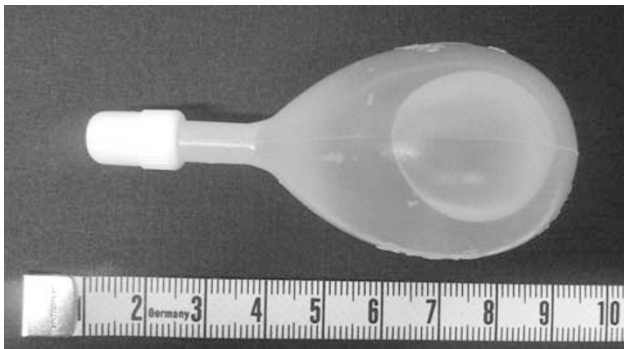
E-mail: hyungik1@snu.ac.kr

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Table 1 Demographic characteristics

Age (years)	44.5 ± 10.8
Duration of SCI (years)	14.2 ± 9.5
<i>Gender (number of the persons (%))</i>	
Male	294 (76.0)
Female	94 (24.0)
<i>Types of SCI (number of the persons (%))</i>	
Motor complete tetraplegia	66 (17.0)
Motor incomplete tetraplegia	54 (13.9)
Motor complete paraplegia	142 (36.6)
Motor incomplete paraplegia	100 (25.8)
Unknown	26 (6.7)
<i>Causes of SCI</i>	
Trauma	360
Disease involving the spinal cord	28

Abbreviation: SCI, spinal cord injury.

**Figure 1** ME available in Korea.

at pharmacies, were enclosed to minimize confusion. Defecation locations were asked: beds, toilets, diapers, chamber pots, bedpans, commodes or toilet stools. The magnitude of assistance required to transfer them to these locations, and that needed for defecation itself were asked: independently, with one person's help and with help of ≥ 2 persons. As for the assistance needed for transferring, no transfer needed was given as an additional choice. Patients were also asked whether they used oral medications to facilitate defecation.

Bowel management outcomes

Items concerning bowel management outcomes were: frequency of bowel movements (FBM); time taken in one defecation; symptoms of autonomic dysreflexia (AD); frequencies of fecal incontinence (FFI); flatus incontinence; perianal skin problems; and hemorrhoids. These items are known to influence the QoL significantly. Choices for FBM included every day, every other day, 1–3 times a week and < 1 time a week. Time taken in one defecation was selected from one of the following: < 5 min, 6–15 min, 16–30 min, 31–60 min and > 60 min. Answers to FFI were given as follows: none, several times a year, 1–3 times a month, 1–6 times a week and everyday.³ Headache, sweating and discomfort during defecation were given as examples for symptoms of possible AD. These symptoms, flatus incontinence, perianal skin problems and hemorrhoids were asked as present or absent.

Impact on the QoL

The QoL was categorized as general, social and home QoL.³ The impact of bowel dysfunction on QoL deterioration was graded on the 5 Likert scales. Subjects were asked as follow: 'How much does defecation make your life hard?' 'How much does defecation restrict social activities?' and 'How much does defecation make your life hard at home?' Answers to these questions

Table 2 Number (%) of the persons using each defecation stimulation method

<i>Defecation stimulation methods</i>	<i>Number of the subjects</i>
Without stimulation	93 (25.1)
<i>Single method</i>	
Supp	101
Digital rectal stimulations	57
Mini enemas	41
LVEs	12
Finger evacuations	12
Warm-water irrigations	4
Others	5
<i>Combined methods</i>	
Digital rectal stimulations+finger evacuations	13
Supp+finger evacuations	7
Digital rectal stimulations+Supp	6
Mini enemas+finger evacuations	6
LVEs+warm-water irrigations	3
Supp+mini enemas	3
Digital rectal stimulations+LVEs	2
Supp+warm-water irrigations	1
Mini enemas+LVEs	1
Digital rectal stimulations+mini enemas+finger evacuations	1
Supp+LVEs+finger evacuations	1
Digital rectal stimulations+Supp+LVE+finger evacuations	1

Abbreviations: LVE, large-volume enema; Supp; suppositories.

were recorded as not at all, mildly, moderately, severely and completely. These 5 levels of magnitude were in accordance with the qualifier system used in the International Classification of Function, Disability and Health.⁷

Statistical analysis

Data were analyzed using the SPSS for windows version 17.0. (SPSS Inc., Chicago, IL, USA). Differences in bowel stimulation methods, their outcomes and QoL were compared using the Pearson's χ^2 test or the Fisher's exact test. The Bonferroni correction was applied for multiple significance tests between bowel management outcomes of two different stimulation methods. The impact of bowel dysfunction on the QoL was investigated using the logistic regression analysis. A P value < 0.05 was considered to be statistically significant.

RESULTS

Defecation stimulation methods

Defecation stimulation methods were reported by 370 patients. Defecation without stimulation was reported in 24.3% of the respondents. One stimulation method was used by 59.8%, and two or more methods by 11.6% of the respondents (Table 2). Besides our examples, five respondents (1.3%) reported warm-water transanal irrigation^{8–11} as their sole stimulation method. Reported stimulation methods were Supp in 120 respondents (43.3%), DRS in 81 (29.2%), ME in 52 (18.8%), FE in 41 (14.8%), LVE in 20 (7.2%), warm-water irrigation in 8 (2.9%) and unspecified in 6 (2.2%), when combined usages were inclusive. One hundred and thirty-two (35.0%) used oral medications to facilitate defecation.

MEs available in Korea are unique, which delivers 20 ml of glycerin via a small rubber-made device (Figure 1). The thin part of the device is inserted into the rectum, and the round part of the device is squeezed to inject enema fluid into the rectum.

Table 3 Difference in defecation stimulation methods according to the characteristics of the participants with spinal cord injury

	<i>Tetraplegia</i>	<i>Paraplegia</i>	<i>P-value</i>	<i>Complete SCI</i>	<i>Incomplete SCI</i>	<i>P-value</i>	<i>Male</i>	<i>Female</i>	<i>P-value</i>
	<i>Number of the subjects (%)</i>	<i>Number of the subjects (%)</i>		<i>Number of the subjects (%)</i>	<i>Number of the subjects (%)</i>		<i>Number of the subjects (%)</i>	<i>Number of the subjects (%)</i>	
Digital rectal stimulations	12 (14.8)	42 (31.8)	0.10	38 (29.7)	16 (18.8)	0.01*	48 (27.1)	9 (20.0)	0.35
Suppositories	46 (56.8)	51 (38.6)	<0.01*	52 (40.6)	45 (52.9)	0.66	79 (44.6)	22 (48.9)	0.93
Mini enema	19 (23.5)	20 (15.2)	0.05*	22 (17.2)	17 (20.0)	0.58	29 (16.4)	11 (24.4)	0.65
Large-volume enemas	2 (2.5)	10 (7.6)	0.42	7 (5.5)	5 (5.9)	0.56	10 (5.6)	2 (4.4)	1.00
Finger evacuation	2 (2.5)	9 (6.8)	0.42	9 (7.0)	2 (2.4)	0.06	11 (6.2)	1 (2.2)	0.59
Total	81 (100)	132 (100)		128 (100)	85 (100)		177 (100)	45 (100)	

Abbreviation: SCI, spinal cord injury.
* $P < 0.05$ by the χ^2 test or the Fisher's exact test.

Table 4 Location, posture and magnitude of assistance for neurogenic bowel management

	<i>Number of the subjects (%)</i>
<i>Locations for bowel management</i>	
Toilet stools or commodes in toilets	289 (80.1%)
Diapers in bed	26 (7.2%)
Chamber pot or bedpan	21 (5.8%)
Commode in a room	25 (6.9%)
<i>Posture</i>	
Sitting	312 (85.0%)
Lateral decubitus	55 (15.0%)
<i>Assistance required to a transfer and preparation for defecation</i>	
Independent	191 (51.9%)
One person	134 (36.4%)
More than two persons	12 (3.3%)
No transfer needed	31 (8.4%)
<i>Assistance for defecation itself</i>	
Independent	230 (63.2%)
One person	122 (33.5%)
More than two persons	12 (3.3%)

Patients with tetraplegia used Supp and ME more frequently than those with paraplegia. DRS and FE were used more frequently in persons with complete motor lesion than in those with incomplete motor lesion. Defecation stimulation methods were not significantly different between men and women (Table 3).

Toilet stools/commodes in toilets were used in 80.1% of the respondents, with sitting posture in 85%. Magnitude of assistance was ≥ 1 person in 39.7% to a transfer and preparation for defecation and 36.8% to defecation itself (Table 4).

Bowel management outcomes

Bowel management outcomes are shown in Table 5. There were significant differences in management outcomes between individual defecation stimulation method users. Outcomes were graded to stress clinical significance. Differences were detected in an FBM <1 per week, time taken in one defecation longer than 30 or 60 min, fecal incontinence >1 per week and presence of hemorrhoids between individuals using six different stimulation methods (Table 6). A defecation time of >30 min was more frequently reported in

Table 5 Outcomes of neurogenic bowel managements

	<i>Number of the subjects (%)</i>
<i>The frequency of bowel movements</i>	
Everyday	85 (21.9%)
Every other day	98 (25.6%)
1–3 times a week	152 (39.7%)
<1 per week	48 (12.5%)
<i>Time in one defecation</i>	
<5 min	46 (12%)
6–15 min	98 (25.6%)
16–30 min	105 (27.5%)
31–60 min	100 (26.2%)
>60 min	33 (8.6%)
<i>Frequency of fecal incontinence</i>	
Never	126 (33.2%)
Several times per year	156 (41.2%)
1–3 times per month	49 (12.9%)
1–6 times per week	23 (6.1%)
Everyday	25 (6.6%)
Presence of flatus incontinence	167 (51.7%)
Generalized discomfort during defecation	160 (42.0%)
Perianal skin problems	75 (19.7%)
Hemorrhoids	118 (30.8%)

suppository users than in DRS users (55.6 versus 29.8%, $P=0.0032$ by the Fisher's exact test). No other variables were found to be significantly different between individual stimulation methods in multiple significance tests using the Fisher's exact test ($P < 0.0033$ was set as a significant level).

Bowel care and QoL

Deterioration of generalized QoL due to defecation was greater than moderate degrees in 64.3% of the respondents. It was 66.5 and 62.5% in social and home QoL. As for severely lowered QoL, 34.4, 33.5 and 30.9% of the respondents were reported in generalized, social and home QoL, respectively.

Differences in QoL deterioration according to bowel management outcomes were analyzed. Each bowel management outcome was dichotomized as follows: everyday versus less frequent movements, every other day versus less frequent movements and so on. Deterioration in each QoL was also divided into severe or less. There were

Table 6 Difference in bowel management outcomes between each stimulation method users

	Frequency of bowel movements			Time taken in one defecation						Frequency of fecal incontinence			Presence of hemorrhoids		
	≥ 1 per week	< 1 per week	Total	≤ 30 min	> 30 min	Total	≤ 60 min	> 60 min	Total	< 1 per week	≥ 1 per week	Total	Yes	No	Total
	Digital rectal stimulations	53	4	57	40	17	57	56	1	57	47	10	57	19	38
Suppositories	89	11	100	44	55	99	82	17	99	93	6	99	33	68	101
Mini enemas	31	10	41	25	16	41	37	4	41	32	7	39	18	22	40
Large-volume enemas	8	4	12	6	6	12	10	2	12	10	2	12	8	3	11
Finger evacuations	8	4	12	5	7	12	10	2	12	8	4	12	2	10	12
Warm-water irrigation	4	0	4	2	2	4	4	0	4	4	0	4	0	4	4
Total	193	33	226	122	103	225	199	26	226	194	29	223	80	145	225
P-value			0.01			0.04			0.04			0.03			0.03

significant differences in general, social and home QoL deterioration according to the grades of bowel management outcomes by the χ^2 test: FBM, time taken in one defecation, FFI, presence of flatus incontinence, symptoms of possible AD, perianal skin problems and hemorrhoids. These variables were included in the logistic regression models, and stepwise forward selections of the variables were conducted. Dependent variables were severely lowered general, social and home QoL for each logistic regression model. Independent variables included in all three final models were FFI, perianal skin problem, flatus incontinence and hemorrhoids. Time for one defecation had a significant influence on general and home QoL, and symptoms of possible AD was associated with lower home QoL. Frequency of fecal incontinence had the greatest effects on QoL. When patients had fecal incontinence everyday, they had 67.40 times greater chance to obtain severely lowered general QoL (Table 7). Time taken in defecation > 60 min, presence of perianal skin problem and flatus incontinence followed FFI (Table 7).

QoL deterioration differs between each stimulation users. Decline in general QoL was greater in LVE users than in DRS users. Social QoL deterioration was much profound in LVE users than in DRS or FE users. QoL at home was lower in patients using LVE than in those using other methods. ME users had worse QoL at home than DRS users (Figure 2).

DISCUSSION

This is the first study to survey the status of bowel care and its relationship with the QoL in community-dwelling chronic SCIPs in Korea.

The response rate was 84.5%, and it is much higher than those reported in previous studies,^{2,12-14} even though this was a postal survey using self-reported questionnaire. It may be owing to the fact that authors had taken on-line and off-line counseling and education in the Korean Spinal Cord Injury Association for 5 years.

Defecation stimulation methods

Our survey revealed that 18.8% of community-dwelling SCIPs used 20-ml glycerin enemas, which has not been previously reported. Small-volume enema was defined as 4 ml of glycerin,⁵ and ME, or clysmas, as ≤ 150 ml.¹⁵ Thus, ME frequently used in Korea (20 ml) was classified as a type of ME.

Suppository was the most frequently used method. It was adopted in 43.2% of the respondents as one of the combined stimulation methods. This rate was similar to that reported in a previous survey.¹⁵

DRSs were used in 29.2% of respondents. This ratio was lower than those published previously (59.6¹⁶ and 53%¹⁷). Neurogenic bowel cares, including DRS, had not been covered by the National Health Insurance of Korea until 2010. This policy would explain the lower proportion of SCIPs using DRS: because there was no coverage for educating and performing DRSs, prescribing Supp or enemas may have been preferred.

Eight respondents (2.9%) used warm-water transanal irrigation to stimulate defecation by pouring 500 to 1000 ml of warm water into the rectum, using a simple LVE set. Transanal irrigation is a well-described bowel management method;⁸⁻¹¹ however, patients in this study had learned this method not from medical personnel, but from peer SCIPs. No one used the commercially available Peristeen Anal Irrigation System.¹⁸

Colostomy has been reported in 2.4¹ and 7.3%¹⁷ of SCIPs in previous studies, but there was no respondent with colostomy in our survey. Koreans tend to avoid undergoing colostomy unless it is inevitable. No colostomy for SCI-induced neurogenic bowel has been reported in a previous study conducted in Korea, neither.⁶ Although colostomy formation is a well-accepted treatment for neurogenic bowel dysfunction,¹ it may not usually be accepted in Korean culture. Perspectives on colostomy might be different between countries.¹⁹

Bowel management outcomes and QoL

In a previous study in Korea, gastrointestinal problems in chronic SCIPs were reported to be as high as 62.5%, which included constipation, pain during defecation, fecal incontinence and urgency.⁶ These problems resulted in the deterioration of QoL in 80% and unhappiness in 62%.⁶ The results of our study showed moderate-to-severe deterioration in 62.6, 64.9 and 61.1% of the respondents in general, social and home QoL, respectively, similar to those reported in previous studies.

In SCIPs, bowel dysfunction is a cause of distress, and defecation time and FFI are associated with distress.¹⁶ Similarly, in our survey, these factors were associated with lower QoL. FFI significantly increased the risk of severely lowered QoL; the presence of flatus incontinence, perianal skin problems and hemorrhoids were also associated with lower QoL, as reported in a previous study.³

Discomfort before or at defecation, longer time spent on defecation and frequent fecal incontinence were items that significantly lowered QoL in persons with neurogenic bowel dysfunction.³ In our survey, present flatus incontinence was associated with lower social QoL, as shown in the previously mentioned study.³ AD arising from the

Table 7 Logistic regression models for factors associated with severely lowered generalized, social and home QoL

	Exp(B)	P-value	95% CI for Exp(B)
<i>Severe deterioration in generalized QOL</i>			
Perianal skin problem*	2.13	0.03	1.09–4.14
Flatus incontinence*	2.25	0.01	1.28–3.96
<i>Time in one defecation*</i>			
≤5 min		<0.01	1.00
6–15 min	1.55	0.53	0.39–6.15
16–30 min	2.91	0.11	0.77–10.99
31–60 min	3.33	0.08	0.87–12.73
> 60 min*	11.21	0.01	2.54–49.56
Hemorrhoids*	0.28	<0.01	0.15–0.50
<i>Frequency of fecal incontinence*</i>			
None		<0.01	1.00
Several times per year*	2.89	0.01	1.38–6.06
1–4 per month*	5.02	<0.01	2.00–12.58
1–6 per week*	14.40	<0.01	4.38–47.27
Everyday*	67.40	<0.01	12.95–350.76
Constant*	0.08	<0.01	
<i>Severe deterioration in social QOL</i>			
Perianal skin problem*	2.84	<0.01	1.45–5.56
Flatus incontinence*	1.83	0.04	1.04–3.22
Hemorrhoids*	0.33	<0.01	0.18–0.59
<i>Frequency of fecal incontinence*</i>			
None		<0.01	1.00
Several times per year	1.99	0.06	0.96–4.13
1–4 per month*	3.60	0.01	1.45–8.98
1–6 per week*	5.48	0.01	1.62–18.57
Everyday*	47.69	<0.01	9.02–252.07
Constant*	0.11	<0.01	
<i>Severe deterioration in QOL at home</i>			
General discomfort during defecation	1.73	0.07	0.96–3.09
Perianal skin problem*	2.50	0.01	1.28–4.91
Flatus incontinence*	1.85	0.03	1.05–3.25
<i>Time in one defecation*</i>			
≤5 min		0.01	1.00
6–15 min	0.78	0.69	0.22–2.76
16–30 min	1.71	0.38	0.52–5.68
31–60 min	1.85	0.32	0.55–6.29
> 60 min*	4.92	0.02	1.24–19.46
Hemorrhoids*	0.32	<0.01	0.18–0.58
<i>Frequency of fecal incontinence*</i>			
None		<0.01	1.00
Several times per year	2.00	0.06	0.97–4.11
1–4 per month*	2.69	0.04	1.07–6.75
1–6 per week*	6.95	0.01	2.23–21.72
Everyday*	26.87	<0.01	7.10–101.59
Constant*	0.12	<0.01	

Abbreviations: CI, confidence interval; QoL, quality of life.
 *P-value <0.05.

gastrointestinal tract accounted for 43% in chronic SCIPs, which had impact on lifestyle.²⁰ Symptoms of possible AD were found in 42% in this survey, however, were not associated with lower QoL.

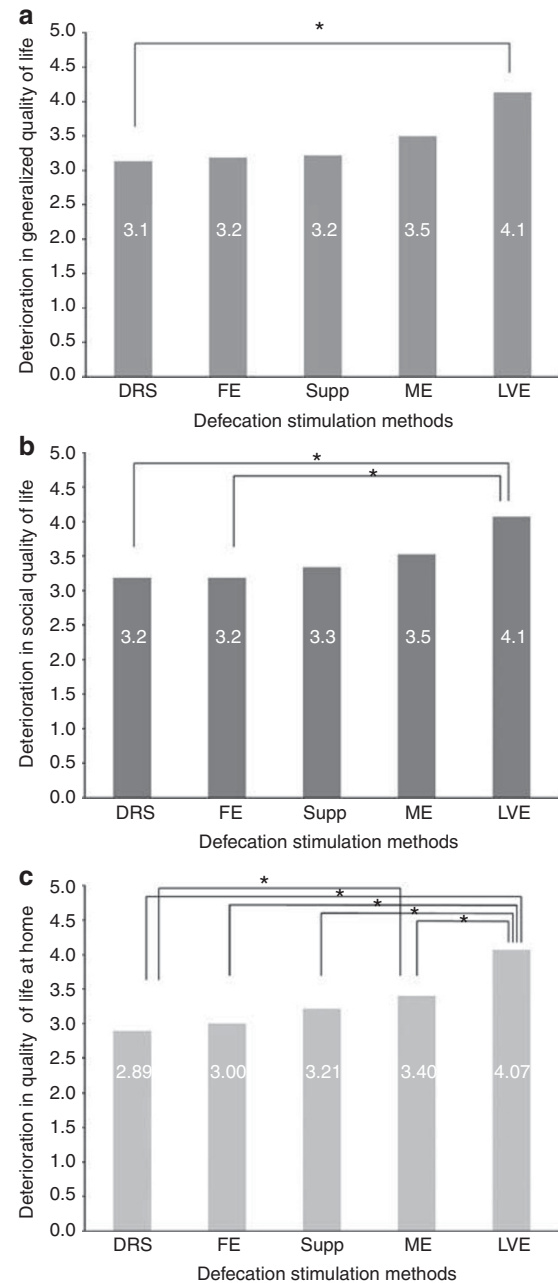


Figure 2 QoL deterioration in different defecation stimulation users. QoL was categorized as generalized (a), social (b) and home (c). *P<0.05.

As self-reported questionnaire was used, examples given as ‘headache, sweating or discomfort’ might be read as minor symptoms rather than those of AD.

In individual stimulation method users, LVE users had significantly lower QoL than DRS users did. In contrast, DRS users had the greatest QoL. LVE users might have more severe neurogenic bowel than DRS users, because they might have adopted LVE as other stimulation methods were not helpful to them. DRS is usually tried in acute rehabilitation setting, but patients not responsive to it may try other stimulation methods such as Supp or LVE. Transanal^{8–11} or antegrade colonic irrigation,²¹ which is safe and successful method for neurogenic bowel, might be recommended as alternatives to LVE.

Limitations

The subjects of our survey were members of the Korean Spinal Cord Injury Association, which is a non-government organization. Selection bias may have existed because they are likely to be more socially active than those unregistered. If socially isolated SCIPs were indeed excluded, our subjects may not be representative of the entire cohort of community-dwelling SCIPs in Korea. The subtypes of SCI could not be defined by the ASIA impairment scale because this survey used self-reported questionnaire without reference to medical records. Therefore, lower motor neuron-type injury could not be discerned from upper motor neuron injury.

CONCLUSIONS

In community-dwelling chronic SCIPs in Korea, bowel care had a significant impact on QoL as previously reported in other countries. A novel ME and warm-water irrigation were identified in this survey. Bowel care-related factors that influenced the QoL included FFI, perianal skin problems, hemorrhoids, flatus incontinence and defecation time > 1 h. Bowel dysfunction interventions may contribute to the improvement of the QoL in SCI patients. One way to overcome this challenge may be to reduce FFI, perianal skin problems and hemorrhoids. Efforts to reduce time taken in defecation may also be needed to improve bowel-related QoL. As Supp users more frequently showed defecation time > 1 h than DRS users, encouraging other methods, such as transanal or antegrade colonic irrigation, might help to reduce defecation time and subsequent deterioration of QoL in chronic SCIPs.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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