

Review

Effectiveness of Pelvic Floor Muscle Training for Treating Faecal Incontinence

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Abstract: The purpose of this study is to examine the effect of pelvic floor muscle training on faecal incontinence. Faecal incontinence is a condition in which stool leaks from the anus involuntarily or uncontrollably. Faecal incontinence is common in elderly people and patients with underlying diseases, but the pathophysiology of faecal incontinence is diverse, and treatment methods must be varied accordingly. Among the known treatment methods, in this study, we focused on pelvic floor muscle training, which can be performed in daily life. The literature was searched for papers that present existing knowledge and address current perspectives. Extracted studies included papers that report scientific consensus. After reviewing the literature, it appears that it is possible to effectively train patients to defecate twice a day, approximately 30 min after breakfast and dinner, by having them attempting to defecate, even when there is no such urge. Pelvic floor muscle training can improve urinary and faecal incontinence by strengthening the contractile force of the pelvic floor muscles such as the external anal sphincter and levator ani. However, the specific types of faecal incontinence patients that can effectively benefit from pelvic floor muscle training is unclear. It is important for patients to understand the pelvic floor muscle training program and to develop sufficient motivation to continue training at home.

Keywords: pelvic floor muscle training; faecal incontinence; elderly individuals; conservative therapy



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1. Introduction

1.1. Definition of Faecal Incontinence

Stool leakage is a symptom of faecal incontinence. The International Consultation on Incontinence (ICI) distinguishes between anal and faecal incontinence. Anal incontinence is defined as “the involuntary loss of flatus, liquid or solid stool that is a social or hygienic problem” [1], and this can be seen as a definition of faecal incontinence that can be treated. On the other hand, faecal incontinence is also defined as “the involuntary loss of liquid or solid stool that is a social or hygienic problem” or as anal incontinence minus gas incontinence [2,3]. The American Society of Colon and Rectal Surgeons (ASCRS) defines faecal incontinence as “the uncontrolled passage of faeces or gas over at least 1 month’s duration, in an individual of at least 4 years of age, who had previously achieved control”. This definition does not distinguish between faecal incontinence and gas incontinence and includes age and the symptomatic period [4–6]. The American College of Gastroenterology (ACG) defines faecal incontinence as “either the involuntary passage or the inability to control the discharge of faecal matter through the anus” [7,8]. This definition does not include factors such as social background, age, or duration of symptoms; excludes gas incontinence; and is almost in line with the Japanese definition.

1.2. Faecal Incontinence in Patients

Faecal incontinence is defined as the involuntary leakage of solid or liquid stool, and many patients may not spontaneously report symptoms due to embarrassment. Risk factors for faecal incontinence include bowel disorders, especially diarrhoea, trauma to

the anal sphincter, rectal urgency, and chronic disease burden. Other risk factors include neurological disorders, inflammatory bowel disease, and anatomical disorders of the pelvic floor.

Faecal incontinence is classified by its type, aetiology, and severity, based on the frequency, amount, consistency, and nature of stool leakage. Pelvic floor muscle training to prevent faecal incontinence should be combined with daily bowel habit control, along with pharmacological and dietary therapy. A combination of dietary and lifestyle modifications, behavioural therapy (including biofeedback therapy), and pharmacological therapy for constipation and diarrhoea can be effective, especially for patients with mild faecal incontinence [9].

If simple measures are ineffective, anorectal manometry and other tests (endoanal imaging, defecography, rectal compliance and sensation, anal neurophysiological testing) are performed as necessary.

Faecal incontinence is a common, challenging, and stigmatized condition. Despite the availability of effective treatment options, most patients do not seek treatment. History and physical exam clues can help the healthcare provider establish a diagnosis. It is important to directly ask about the presence or absence of incontinence. Bowel disorders are a common trigger of symptoms and are among the easiest to treat. It is important to identify patients who may have faecal incontinence and to provide appropriate rehabilitation to prevent this condition [10].

2. Relevant Sections and Discussion

2.1. What Are the Characteristics of and Initial Treatments of Faecal Incontinence in Frail and Bedridden Elderly People?

The incidence of faecal incontinence in frail and bedridden elderly people is reportedly approximately 10% for those living at home and approximately 50% for those living in nursing facilities [11,12]. As discussed in subsequent sections, although faecal incontinence among residents is recognized in nursing homes, it is rarely seen directly as a problem, and institutional staff are not necessarily proactive about defecation care and treatment (Figure 1). Faecal incontinence has a negative impact on quality of life, makes independence difficult, and leads to social isolation [13]. However, treatment of faecal incontinence is often possible by understanding and evaluating the condition. The causes of faecal incontinence in frail patients are often neurogenic and involve conditions such as stroke [14], dementia, diabetes [15], and faecal embolism, as well as limitations in movement [16] and visual impairment. The initial treatment basically involves conservative therapy for faecal incontinence [17].

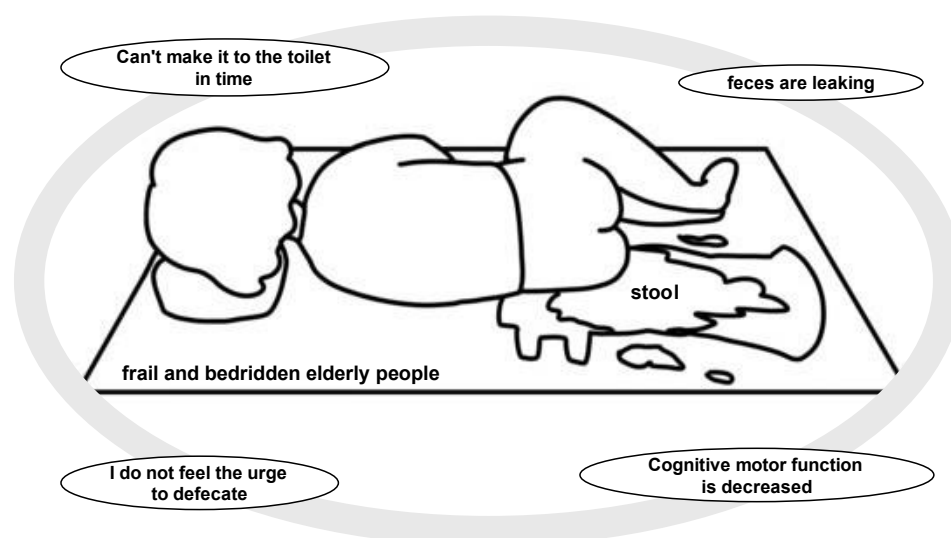


Figure 1. The real situation of faecal incontinence.

Faecal incontinence has a negative impact on quality of life, makes it difficult for individuals to be independent, and leads to isolation from society.

Treatment and prevention of faecal embolism are characteristic responses for frail and bedridden elderly people. There are many causes of faecal embolism in frail and bedridden elderly people, including prolonged periods of lying or sitting, low abdominal pressure during defecation, insufficient intake of water and dietary fibre, and metabolic factors such as hypothyroidism and hypokalaemia. Other aetiologies include diseases, the use of drugs that suppress gastrointestinal motility, and neurological conditions such as cerebral infarction and Parkinson's disease [18]. Faecal embolism occurs in elderly patients who have dementia or are bedridden in nursing care facilities [19]. Faecal embolism causes leaky faecal incontinence. It has been reported that more than 80% of nursing facility residents have a bowel movement less than twice a week, and that 71% have faecal incontinence [20].

To prevent faecal embolism, it is necessary for patients to learn about good defecation habits and to engage in regular, planned defecation. In a randomized controlled trial (RCT) of patients with faecal incontinence in nursing homes, faecal incontinence was significantly improved by faecal control and regular enemas [21]. On the other hand, a study investigating frailty reported that faecal incontinence is significantly improved by exercise and the induction of defecation [22]. In addition, convenient transportation to the toilet, the use of portable toilet bowls, and skin care using disposable pads are also necessary [23]. Bedridden elderly people need appropriate diaper care, but if they are unable to express their urge to defecate, their use of a bedpan to defecate reduces the burden on caregivers. It has been reported that anal plugs are useful for bedridden elderly people with diarrhoea [24]. Initial treatment is performed using these methods.

However, previous studies have not demonstrated the effectiveness of pelvic floor muscle training in frail or bedridden elderly people. The specific types of faecal incontinence patients that can benefit from pelvic floor muscle training is currently unknown. It is believed that faecal incontinence patients who are eligible for the program are those who can understand the content of the instruction and have sufficient motivation to continue the training. Therefore, the suitability of pelvic floor muscle training for frail or bedridden elderly people should be carefully considered.

2.2. Physiological Tests for Faecal Incontinence

2.2.1. Anorectal Pressure Test

A rectoanal internal pressure test is performed using a pressure measuring probe inserted transanally to measure the pressure within the rectum and anal canal. Various instruments are used for testing, and the device consists of a structure that measures the pressure from the sensor probe by connecting it to a recorder via a transducer. The tests are often performed with the subject in the left lateral position. Two types of pressure are measured: the internal pressure at rest and the internal pressure during contraction when the anus is closed [25]. The internal anal pressure is measured using a balloon inserted into the rectum; the internal pressure increases momentarily, then drops below the resting state, and finally recovers to near the resting internal pressure. This rising phenomenon is called the recto-anal excitatory reflex, and the decreasing and recovering phenomenon is called the recto-anal inhibitory reflex. Regarding the contribution of the internal and external anal sphincters to resting pressure, it has been reported that the external anal sphincter contributes 15% [26], but the remaining 85% does not come entirely from the internal anal sphincter. A decrease in resting internal pressure is also observed in male patients with faecal incontinence, but this pressure is said to be greater than that in women [27]. Additionally, A relationship has been found between symptoms and anal pressure [28]. If an anal sphincter disorder is the main cause of faecal incontinence, patients with leaky faecal incontinence will have decreased resting internal anal pressure, and patients with urge faecal incontinence will have decreased systolic internal pressure, leading to faecal incontinence.

2.2.2. Anorectal Sensory Test

Rectal balloon sensation testing is a testing method that objectively evaluates rectal sensation by inserting a balloon into the rectum, connecting it to a syringe that can measure volume, and inflating the balloon in stages. The capacity of the balloon is defined as the volume at which the subject first feels pressure in the rectum, the capacity at which the subject feels the urge to defecate, and the maximum tolerable rectal volume at the point at which the urge to defecate becomes urgent or the patient can no longer tolerate the pain. In patients with faecal incontinence, the balloon volume at which the urge to defecate is felt is lower than that in the control group, in which case the rectal sensation is in a state of hypersensitivity [29], and the rectal volume is also reduced [30]. Additionally, if the maximum rectal capacity is high, the rectal sensation is considered hyposensitive.

2.2.3. Anal Electromyography

This test is performed to evaluate the electrical activity of the external anal sphincter and puborectalis muscles. Measurements are performed with the patient in the left lateral position using surface or needle electrodes. A normal electromyogram shows that when the anal sphincter contracts or when the anal sphincter is contracted, a sufficient motor unit potential (MUP, electrical activity with a certain voltage and width) is detected in the external anal sphincter, allowing defecation. Sometimes, there is a disappearance or marked decrease in MUP. Decreased electrical activity during anal sphincter contraction or coughing suggests nerve fibre damage [31]. Patients with faecal incontinence often exhibit reduced electrical activity in the external anal sphincter and puborectalis muscles compared to that of the controls [32]. Furthermore, when electromyography was performed on patients with idiopathic faecal incontinence, abnormal findings were obtained in 65% of the external anal sphincters and 43% of the puborectalis muscles [29].

3. Daily Life Assistance to Prevent Faecal Incontinence in Patients

Daily life support for patients with faecal incontinence includes teaching them to refrain from consuming caffeine, citrus fruits, spicy foods, and alcohol, which have a softening effect on stool [33]. Dietary fibre supplements such as psyllium have been reported to reduce faecal incontinence by improving stool quality [34]. One RCT showed that faecal incontinence can be improved by consuming dietary fibre in addition to taking antidiarrheal drugs [35]. On the other hand, in an RCT in which elderly stroke patients with decreased physical strength were instructed to change their diet and fluid intake to regulate their bowel movements, it was found that although the number of normal bowel movements increased and faecal incontinence decreased, this improvement was not significant [36].

Different types of faecal incontinence, including leaky faecal incontinence, urgency faecal incontinence, or mixed faecal incontinence, were observed. The internal anal sphincter cannot consciously contract normally. If its function is impaired, stool leaks without being noticed, resulting in "leaky faecal incontinence". The external anal sphincter can normally contract consciously. If this function is impaired, the individual feels like they need to have a bowel movement, but the stool leaks before they reach the toilet. Thus, this becomes "imminent faecal incontinence" (Figure 2).

Guidance on bowel habits is important in the treatment of faecal incontinence. If the rectal sensation is normal, we recommend that the person go to the toilet as soon as possible, without holding back when they feel the urge to defecate. On the other hand, if rectal sensation is decreased, faecal incontinence can be significantly improved by systematically attempting to defecate, even if there is no urge to do so [37,38]. In other words, in frail or bedridden elderly people, if faeces continue to accumulate in the rectum without the urge to defecate due to decreased rectal sensation, overflow faecal incontinence may occur. In such cases, it may be effective to train such individuals to go to the toilet and defecate (stress defecation) twice a day, approximately 30 min after breakfast and dinner, even if they have no urge to defecate.

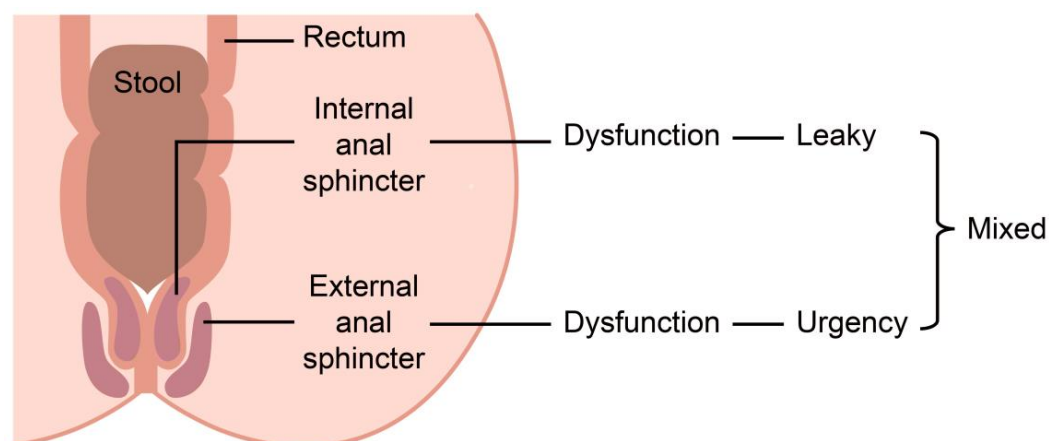


Figure 2. Leaky faecal incontinence, urgency faecal incontinence, or mixed faecal incontinence were observed.

Furthermore, nurse-led education and advice regarding defecation reduce faecal incontinence and are also beneficial for caregivers [38]. When faecal incontinence is difficult to manage, dermatitis, including skin erythema, erosion, ulceration, and fungal infection, may occur. Skin care regimens that moisturize and protect against mildly acidic cleansers, as well as the use of skin coating agents, can reduce the incidence of dermatitis associated with faecal incontinence. Anal indwelling catheters and wearable anal appliances are effective at reducing perineal skin inflammation [38].

4. Pelvic Floor Muscle Training for Patients

Pelvic floor muscle training is a method of improving urinary and faecal incontinence by strengthening the contractile force of the pelvic floor muscles, such as the external anal sphincter and levator ani muscles. However, the type of faecal incontinence patients that can effectively benefit from pelvic floor muscle training is unknown; moreover, it is important for the patient to understand the content of pelvic floor muscle training programmes and to be sufficiently motivated to continue pelvic floor muscle training at home. Most patients are eligible.

Pelvic floor muscle training is also called the Kegel [39] exercise. To train the pelvic floor muscles, the patient is instructed to contract the pelvic floor muscles for 10 s and then rest for 20 s while continuing to breathe without contracting the abdominal muscles. The patient is instructed to repeat this contraction 10 to 20 times, which is considered a set, and to perform three to five sets every day [40]. The guidance method may be limited to verbal or written explanations, but the therapist may also place their hands on the patient's abdominal muscles and instruct the patient not to put pressure on the abdominal muscles when contracting the pelvic floor muscles, or the therapist may perform a visual inspection. In some cases, the therapist may insert an index finger into the anus of the patient to confirm that the patient is actually engaging the pelvic floor muscles when they contract [40].

Most RCTs evaluating the effects of pelvic floor muscle training have evaluated this approach as a control group protocol for biofeedback (BF) therapy [40,41]. The effectiveness of pelvic floor muscle training for treating faecal incontinence ranges from 41% to 66%, and there are reports that this rate of effectiveness is lower than that of BF therapy [42], as well as reports that there is no significant difference between the therapies [43,44]. Therefore, although pelvic floor muscle training may have a lower efficacy rate than BF therapy, 41% of patients who did not improve with other conservative treatments received pelvic floor muscle training alone. Nonetheless, it has been reported that faecal incontinence improves in some cases [42], and pelvic floor muscle training is useful as a simple treatment method.

5. Is Pelvic Floor Muscle Training Effective for the Treatment of Urinary Incontinence?

Incontinence significantly deteriorates the quality of life of elderly people. Therefore, appropriate rehabilitation therapy for incontinence is necessary. Accordingly, a previous study has suggested the prevention of incontinence through pelvic floor muscle training [45].

The study reported the use of a three-month program of physical activity and training on ADLs for elderly people with urinary incontinence. A total of 98 residents were randomized, with 48 included in the intervention group and 50 in the control group. In the intervention group for physical activity, the ADL coaching included training on mobility, walking ability, balance, muscle strength, and endurance, as well as ADL training regarding meals and clothes. The dropouts from the research (including those resulting from death, transfer, and inadequate data) included 13 from the intervention group and 17 from the control group. Eventually, the urinary incontinence results, according to the 24 h pad test for the 35 members of the intervention group and the 33 patients in the control group, were compared. The urinary incontinence weight in the intervention group decreased from 576 g before intervention to 462 g after intervention, and that of the control group increased from 424 g to 653 g. The intervention group showed a statistically significant improvement in urinary incontinence [45].

A prior study conducted a 12-week intervention investigation for elderly women without urinary incontinence, combining physical activity training and behavioural therapy for urinary incontinence. The randomized study included 42 people living in apartments for the elderly, with 23 assigned to the intervention group and 19 to the control group. In the intervention group, 30 min per day of physical activity, along with weekly training using a resistance band, were required. Muscle training was provided, and instruction regarding urinary incontinence was provided for life guidance, including education on drinking water, pelvic floor muscle training, bladder training, and urination. The evaluation of urinary incontinence was performed using a urination diary and completion of the ICIQ, both before and 12 weeks after intervention. The number of urinary losses per day decreased by 50% in the intervention group, and the control group showed no change. According to the results from the ICIQ, the intervention group showed significant improvement in regards to items related to the number of urinary incontinence events per day and the frequency of urinary incontinence when compared to the results for the control group [46].

Another study investigated the effects of 12 weeks of pelvic floor training on elderly women with urinary incontinence. The target was 98 people diagnosed with mild cognitive decline and Alzheimer's disease, with an average age of 75.1 years. The cognitive function and behavioural symptoms were evaluated using the MMSE and the Barthel Index, and urinary incontinence was evaluated via a urination diary and the ICIQ-SF. The subjects were randomly divided into control and pelvic floor intervention groups, and 16 people dropped out during this process; the final 40 people assigned to the control group and the 42 assigned to the intervention group were exhibited comparable characteristics. After 12 weeks, the average amount of urination per day decreased significantly in both groups, decreasing by 1.6 times in the intervention group. The average daily urination and the ICIQ-SF score were significantly improved in the intervention group. It has been reported that pelvic floor training is an effective treatment for elderly women with mild cognitive decline, although it is not adapted to patients with severe dementia, as they are unable to understand the contents of the instruction [47].

In the current research, Vinsnes' work [45] employs interventions involving physical function training and ADL training, and Talley's work [46] focuses on behavioural therapy, including pelvic floor muscle exercises, as well as physical function and ADL training. Lee's work [47] includes interventions involving pelvic floor training only. These three papers comprise different patient backgrounds and intervention methods, but the results show that physical activity training and ADL training may contribute to the decrease in and reduction of the occurrence of urinary incontinence.

All of these previous studies have reported the effectiveness of pelvic floor muscle training for urinary incontinence. These results show the effectiveness of pelvic floor muscle

training, but have not shown its effectiveness for the treatment of faecal incontinence. In the future, it will be necessary to seek research results regarding the effectiveness of pelvic floor muscle training for patients with faecal incontinence.

6. Biofeedback Therapy for Patients with Faecal Incontinence

Biofeedback (BF) therapy is a general term for techniques and phenomena that make it possible to consciously adjust the state of the body by providing unconscious biological information to the conscious mind through engineering [48]. The purpose of BF therapy is to increase and maintain the contractile force of the pelvic floor muscles, including the external anal sphincter, and to normalize rectal sensation. The methods include pelvic floor muscle contraction training, stress exercise training, and rectal sensation normalization training.

In pelvic floor muscle contraction training, the patient visually recognizes the contractile force of the pelvic floor muscles using an anal electromyogram or anal manometer, thereby effectively training the pelvic floor muscles to contract. The method involves training the pelvic floor muscles using three types of contraction methods—the strongest contraction, sustained contraction, and quick contraction—using a BF device in an outpatient setting. Moreover, it is more effective to attach a surface electromyograph to the side of the abdomen and provide visual feedback to the patient about the degree of abdominal muscle activity, instructing the patient not to apply force to the abdominal muscles when contracting the pelvic floor muscles. These outpatient procedures are carried out once or twice a month for a total of five times, and the patients perform contraction training at home, 10 sets each for a total of 30 times, three times a day. The patient is taught to perform five sets [40]. BF therapy is a rehabilitation therapy that effectively teaches pelvic floor muscle training, and it is similar to pelvic floor muscle training in that it is important to continue self-training at home.

In coordinated movement training, a balloon is placed in the rectum during pelvic floor muscle contraction training, and the balloon is expanded to train the pelvic floor muscles to contract in coordination when the person feels the urge to defecate.

Rectal-sensation normalization training is performed in addition to this pelvic floor muscle contraction training or coordination training, and it is not performed alone. For patients with rectal sensitivity during the rectal balloon sensation test (maximum tolerated volume < 150 mL), a small amount of air is gradually introduced into the balloon until they can tolerate a volume of 200 mL or more. On the other hand, in patients with decreased rectal sensation, according to the rectal balloon sensation testing (minimum sensation onset > 100 mL), training should be performed gradually, starting with a large volume so that initial sensation is not achieved with a volume of 50 to 100 mL [40].

According to a 2001 systematic review that focused mainly on case studies, the effectiveness rate of BF therapy for treating faecal incontinence was approximately 70%, and there was no difference in the effectiveness rate between pelvic floor muscle contraction training and coordination training [49]. In a study that examined the relationship between the presence or absence of anal sphincter damage on anal ultrasound and the effectiveness of BF therapy, the effectiveness rate was as low as 45% when both the internal and external anal sphincters were damaged. In contrast, when both anal sphincters were normal, the score was 80% [50]. A subsequent RCT showed that BF therapy was as effective as drug therapy or pelvic floor muscle training [43]. BF therapy (efficacy rate: 76%) was reported to be significantly more effective [42], but its efficacy has not been evaluated. A 2009 meta-analysis of six RCTs revealed that the odds ratio (OR) for the effectiveness of BF therapy compared to that of other treatments was 1.2 (0.7 to 2.1) [51], and in 2012, the Cochrane Review also stated that the evaluation of the effectiveness of BF therapy for treating faecal incontinence was not conclusive [41].

In addition, a report examining the long-term outcomes of BF therapy compared to those of untreated patients showed that the 5-year efficacy was significantly better in the BF group than in the untreated group (86% and 26%, respectively) [52]. Although it requires a BF device, such pelvic floor muscle training can be effective, and there are no side effects,

making it more suitable for patients with faecal incontinence for whom other conservative treatments are ineffective. BF is thus considered a therapeutic method [40–53].

7. Conclusions

Pelvic floor muscle training is a method to improve urinary and faecal incontinence by strengthening the contraction force of the pelvic floor muscles such as the external anal sphincter and levator ani. Other conservative treatments for faecal incontinence require a combination of dietary therapy, lifestyle modification, and bowel habit guidance. The main goals of these treatments are to harden stool; strengthen the contraction force of the pelvic floor muscles, such as the external anal sphincter; normalize rectal sensation; and empty the rectum and colon regularly. To achieve success, it is important to actively combine dietary therapy, lifestyle modification, and bowel habit guidance, which can be implemented with a certain level of knowledge and experience.

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