



The effect of aromatherapy with lavender essential oil on odor intensity, sexual quality of life, and ostomy adjustment: A clinical trial

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ABSTRACT

Purpose: This study aimed to assess the effects of lavender essential oil aromatherapy on odor intensity, sexual quality of life, and ostomy adjustment in patients with permanent colostomies as a safe, accessible, and holistic supportive intervention.

Methods: In this randomized two-group clinical trial, 50 patients with permanent colostomies at Bahonar Hospital in southeastern Iran were recruited in 2024. Participants were randomly assigned to intervention and control groups. The intervention group received a brief educational session and used 0.5 cc of lavender essential oil sprayed into the ostomy bag during each change for one month. Weekly follow-ups were conducted to ensure compliance. The control group received no intervention and continued their routine colostomy care and usual diet. Both groups completed the Sexual Quality of Life Questionnaire (SQOL), Ostomy Adjustment Inventory-23 (OAI-23), and General Labeled Magnitude Scale (GLMS) at baseline and post-intervention. Caregivers also assessed odor perception using the GLMS. Data were analyzed using SPSS v26 with appropriate statistical tests. **Results:** Post-intervention, the intervention group showed significant improvements in sexual quality of life among both women ($p = 0.007$) and men ($p = 0.001$), as well as ostomy adjustment ($p < 0.001$). Patient-reported odor intensity also significantly decreased ($p = 0.02$). No significant changes were observed in the control group or in the caregiver-reported odor.

Conclusion: Lavender essential oil is a safe, accessible, and cost-effective intervention that reduces odor, enhances sexual quality of life, and facilitates ostomy adjustment in patients with permanent colostomies.

1. Introduction

Colorectal cancer is recognized as one of the most prevalent forms of gastrointestinal malignancy, substantially affecting both physical health and the overall quality of life of patients (Hossain et al., 2022; Vaghari-Tabari et al., 2020; Yu and Tang, 2021). Although therapeutic innovations have emerged in recent decades, surgical resection—often involving permanent colostomy—remains the primary treatment strategy, significantly enhancing survival in many cases (Yu and Tang, 2021). However, this intervention frequently imposes significant psychological, emotional, and social burdens on patients (Dung et al., 2023; Marques et al., 2022a).

One of the most distressing consequences reported by individuals living with colostomies is the persistent and unpleasant odor from the stoma, which not only diminishes self-confidence but also contributes to social withdrawal and strains intimate relationships, especially in terms

of sexual well-being (Duluklu and Çelik, 2019; Yousef et al., 2024). Among the psychosocial repercussions, sexual dysfunction is particularly prevalent, often stemming from diminished body image, fear of partner rejection, and embarrassment linked to visible bodily changes such as the colostomy pouch (Paszyńska et al., 2023). Thus, integrating sexual health considerations into comprehensive post-colostomy care plans is vital.

Ostomy adjustment—referring to the process of psychological and behavioral adaptation to a colostomy—can be a long and emotionally taxing journey (Doucette, 2020). Many patients experience difficulty regaining confidence and navigating new self-perceptions, emphasizing the need for supportive, patient-centered interventions.

Over the past years, complementary and integrative therapies have received increasing attention, especially in oncology care, as supportive methods to enhance psychological and emotional outcomes. Among these, aromatherapy—the therapeutic use of essential oils—has gained

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popularity for being simple, low-cost, and accessible (Jafarbegloo et al., 2020; Ke et al., 2022; Li et al., 2024). Lavender essential oil, in particular, has been shown in several studies to reduce anxiety, improve sleep quality, and promote emotional balance (Ghasemi et al., 2025; Yoo and Park, 2023; Yousef et al., 2024). For instance, Yoo and Park (2023) demonstrated that lavender oil inhalation significantly alleviated anxiety symptoms across various populations (Yoo and Park, 2023). Similarly, Ghasemi et al. (2025) reported that inhalation of lavender, rosemary, and orange blossom oils improved sleep and emotional well-being in patients with diabetes (Ghasemi et al., 2025). A systematic review by AlMohammed et al. (2022) also highlighted lavender, Damask rose, and peppermint as the most utilized and effective herbs in clinical aromatherapy for anxiety and sleep disorders (AlMohammed et al., 2022).

Nevertheless, despite promising findings, the efficacy of aromatherapy is not universal and may be influenced by individual variability, patient preferences, and application methods. Some patients may not experience meaningful benefits, while others may report transient or placebo-related effects. Additionally, factors such as age, gender, comorbidities, olfactory sensitivity, and psychological expectations may modulate responses to aromatherapy (Von Gunten, 2012). Therefore, adopting a personalized approach and continuously evaluating patient feedback is essential for effective integration of such therapies into clinical practice.

Another critical consideration is that many existing studies suffer from small sample sizes, heterogeneous populations, or short follow-up durations, limiting the generalizability of findings. There is an urgent need for more well-designed, large-scale randomized controlled trials to determine the long-term effects, safety, and efficacy of aromatherapy, particularly in specific populations such as ostomy patients (Lakhan et al., 2016).

Given the multifaceted challenges faced by individuals with permanent colostomies—including odor-related distress, altered sexual functioning, and psychosocial adjustment difficulties—exploring integrative solutions like aromatherapy is both relevant and necessary. Lavender essential oil, due to its antibacterial, deodorizing, and anxiolytic properties, may offer unique therapeutic value. However, any conclusions must be approached cautiously, and further robust research is essential to confirm its effectiveness in broader patient populations.

In this context, the present study was designed to examine the effects of lavender essential oil aromatherapy on odor intensity, sexual quality of life, and ostomy adjustment in patients attending the Ostomy Clinic at Bahaonar Hospital in southeastern Iran.

2. Methods

2.1. Study design and settings

This study was designed as a randomized, controlled, parallel-group clinical trial conducted in 2024 at the Ostomy Clinic of Bahaonar Hospital, affiliated with Kerman University of Medical Sciences, Iran. The objective was to investigate the effects of aromatherapy with lavender essential oil on odor intensity, sexual quality of life, and ostomy adjustment among patients with permanent colostomies.

2.2. Participants

Eligible participants were adults (≥ 18 years) diagnosed with permanent colostomy for at least three months, residing in the city of Kerman, experiencing bothersome ostomy bag odor, and engaging in regular ostomy care (i.e., changing or rinsing the ostomy bag at least once daily). Additionally, all participants were required to have a sexual partner. Exclusion criteria included current chemotherapy or radiotherapy, psychiatric illness, known allergy to lavender essential oil, use of any odor-masking agents other than those provided in the study, late ostomy complications (e.g., prolapse, stenosis, peristomal skin damage,

hernia), incomplete questionnaire data, and residence outside the city limits.

2.3. Sample size

The sample size was calculated using data from a prior randomized controlled trial by Duluklu and Celik (2019), which reported mean quality of life scores of 74 (SD = 14.54) in the intervention group and 55.3 (SD = 27.996) in the control group. Based on a two-tailed test, $\alpha = 0.05$, and power of 80 % (Duluklu and Celik, 2019), the minimum required sample size per group was estimated to be 22 participants. To account for potential attrition, 25 individuals were enrolled in each arm, resulting in a total sample size of 50 (see Fig. 1).

$$n = \frac{\left(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta} \right)^2 (\delta_1^2 + \delta_2^2)}{(\mu_1 - \mu_2)^2}$$

2.4. Randomization, concealment, and blinding

Participants were selected through convenience sampling due to logistical constraints. Allocation to the intervention and control groups was determined based on the order of hospital registration numbers (odd vs. even). While this quasi-random allocation method facilitated implementation, it lacks the rigor of true randomization and may introduce selection bias, thereby limiting the generalizability of the results. The study employed single blinding, whereby the data analyst remained blinded to group assignments, although blinding of participants and the principal investigator was not feasible due to the nature of the intervention.

2.5. Intervention

Participants in the intervention group received an individual 20-min education session that included an overview of the study objectives and detailed instructions for using the lavender essential oil. Written informed consent was obtained prior to participation. To assess hypersensitivity, a patch test was administered by applying one drop of the essential oil to the inner forearm, with follow-up evaluation after 48 h. Eligible participants received a 15-cc dark glass spray bottle containing undiluted lavender essential oil and a pictorial instructional brochure. They were instructed to apply approximately 0.5 cc (three sprays) into the ostomy bag during each change or rinse, ensuring even coverage of the interior surface. Additionally, a dietary guideline tailored to odor control in colostomy patients was provided. Weekly follow-up calls were conducted to monitor adherence, provide clarification, and support compliance.

Participants in the control group received no additional interventions and continued with their routine ostomy care and standard diet for the one-month study period.

3. Measures

3.1. Demographic information questionnaire

This questionnaire included demographic variables such as age, gender, marital status, and level of education, as well as medical information such as the reason for colostomy placement, duration since the colostomy was performed, and frequency of colostomy bag changes or rinsing.

3.2. Ostomy Adjustment Inventory (OAI-23)

The OAI-23 was developed by Simmons et al. (2009) to assess the

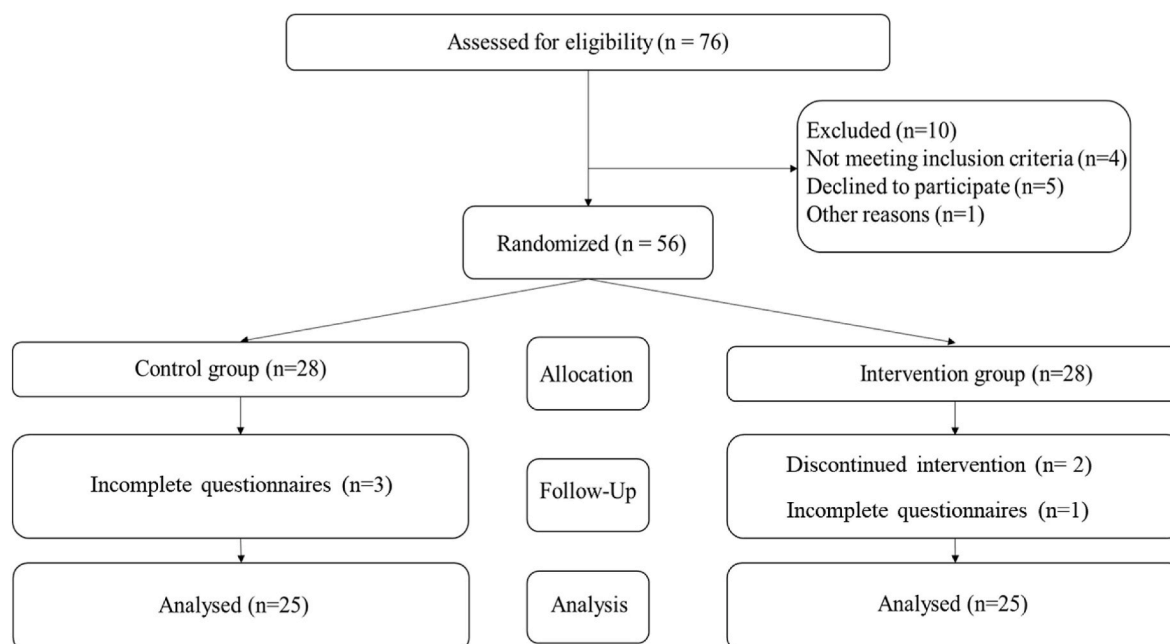


Fig. 1. Flowchart of the study process.

level of adaptation to an ostomy. It consists of 23 items across four dimensions: acceptance (9 items), anxious preoccupation (5 items), social engagement (4 items), and anger (2 items). Responses are rated on a 5-point Likert scale ranging from “strongly agree” (score of 4) to “strongly disagree” (score of 0). Twelve items (2, 5, 7, 8, 10, 11, 12, 13, 16, 17, 18, and 21) are reverse-scored. The total score ranges from 0 to 92, with higher scores indicating better adjustment to the ostomy (Özden and Kılıç, 2023). The validity of the questionnaire was confirmed by Simmons et al. (2009), and its reliability was supported by a Cronbach’s alpha of 0.93 and a test-retest correlation coefficient of 0.91 (Simmons et al., 2009). In a study by Hashemati Nobaveh et al. (2016), the Cronbach’s alpha was 0.86 overall and 0.865, 0.875, 0.878, and 0.883 for the subscales of acceptance, anxious preoccupation, social engagement, and anger, respectively. Test-retest reliability yielded a correlation coefficient of 0.819 (Pouresmail et al., 2017).

3.3. General Labeled Magnitude Scale (GLMS)

The GLMS was developed to evaluate perceived sensory intensities, particularly in areas such as taste and pain. It provides an intuitive, accurate, and efficient method for assessing sensory experiences. The GLMS includes labeled markers at 0 (“no sensation”), 1.4 (“barely detectable”), 6 (“weak”), 17 (“moderate”), 35 (“strong”), 51 (“very strong”), and 100 (“strongest imaginable sensation of any kind”) (Higgins and Hayes, 2020). The validity of this scale was confirmed by Bartoshuk et al. (2004) (Bartoshuk et al., 2004). Marques et al. (2022) used this scale to assess perceived unpleasant ostomy bag odor in patients (Marques et al., 2022a), and other researchers have also employed the GLMS in similar studies (Hayes et al., 2013; Lee et al., 2022).

3.4. Sexual Quality of Life Questionnaire – Female (SQOL-F)

The SQOL-F was developed by Symonds et al. (2005) to measure sexual quality of life in women and contains 18 items. Responses are rated on a 6-point Likert scale ranging from “strongly agree” (score of 6) to “strongly disagree” (score of 1). The total score is calculated by summing all item scores, with possible total scores ranging from 18 to 108. Higher scores indicate better sexual quality of life. The validity of this instrument was confirmed by Symonds et al. (2005), and its reliability was supported by a Cronbach’s alpha of 0.73 (Symonds et al.,

2005). The Persian version was validated by Roshan Chesli et al. (2020), who reported a Cronbach’s alpha of 0.89 (Roshan Chesli Rasool, 2018). Gómez-Cantarino et al. (2022) also used this tool in their study on female sexual quality of life (Sim-Sim et al., 2022).

3.5. Sexual Quality of Life Questionnaire – Male (SQOL-M)

The SQOL-M was developed by Abraham et al. (2008) to assess sexual quality of life in men and consists of 11 items. Responses are rated on a 6-point Likert scale from “strongly agree” (score of 6) to “strongly disagree” (score of 1). The total score ranges from 11 to 66, with higher scores indicating better sexual quality of life. The validity of the instrument was confirmed by Abraham et al. (2008), and its reliability was supported by a Cronbach’s alpha of 0.92 and a test-retest correlation of 0.82 (Abraham et al., 2008). The Persian version was validated by Ghofranipour et al. (2017), with internal consistency (Cronbach’s alpha = 0.94) and intraclass correlation (ICC = 0.95) confirming its reliability (Sadat et al., 2017). Tastemur et al. (2021) also used this questionnaire in their study on male sexual quality of life (Tastemur et al., 2021).

3.6. Data collection

Assessments were conducted at baseline and one month post-intervention. Questionnaires were completed in writing by participants during clinic visits (Saturday to Wednesday, 9 a.m.–12 p.m.) in the presence of trained clinic staff to ensure consistency and completeness. Caregivers also completed the GLMS at both timepoints.

3.7. Data analysis

Data were analyzed using SPSS software version 26. Descriptive statistics (mean, standard deviation, frequency, and percentage) and inferential tests (independent *t*-test, Chi-square test, Mann–Whitney *U* test, and Wilcoxon test) were used. A significance level of 0.05 was considered for all analyses.

3.8. Ethical considerations

This study was conducted after obtaining ethical approval from the Ethics Committee of Kerman University of Medical Sciences (Code: IR.

KMU.REC.1403.054) and registration from the Iranian Registry of Clinical Trials (IRCT Code: IRCT20151107024919N19). All participants signed a written informed consent form after receiving detailed information about the study. They were informed that participation was voluntary and that refusal to participate would not affect their course of treatment. Confidentiality of the data was ensured, and participants were informed that they could access the study results upon request.

4. Results

The results of the Chi-square test showed no statistically significant differences between the two groups in terms of demographic variables at the beginning of the study ($P > 0.05$), indicating that the groups were homogeneous with respect to demographic characteristics. The mean age of patients in the intervention group was 72.49 ± 26.11 years, and in the control group, it was 48.92 ± 14.75 years. Additionally, the mean duration of living with permanent colostomy was 96.37 ± 25.49 months in the intervention group and 92.39 ± 35.92 months in the control group.

No significant differences were observed between the groups in terms of age or colostomy duration ($P > 0.05$), indicating homogeneity in these variables as well (Table 1).

Table 2 shows that before the intervention, the mean score of sexual quality of life among female patients did not differ significantly between the two groups ($P = 0.46$). However, following the intervention, the sexual quality of life score in the intervention group was 11 points lower than in the control group ($P = 0.007$). This reduction indicates an improvement in the sexual quality of life of female patients in the intervention group.

The results of Table 3 indicate that before the intervention, there was no significant difference in the mean sexual quality of life scores among male patients between the two groups ($P = 0.47$). However, after the intervention, the sexual quality of life score in the intervention group was 17 points lower than that of the control group ($P = 0.001$). This reduction indicates an improvement in the sexual quality of life of male patients in the intervention group.

The results of Table 4 show that before the intervention, there was no significant difference in the mean score of ostomy adjustment and its dimensions between the intervention and control groups among patients with permanent colostomy ($P > 0.05$). However, after the intervention, the comparison revealed a statistically significant difference ($P < 0.05$). According to these findings, the mean total score of ostomy adjustment in the intervention group was 13.16 points higher than that of the control group following aromatherapy.

The results of Table 5 show that the level of unpleasant odor perceived by the patients and their first-degree caregiver did not differ significantly between the intervention and control groups before the intervention ($P > 0.05$). However, after the intervention, a statistically significant difference was observed only in the patient group ($P < 0.05$).

Table 2

Comparison of sexual quality of life scores among female patients between the two groups before and after the intervention.

Group	Before Intervention (Mean $\pm$ SD)	After Intervention (Mean $\pm$ SD)
Intervention	76.50 $\pm$ 10.53	65.50 $\pm$ 9.64
Control	77.14 $\pm$ 6.17	76 $\pm$ 6.05
Test Statistic	−0.73	−2.29
P value	0.46	0.02

Table 3

Comparison of sexual quality of life scores in male patients between the two groups before and after the intervention.

Group	Before Intervention (Mean $\pm$ SD)	After Intervention (Mean $\pm$ SD)
Intervention	49.07 $\pm$ 11.10	32.07 $\pm$ 6.76
Control	45.11 $\pm$ 15.90	43.78 $\pm$ 13.01
Test Statistic	−0.72	−2.46
P value	0.47	0.01

Table 4

Comparison of total score and dimensions of ostomy adjustment between the two groups before and after the intervention.

Dimensions of Ostomy Adjustment	Group	Before Intervention	After Intervention
		(Mean $\pm$ SD)	(Mean $\pm$ SD)
Acceptance	Intervention	17.33 $\pm$ 7.57	33.27 $\pm$ 2.49
	Control	21.67 $\pm$ 9.04	20.67 $\pm$ 9.01
	Test Statistic	−1.76	−7.47
	P value	0.09	<0.001
Anxious Preoccupation	Intervention	9 $\pm$ 4.01	13.40 $\pm$ 1.88
	Control	10.56 $\pm$ 3.91	11.06 $\pm$ 3.84
	Test Statistic	1.95	−2.23
	P value	0.06	0.03
Social Engagement	Intervention	8.20 $\pm$ 4.26	4.40 $\pm$ 2.03
	Control	9.90 $\pm$ 4.43	9.78 $\pm$ 3.99
	Test Statistic	1.35	6.11
	P value	0.18	<0.001
Anger	Intervention	4.33 $\pm$ 2.66	1.87 $\pm$ 1.06
	Control	4.56 $\pm$ 2.57	4.94 $\pm$ 2.58
	Test Statistic	−1.15	−4.36
	P value	0.25	<0.001
Overall Ostomy Adjustment	Intervention	45.27 $\pm$ 18.82	61.40 $\pm$ 4.79
	Control	53.17 $\pm$ 20.18	53.17 $\pm$ 20.24
	Test Statistic	−1.75	−2.44
	P value	0.07	0.02

5. Discussion

The present study demonstrated that aromatherapy with lavender essential oil had a positive effect on reducing unpleasant odors,

Table 1

Frequency distribution of demographic and clinical characteristics of patients with permanent colostomy.

Group		variable			P value
		Intervention	control		
		Frequency (Percent)	Frequency (Percent)	test statistic (χ^2)	
Gender	Female	10 (40)	8 (32)	0.34	0.55
	Male	15 (60)	17 (68)		
Education Level	Below Diploma	4 (16)	5 (20)	0.72	0.70
	Diploma & Associate Degree	7 (28)	9 (36)		
	Bachelor's and above	14 (56)	11 (44)		
Cause of Colostomy Placement	Cancer	15 (60)	17 (68)	0.34	0.55
	Other Causes	10 (40)	8 (32)		
Frequency of Colostomy Bag Change	Once per day	8 (32)	6 (24)	0.40	0.75
	More than once per day	17 (68)	19 (76)		

Table 5
Comparison of the perceived odor levels by patients and their first-degree caregivers between the two groups before and after the intervention.

		Before Intervention	After Intervention
Patient-perceived odor level	Test	−0.95	−2.86
	Statistic		
First-degree caregiver-perceived odor level	P value	0.34	0.004
	Test	−1.08	−1.21
	Statistic		
	P value	0.28	0.23

improving sexual quality of life, and enhancing ostomy adjustment in patients with colostomy. These findings highlight the potential of simple, non-pharmacological interventions in supporting the overall well-being of individuals with permanent colostomies.

Although a statistically significant reduction in odor-related distress was reported by patients, the same effect was not observed in caregivers' reports. This discrepancy may reflect differences in the context and timing of exposure. Patients experience the odor continuously and intimately, whereas caregivers might only be exposed intermittently, such as during ostomy bag changes. Additionally, caregivers may develop olfactory adaptation (habituation), reducing their sensitivity over time. Another possible explanation is the subjective nature of odor perception and psychological distance—caregivers may consciously or unconsciously downplay odor intensity to avoid patient embarrassment or maintain emotional support.

While the results of the current study align with previous findings on the benefits of lavender essential oil (Alptekin and Arslan, 2024; Marques et al., 2022b; Yousef et al., 2024), it is critical to acknowledge the potential variability in individual responses. Aromatherapy is highly individualized, and its effectiveness can be influenced by factors such as olfactory threshold, psychological expectations, stress baseline, and even cultural attitudes toward herbal medicine (Von Gunten, 2012).

The therapeutic effects of lavender are believed to stem from its complex phytochemical composition, particularly linalool and linalyl acetate. These compounds exhibit antimicrobial properties that may suppress odor-producing anaerobic bacteria within the ostomy bag (Marques et al., 2022b; Yousef et al., 2024). From a neurobiological perspective, linalool binds to glutamate receptors in the central nervous system, contributing to reduced excitatory neurotransmission and promoting parasympathetic activation, which results in stress and anxiety reduction. Linalyl acetate may also enhance GABAergic activity, further amplifying anxiolytic effects (Natih, 2025).

Patients in the intervention group demonstrated significant improvement in ostomy adjustment, particularly in acceptance and reduction of anxious preoccupation. This aligns with prior evidence (Pouresmail et al., 2017; Simmons et al., 2009) and may be explained by lavender's calming effect, leading to improved emotional coping, greater self-acceptance, and reduced embarrassment.

Sexual quality of life improved significantly in both male and female participants. Malodor is a common barrier to intimacy. The reduction in odor, combined with the mood-enhancing and anxiolytic effects of aromatherapy, likely played a key role in restoring confidence and sexual communication. This is consistent with the results of earlier trials on aromatherapy and sexual function (Abbaspoor et al., 2022; Hajabdollahi et al., 2025; Jafari et al., 2023; Malakouti et al., 2017; Sharifpour et al., 2023).

5.1. Limitations

Several limitations must be acknowledged. The quasi-random allocation based on registration numbers and the use of convenience sampling from a single clinical site may introduce selection bias and limit the generalizability of findings. The self-reported nature of key outcomes—particularly odor perception and sexual function—also raises

the possibility of response bias. Additionally, the absence of direct observation at home may have affected adherence to the intervention, despite regular follow-up. Finally, the one-month study duration limits conclusions regarding the long-term efficacy and sustainability of aromatherapy.

Future studies should employ rigorously randomized, multicenter designs with longer follow-up periods to enhance validity and assess durability of effects. Comparative trials using different essential oils and mixed-methods approaches—including qualitative exploration of patient and caregiver experiences—are also recommended. Incorporating objective odor assessment tools could further improve measurement accuracy and strengthen outcome evaluation.

6. Conclusion

The use of lavender essential oil in ostomy bags is a simple, cost-effective, and natural method that, in addition to its ease of application, has a significant impact on reducing unpleasant odors, improving sexual quality of life, and enhancing ostomy adjustment in patients with permanent colostomy.

CRediT authorship contribution statement

Lida Abazari: Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation. **Batool Tirgari:** Writing – review & editing, Visualization, Supervision, Project administration, Methodology, Formal analysis, Conceptualization.

Declaration of competing interest

The authors declare that there are no conflicts of interest related to the publication of this manuscript. No financial, personal, or professional relationships influenced the research, authorship, or publication of this study.

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