



Effects of Bathing in a Tub on Physical and Psychological Symptoms of End-of-Life Cancer Patients

An Observational, Controlled Study

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This observational, controlled study explored the effects of bathing on the physical and psychological aspects of terminal cancer patients on a palliative care ward. With nurses' assistance, the patients evaluated and recorded the severity of their symptoms at 10:00 AM, 30 minutes after initial bathing, and at 5:00 PM. The bathing care was provided as routine care according to the patients' wishes. Twelve symptoms were measured using 9 items (numbers 1-9) from the Edmonton Symptom Assessment System-Revised Japanese version and 3 items from the Cancer

Fatigue Scale. Outcomes were compared between bathing days and nonbathing days (control) and between before and after bathing.

Of the 57 bathers, data were available for both bathing days and nonbathing days for 42 bathers. In the comparison between bathing and nonbathing days, tiredness was significantly improved (effect size [ES], 0.35; $P = .02$). On the basis of the pre-post bathing comparison, 6 symptoms, namely, tiredness (ES, 0.40; $P < .01$), lack of appetite (ES, 0.36; $P = .01$), decreased well-being (ES, 0.33; $P = .01$), anxiety (ES, 0.36; $P = .01$), pain (ES, 0.31; $P = .02$), and depression (ES, 0.30; $P = .02$), were significantly improved. Bathing in a tub effectively improves tiredness and might be effective for distressing symptoms in end-of-life cancer patients.

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KEY WORDS

baths, palliative care, symptom burden, terminal care

In the end-of-life care setting, many cancer patients have various complex and difficult symptoms, namely, pain, nausea, fatigue, shortness of breath, anxiety, depression, and other social and spiritual pain. Pharmacological intervention may not always be effective for these symptoms, and there is a clinical expectation for nonpharmacological interventions. Bathing has been a focus from the perspective of complementary and alternative therapy to improve health outcomes in general clinical settings worldwide for a number of symptoms or disorders, including chronic pain, cardiac function, improving aerobic capacity, depression, and insomnia.¹⁻¹⁴

Bathing is an integral part of the Japanese culture and lifestyle. It is not only for maintaining cleanliness, but it has been regarded as a ritualistic pleasure to induce comfort, relaxation, and social acceptance. Several studies from Japan focused on relaxation and the quality of sleep after bathing. Hayasaka et al found that bathing in a tub improves health consciousness and quality of sleep in Japanese individuals, whereas Maeda et al¹⁵ reported that habitual spa bathing at least 4 to 5 times a week had preventive



and promotive effects in certain diseases, such as hypertension (preventive) in women and cardiovascular diseases (preventive) and colon cancer survival (promotive) in men.¹⁶ Nauman et al¹³ suggested that outpatients with confirmed depressive disorder bathing in a tub at least twice each week showed improved depression, sleep, and heart rate, allowing for better relaxation. These reports support the efficacy of bathing for a wide range of symptoms, which may benefit terminally ill cancer patients. However, most of these previous reports involved healthy volunteers rather than terminally ill cancer patients. In terminal-stage patients, safety is a major barrier to interventions, in both clinical and research settings.

Therefore, only a few studies have evaluated bathing in cancer patients, more specifically in terminally ill patients. Fujimoto et al¹⁷ reported the safety of bathing terminal cancer patients based on a survey of 20 inpatients in a palliative care ward. They found no major adverse effects before and after bathing. Moreover, they reported that they frequently obtained positive verbal responses, namely, “comfortable” and “relaxed.” Focusing on efficacy, we interviewed many terminal cancer patients about their experience with mechanical bathing. The patients reported that “I want it again and I liked it” or they felt “relaxed after bathing” and “exhilarated.”¹⁷ Skaczkowski et al¹⁸ reported 52 palliative care patients who rated their pain, anxiety, and well-being before and after taking a bath in a purpose-built spa bath, and they justified further investigation of the potential for water-based relaxation therapy for patients at the end of life. They indicated that such research was achieved in a controlled trial in the next phase. Nevertheless, there has been no research measuring actual changes in symptoms in a controlled trial of bathing.

Therefore, this observational, controlled study aimed to explore the effects of bathing on the physical and psychological aspects of terminal cancer patients hospitalized on a palliative care ward. This study was a comparison of differences in symptom scores for each item of the Edmonton Symptom Assessment System-Revised Japanese version (ESAS-r-J) and the Cancer Fatigue Scale (CFS) between bathing and nonbathing days in a tub, with the nonbathing days used as a control group.

METHODS

Participants

This was an observational, controlled study conducted in a single facility between August 2018 and April 2019. The subjects were terminal cancer patients hospitalized on the palliative care ward of Fujisawa Shounandai Hospital, Japan. Eligibility criteria were as follows: (1) advanced or recurrent cancer, as diagnosed by the physician; (2) patients' knowledge of their diagnosis: palliative care wards in Japan are only available for cancer patients—“knowledge of their

diagnosis” means that the participants knew that the disease is a disease that progresses without healing, leading to death; (3) hospitalized on the palliative care ward during the study period; and (4) scoring 0 on the Richmond Agitation-Sedation Scale. Informed consent was obtained from the interested patients after the patients and their families received an explanation of the study by the researchers after admission to the palliative care ward.

Design

This was an observational, controlled study.

Measurements

The ESAS-r-J

This valid tool is used widely in both clinical and academic settings to assist in the assessment of 9 symptoms common to cancer patients: (1) pain, (2) tiredness, (3) nausea, (4) depression, (5) anxiety, (6) drowsiness, (7) lack of appetite, (8) decreased well-being, and (9) shortness of breath. The severity of each symptom at the time of assessment is rated from 0 to 10 on a numerical scale, 0 meaning that the symptom is absent and 10 meaning that it is of the worst possible severity.^{19,20}

Cancer Fatigue Scale

The CFS is composed of 3 factors and 15 items. Okuyama et al²¹ reported their validation and the reliability of the CFS for assessment of fatigue in cancer patients. There are 3 subscales: (1) physical, (2) affective, and (3) cognitive. Each item is rated from 0 (not at all) to 10 (very much). Three items (energy, attention, and memory), which do not overlap with ESAS-r-J items, were selected to minimize the participants' burden to complete the assessment.

Data Collection

Patients who would be unable to use the bathrooms could bathe in the tub in a reclining or lying down position. Bathrooms equipped with mechanical baths have ample space around the bathtub for caregivers to facilitate bathing assistance. Patients on the palliative care ward were offered a bath in a tub as part of routine care. Patients who indicated a desire to take a bath in a tub could do so from once to twice a week, if they so desired. The water temperature was about 41°C, and the bath duration was approximately 10 minutes. With nurses' assistance, patients evaluated and recorded the severity of their symptoms at 10:00 AM, 30 minutes after initial bathing, and at 5:00 PM. Nurses always examined the patients' vital signs at the same time at 10:00 AM and 5:00 PM as normal care, no special training was required, and any nurse could collect the data. Data were collected for 7 days after the participant was hospitalized.

The bathing care was provided as routine care according to the patients' wishes; bathing was not planned as part



of the study. Twelve symptoms were evaluated using the 9 items (numbers 1-9) from the ESAS-r-J^{20,22} and the 3 items (numbers 10-12) from the CFS.²¹ The category of each symptom was determined, including physical symptoms ([1] pain, [2] tiredness, [3] nausea, [4] depression, [7] lack of appetite, [9] shortness of breath, and [10] energy) and psychological symptoms ([5] anxiety, [6] drowsiness, [11] attention, and [12] memory), and (8) decreased well-being was classified as both. The primary outcome of this study was the total score of the ESAS-r-J items; the

secondary outcome was the 3 scores of the CFS items, and the scores of each item were aggregated.

Patients' Characteristics

The following demographic data were obtained from the patients' medical charts: sex, age, primary tumor site, hospitalization period, performance status, routes of opioid administration, food intake, place of care before administration/transfer to the palliative care ward, final bath in a tub before transfer, and date of first bath in a tub after transfer to the

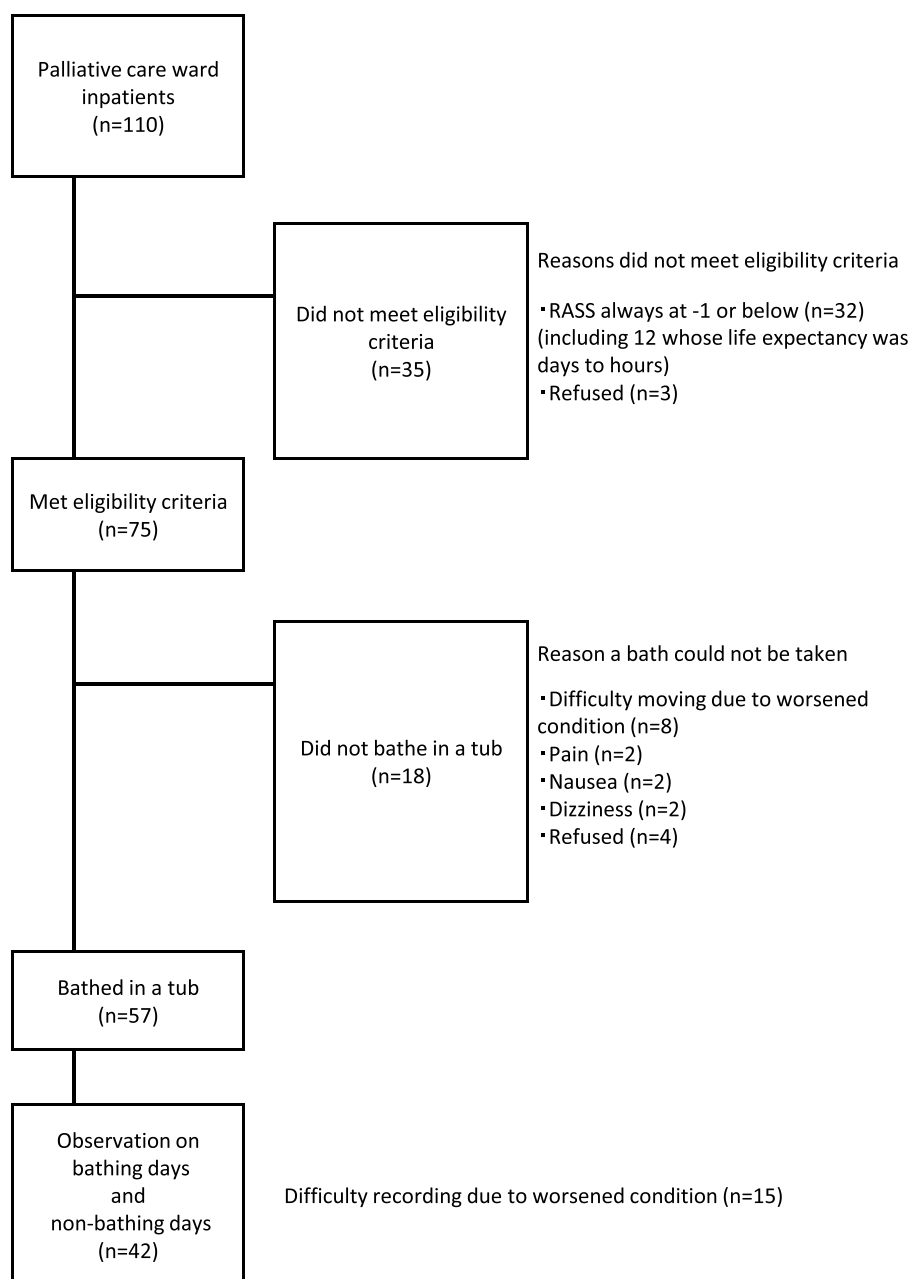


FIGURE 1. Enrollment of study subjects. RASS, Richmond Agitation-Sedation Scale.



palliative care ward. The participants were also asked about the frequency of and preference for bathing and the last date of bathing before the current hospitalization.

Statistical Analysis

The demographic factors were compared between bathing days and nonbathing days and between before and after bathing in a tub during the study period using the χ^2 test and the Wilcoxon rank sum test for nominal variables and continuous/ordinal variables, respectively. Effect size (ES) was based on the criteria recommended by Cramer for both ϕ and V : small effect, 0.1 to less than 0.3; moderate effect, 0.3 to less than 0.5; and large effect, 0.5 or greater.²²

First, groups of available data were compared between bathing days and nonbathing days. Next, mean scores for each item of the ESAS-r-J and CFS were compared between before and after bathing in a tub.

The differences between the scores of the 12 symptoms before and after bathing were analyzed using the Wilcoxon signed rank test. A decrease in each item of the total ESAS-r-J score by 1 point after bathing in a tub was defined as "improvement."¹⁹

Validity and Reliability/Rigor

The χ^2 test was used to identify factors related to symptom improvement. The significance level was set at $P < .05$, and all statistical analyses were performed using SPSS, version 26 (IBM, Chicago, Illinois) for Windows.

Ethical Considerations

This study received approval from the Institutional Review Board of Fujisawa Shounandai Hospital (ID: 30-006) and Tohoku University (ID: 2018-1-173). Written, informed consent was obtained from all participants and/or their family caregivers.

RESULTS

Of the 110 advanced cancer patients admitted to the palliative care ward, 75 met the eligibility criteria. Of the 35 individuals who did not satisfy the eligibility criteria, 32 had a Richmond Agitation-Sedation Scale score of -1 or lower (of these, 12 individuals had a life expectancy of days to hours), and 3 refused consent. Finally, the subjects included 57 bathers, who bathed in a tub, and 18 nonbathers, who did not. The reasons the 18 nonbathers could not bathe included difficulty moving due to worsened condition ($n = 8$), pain ($n = 2$), nausea ($n = 2$), dizziness ($n = 2$), and being asked but refused ($n = 4$). Data for both bathing days and nonbathing days were available for 42 patients (Figure 1).

Table 1 presents the patients' characteristics. Of the 57 bathers, 30 (53%) were male, and the patients' median age (interquartile range) was 77.0 years (70.0-83.0 years).

There were no significant differences in the characteristics between bathers and nonbathers, including days of hospitalization.

Figure 2 shows the changes in symptoms between bathing days and nonbathing days among the 42 bathers. Their evening and morning scores were different. The difference in the average overall score for the ESAS-r-J was 3.46 (± 7.72) on bathing days and 1.02 (± 11.05) on nonbathing days (ES, 0.25; $P = .11$). The results after subtraction of the evening and morning scores for the bathing and nonbathing days were as follows: pain (ES, 0.19; $P = .22$), drowsiness (ES, 0.04; $P = .79$), nausea (ES, 0.02; $P = .92$), lack of appetite (ES, 0.13; $P = .41$), shortness of breath (ES, 0.16; $P = .31$), depression (ES, 0.16; $P = .30$), anxiety (ES, 0.03; $P = .87$), decreased well-being (ES, 0.13; $P = .39$), energy (ES, 0.21; $P = .17$), attention (ES, 0.26; $P = .10$), memory (ES, 0.24; $P = .12$), and tiredness (ES, 0.35; $P = .02$). There was a significant improvement only in tiredness.

Table 2 and Figure 3 show the effectiveness for improvement of symptoms after bathing in a tub. The average overall score for the ESAS-r-J was 16.6 (± 16.5) before bathing and 12.4 (± 13.6) after bathing (ES, 0.47; $P < .01$). Significant improvements were observed in the following 6 symptoms after bathing: tiredness (ES, 0.40; $P < .01$), anxiety (ES, 0.36; $P = .01$), lack of appetite (ES, 0.36; $P = .01$), decreased well-being (ES, 0.33; $P = .01$), pain (ES, 0.31; $P = .02$), and depression (ES, 0.30; $P = .02$). In particular, improvement in tiredness symptoms was observed in 24 individuals (42%), with a 1.0-point reduction in the average score, followed by anxiety (0.6-point reduction, 13 individuals, 23%) and lack of appetite (0.9-point reduction, 12 individuals, 21%). Of the symptoms that did not show significant differences, drowsiness worsened in 16 individuals (28%) and improved in 15 individuals (26%), whereas 26 individuals (46%) reported no change. For 2 other items, shortness of breath and nausea, more than 80% reported no change.

DISCUSSION

This study is the first to observe the effectiveness of bathing in a tub for alleviating physical and psychological pain in terminal cancer patients. There were 3 major findings, which are discussed hereinafter.

(1) In the comparison between before and after bathing in a tub, improvement was observed in the overall score of all 9 items of the ESAS-r-J, from 16.6 (± 16.5) before bathing to 12.4 (± 13.6) after bathing (ES, 0.47; $P < .01$), and of the 6 improved symptoms (pain, tiredness, lack of appetite, depression, anxiety, and decreased well-being), tiredness improved the most ($n = 24$, 42%). More specifically, the following 3 symptoms were significantly improved with ES greater than or equal to 0.4: tiredness (ES, 0.40; $P < .01$), memory (ES, 0.47; $P < .01$), and attention (ES, 0.42; $P < .01$).



TABLE 1 Patients' Attributes

		Total		Bathers		Nonbathers		P
		N	%	n	%	n	%	
Subject characteristic								
Sex								
	Male	38	51%	30	53%	8	44%	.55 ^a
	Female	37	49%	27	47%	10	56%	
Age, y								
	Median (interquartile range)	77.0 (70.0–82.0)		77.0 (70.0–83.0)		76.5 (70.3–82.0)		.56 ^b
Cancer symptom and ADL								
Hospitalization period (palliative care ward), d								
	Median no. days (interquartile range)	15.0 (8.0–34.0)		18.0 (8.5–35.0)		9.5 (6.0–16.8)		.05 ^{b,c}
PS								
	1	0	0%	0	0%	0	0%	.54 ^a
	2	12	16%	10	18%	2	11%	
	3	27	36%	20	35%	7	39%	
	4	36	48%	27	47%	9	50%	
Cancer site								
	Lungs	12	16%	10	18%	2	11%	.14 ^a
	Liver, pancreas, gallbladder, bile duct	20	27%	14	25%	6	33%	
	Esophagus, stomach	21	28%	16	28%	5	28%	
	Colon, rectum	7	9%	5	9%	2	11%	
	Kidney, bladder, prostate	8	11%	8	14%	0	0%	
	Breast	3	4%	2	4%	1	6%	
	Uterus, ovary	1	1%	0	0%	1	6%	
	Other	3	4%	2	4%	1	6%	
Route of opioid administration								
	Injected	16	21%	12	21%	4	22%	.68 ^a
	Oral/patch	35	47%	26	46%	9	50%	
	None	24	32%	19	33%	5	28%	
Food intake								
	Full amount	18	24%	15	26%	3	17%	.08 ^a
	Half	17	23%	16	28%	1	6%	
	Small amount	26	35%	16	28%	10	56%	
	None	14	19%	10	18%	4	22%	

(continues)



TABLE 1 Patients' Attributes, Continued

	Total		Bathers		Nonbathers		P	
	N	%	n	%	n	%		
Recuperative environment and bathing before transfer								
Place of care before administration/transfer to palliative care ward								
Home	18	24%	13	23%	5	28%	.60 ^a	
General ward	56	75%	43	76%	13	72%		
Institution	1	1%	1	2%	0	0%		
Final bath before transfer								
6 mo before	3	4%	3	5%	0	0%	.49 ^a	
1-5 mo before	22	29%	17	30%	5	28%		
1-4 wk before	40	53%	30	53%	10	56%		
2-7 d before	7	9%	4	1%	3	17%		
The day before to the day of transfer	3	4%	3	5%	0	0%		
Frequency of bathing in a tub when healthy								
Daily	69	92%	53	93%	16	89%	.45 ^a	
2-3 times/wk	4	5%	3	5%	1	6%		
1 time/wk	1	1%	0	0%	1	6%		
Showering only	1	1%	1	2%	0	0%		
Enjoyment of bathing in a tub when healthy								
Loved it	70	93%	53	93%	17	94%	.57 ^a	
Liked it	2	3%	2	4%	0	0%		
Did not like it much	3	4%	2	4%	1	6%		
Bathing after transfer								
Day of first bath after transfer								
Day of transfer			2	4%				
Second day			23	40%				
Third day			8	14%				
Fourth day			9	16%				
Fifth day			8	14%				
Sixth day			2	4%				
Seventh day			5	9%				

Abbreviation: ADL, Activities of Daily Living.
 Performance Status (PS) was quantified by nurses on the palliative care ward.
 No correlation with bathing: ^a χ^2 test and ^bWilcoxon rank sum test.
^cP = .054, not significant (P > .05).



Score difference

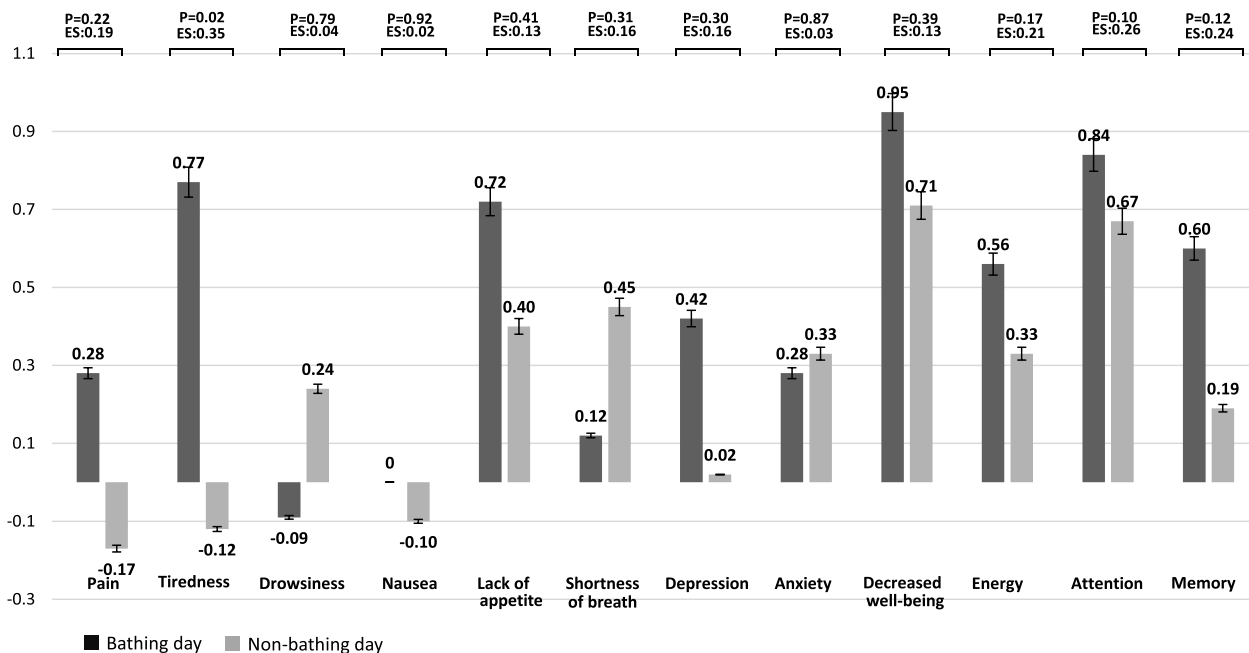


FIGURE 2. Comparison of differences in the scores for each item of the Edmonton Symptom Assessment System-Revised Japanese version and Cancer Fatigue Scale between bathing and nonbathing days. Effect size (ES): criteria recommended by Cramer for both ϕ and V : small effect, 0.1 to less than 0.3; moderate effect, 0.3 to less than 0.5; and large effect, 0.5 or greater. Score difference: difference between the evening and morning scores; subjects included 57 bathers who took a bath in a tub, of whom 42 had data available for both bathing and nonbathing days (Wilcoxon test, 5% significance level).

First, with regard to the improvement in the overall ESAS-r-J score, bathing in a tub might be meaningful not only for hygiene but also for symptom management.²³ Moreover, the participants of this study were terminal cancer patients, and the overall ESAS-r-J score improved for half of the Performance Status 4 patients. Previous studies have found that healthy individuals took baths almost daily in Japan.¹⁶

The survey in this study found that, when the patients were healthy, they enjoyed bathing in a tub daily, but approximately 90% of the terminal cancer patients had not been able to bathe in a tub for at least a few weeks before admission to the palliative care ward. The unique Japanese health consciousness and expectations related to bathing in a tub might lead to relief of painful symptoms. Consistent with the present findings, a few studies have reported improvement in pain after bathing in patients with chronic pain.⁶⁻¹⁰ Physical pain could be improved after bathing, but the biofunctional mechanism remains unclear.

(2) In the comparison between bathing and nonbathing days, although tiredness was significantly improved (ES, 0.35; $P = .02$), the average overall score for the ESAS-r-J was not significantly different (ES, 0.25; $P = .11$).

Second, significant improvements with medium ES were observed in tiredness, memory, and attention after bathing in a tub. For Japanese individuals, relaxation is considered a primary objective of bathing in a tub, in addition to cleanliness.^{23,24} “Relaxation” refers to the predominant activity of the parasympathetic nervous system, as opposed to excitation of the sympathetic nervous system in the form of a stress response.¹⁷

Previous studies have reported improvements in brain waves, insomnia, and exhaustion in older adults after bathing in a tub; thus, it could be considered that bathing, in terms of relaxation, is effective in improving tiredness.⁷ Fujimoto et al¹⁷ did not find a difference between the sympathetic and parasympathetic nervous systems pre and post bathing, but they did find a significant difference in anxiety.

Yamamoto and Nagata²⁵ reported that a warm-water footbath promoted relaxation, positive emotion, comfort, pleasure, and enjoyment, and patients' sympathetic nervous system activity also decreased in hospitalized end-of-life cancer patients with stomach cancer. In addition, narrative data collected from the participants included phrases such as “pleasant” and “relaxing.” Therefore, the researchers concluded that bathing in a tub has a relaxing



TABLE 2 Changes in Symptom Scores After Bathing

Symptom	Before Bathing		After Bathing		ES	P	Improved		No change		Worsened	
	Mean	SD	Mean	SD			n	%	n	%	n	%
	Tiredness	3.3	3.2	2.3			2.8	0.40	<.01	24	42	24
Anxiety	1.3	2.2	0.7	1.7	0.36	.01	13	23	42	74	2	4
Lack of appetite	2.6	3.5	1.7	2.9	0.36	.01	12	21	43	75	2	4
Decreased well-being	2.3	2.9	1.6	2.3	0.33	.01	18	32	35	61	4	7
Pain	1.4	2.4	1.0	1.7	0.31	.02	16	28	37	65	4	7
Depression	1.3	2.3	0.8	1.9	0.30	.02	14	25	40	70	3	5
Shortness of breath	0.9	2.1	0.7	1.7	0.24	.07	9	16	46	81	2	4
Nausea	0.4	1.5	0.5	1.7	0.07	.59	4	7	48	84	5	9
Drowsiness	3.1	3.1	3.2	3.3	0.08	.57	15	26	26	46	16	28
ESAS-r-J overall score	16.6	16.5	12.4	13.6	0.47	<.01	34	60	12	21	11	19
Memory	2.7	3.2	2.0	2.6	0.47	<.01	18	32	37	65	2	4
Attention	2.9	2.9	2.3	2.4	0.42	<.01	19	33	34	60	4	7
Energy	2.9	3.0	2.3	2.5	0.35	.01	18	32	36	63	3	5

Abbreviation: ESAS-r-J, Edmonton Symptom Assessment System-Revised Japanese version. Data were analyzed using Wilcoxon signed-rank test, 5% significance level. Effect size (ES): criteria recommended by Cramer for both ϕ and V: small effect, 0.1 to less than 0.3; moderate effect, 0.3 to less than 0.5; and large effect, 0.5 or greater.

effect in terminally ill patients. This conclusion is consistent with the present findings.

(3) After bathing in a tub, 26% of patients had improved drowsiness, 28% had worse drowsiness, and the number

with worse drowsiness was 2 to 7 times higher than for other symptoms. There was no significant difference in the improvement of drowsiness from before to after bathing in a tub.

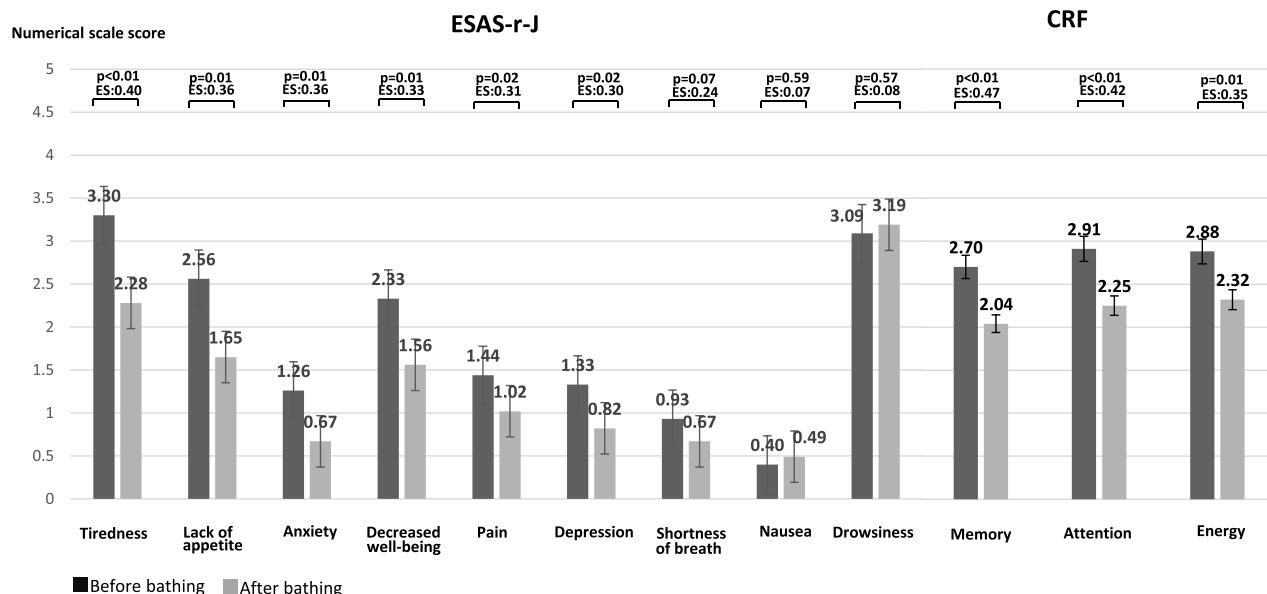


FIGURE 3. Comparison of mean scores for each item of the Edmonton Symptom Assessment System-Revised Japanese version (ESAS-r-J) and Cancer Fatigue Scale (CFS) before and after bathing in a tub. Effect size (ES): criteria recommended by Cramer for both ϕ and V: small effect, 0.1 to less than 0.3; moderate effect, 0.3 to less than 0.5; and large effect, 0.5 or greater (Wilcoxon test, 5% significance level).



Drowsiness worsened after the bath in one-quarter of the terminal cancer patients, but patients commonly reported that it was “a pleasant drowsiness and led to rest/sleep.” Consistent with this finding, previous research reported that bathing in a tub improves sleep and has positive effects on depression and that, after 30 minutes of bathing, circulatory dynamics stabilize and a hypnotic effect is experienced.^{13,26} Therefore, the present findings could be interpreted as showing that bathing reduced stress and induced a comfortable state leading to sleep, which was described as “drowsiness.”

Limitations

There are some limitations to this study. First, because the subjects were terminal cancer patients, a randomized, controlled study was difficult for ethical reasons. Second, the generalizability of this study's results is weak, because this study was conducted in a single facility. In addition, a few of the enrolled patients were unable to complete the measurements because of delirium or worsening status. Third, it was not possible to fully analyze related factors because of the limited sample size. The sample size of bathers was small, and it was difficult to conduct a multivariate analysis to identify the factors related to improvement due to bathing. Fourth, bathing in a tub is a valuable part of the daily culture for Japanese people, and obtaining similar results outside Japan is expected to be difficult. Finally, measurements were taken 30 minutes after a single intervention (bath), and the long-term effects on symptoms, except for tiredness, are unclear. A multicenter study with a longer follow-up for measurements is needed to confirm the present findings.

Clinical Implications of the Study

Bathing in a tub effectively improves tiredness and might be effective for alleviating distressing symptoms for end-of-life cancer patients. With regard to the improvement in the overall ESAS-r-J score, bathing in a tub might be meaningful not only for hygiene but also for symptom management.

Conclusion

Bathing in a tub was found to be effective for Japanese terminal cancer patients, with improvement in the overall ESAS-r-J score and significant differences in 6 symptoms (pain, tiredness, lack of appetite, depression, anxiety, and well-being). Tiredness improved significantly on bathing days compared with nonbathing days.

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