

ORIGINAL RESEARCH ORİJİNAL ARAŞTIRMA

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Determination of the Effect of Starting Oral Feeding with Warm Water on Bowel Functions After Thoracotomy: A Randomized Controlled Trial

Torakotomi Sonrası Oral Beslenmeye İlk Su ile Başlamanın Bağırsak Fonksiyonlarına Etkisinin Belirlenmesi: Randomize Kontrollü Çalışma

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ABSTRACT Objective: The aim of this study was to determine the effect of starting oral feeding with warm water on bowel function after thoracotomy. **Material and Methods:** This randomized controlled trial was conducted in the thoracic surgery ward of a university hospital. Data were collected between May 2022 and June 2023 from a total of 68 patients in the experimental ($n=34$) and control ($n=34$) groups. The first oral intake of the experimental group patients was 200 mL of warm water at 98.6 °F (37°C) in thermally insulated glasses. Control group patients underwent the routine procedure (200 mL of water at room temperature). The "Information Form," "Postoperative Follow-up Form" and "Constipation Risk Assessment Scale" were used to gather data. Descriptive analyses, the Mann-Whitney U, the Fisher exact test, and the Pearson chi-square test were used to evaluate the data. **Results:** No significant difference was found between the mean scores of the Constipation Risk Assessment Scale of the patients in the experimental and control groups. It was determined that the control group patients exercised more than the experimental group patients before surgery ($p=0.028$). On postoperative day 0, the experimental group had a statistically significant higher number of patients experiencing gas flatulence compared to the control group ($p=0.000$). **Conclusion:** The findings of the study showed that starting oral feeding with warm water after thoracotomy was effective in reducing the duration of the first gas flatulence.

Keywords: Thoracic surgery;
gastrointestinal motility; nursing

ÖZET Amaç: Bu araştırmanın amacı, torakotomi sonrası oral beslenmeye ilk su ile başlamanın bağırsak fonksiyonlarına etkisini belirlemektir. **Gereç ve Yöntemler:** Randomize kontrollü olan bu araştırma, bir üniversite hastanesinin göğüs cerrahi servisinde yapıldı. Veriler, Mayıs 2022-Haziran 2023 tarihleri arasında deney ($n=34$) ve kontrol ($n=34$) gruplarından toplam 68 hastadan toplandı. Deney grubu hastaların ilk oral alımına ısı yalıtımlı camlarda 98,6 °F'de (37 °C) 200 mL ilk su başlandı. Kontrol grubu hastalara rutin prosedür (oda ısısında 200 mL su) uygulandı. Veri toplamak için "Bilgi Formu", "Konsitasyon Risk Değerlendirme Ölçeği" ve "Postoperatif Takip Formu" kullanıldı. Araştırma verilerini değerlendirmek için tanımlayıcı analizler, Mann-Whitney U, Pearson ki-kare ve Fisher kesin testi kullanıldı. **Bulgular:** Araştırmada deney ve kontrol grubundaki hastaların Konsitasyon Risk Değerlendirme Ölçeği ortalaması puanları arasında anlamlı bir fark bulunmadı. Ameliyat öncesi kontrol grubu hastalarının deney grubuna göre daha çok egzersiz yaptıkları belirlendi ($p=0,028$). Deney grubunda ameliyat sonrası 0. gün gaz çıkışları olan hastaların sayısı kontrol grubuna göre istatistiksel olarak anlamlı düzeyde daha çok olduğu saptandı ($p=0,000$). **Sonuç:** Araştırma bulguları torakotomi sonrası oral beslenmeye ilk su ile başlamanın ilk gaz çıkışma süresi üzerinde etkin olduğunu gösterdi.

Anahtar Kelimeler: Toraks cerrahisi;
mide-bağırsak fonksiyonları; hemşirelik

Thoracotomy is defined as the surgical opening of the thorax for diagnostic and therapeutic purposes.¹ Dysfunction in gastrointestinal motility after thora-

cotomy is one of the most common problems.^{2,3} Many factors, such as prolonged bed rest during and after surgery, anesthesia, the use of opioid drugs, a

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change in dietary regimen due to the surgical process, uncontrollable pain affecting the gastrointestinal system by increasing the normal stress response, the use of a bedpan, a lack of privacy, and anxiety, cause bowel function to be affected.^{4,7} Patients may experience symptoms and signs such as abdominal distension, constipation, nausea, vomiting, and the absence of flatulence due to decreased bowel function.^{4,8} In addition, gastrointestinal dysfunction may lead to delayed oral food intake, decreased wound healing process, impaired comfort, increased cardiopulmonary load, hypoxemia, arrhythmia, and even cardiovascular problems such as heart failure and pulmonary embolism in severe cases.^{2,9} Therefore, surgical nurses should make appropriate interventions for gastrointestinal dysfunction, which is one of the nursing diagnoses. It is known that non-pharmacological methods such as chewing gum, early oral hydration, consumption of warm water, caffeinated and decaffeinated coffee, warm application, and mobilization in the postoperative period are frequently used, economical, effective, and safe interventions without side effects in order to increase bowel function.^{6,10-12}

It is known that warm water, one of the interventions that increase intestinal functions, has positive effects such as helping the return of peristalsis by relieving intestinal spasm.^{9,13} In their study, Çalışkan et al. found that starting oral intake with warm water at the 4th postoperative hour significantly reduced the duration of the first flatulence and positively affected bowel movements.¹³ It was found that there were no studies in the literature on interventions that increase bowel function after thoracotomy, so this study was conducted. This study was conducted to determine the effect of starting oral feeding with warm water after thoracotomy on bowel function.

MATERIAL AND METHODS

SAMPLE

This randomized controlled trial was conducted in the thoracic surgery service of a university hospital between May 2022 and June 2023. The population of the study consisted of patients who underwent thoracotomies. The minimum number of people to be included in the sample was calculated as 58 with an

effect size of 0.7671029, 95% confidence level, and 80% power in the G power (3.1.9.4) (Heinrich-Heine-Universität Düsseldorf, Germany) program, with each group consisting of 29 people.¹⁴ At the risk of possible data loss, 34 patients were included in each group. Inclusion criteria were as follows: not having gastrointestinal system disease; undergoing elective thoracotomy and lobectomy; not using drugs that may affect bowel function; not having sensory disabilities such as literacy, hearing, vision, or mental competence; being over 18 years of age; and volunteering to participate in the study.

RANDOMIZATION

Patients were assigned to the experimental group (EG) and control groups (CG) (1:1 allocation ratio) with the Researcher Randomizer. The patients who did not match the inclusion criteria rejected from study (n=7). The remaining patients (n=68) were randomly assigned to two groups: experimental (34) and control (34) (Figure 1).

BLINDING

Due to the nature of the study, patients could not be blinded to the intervention (drinking warm water).

PRIMARY OUTCOME POINT

The primary point of the study was defined as determining the effect of starting oral intake with warm water on improving postoperative bowel function.

SECONDARY OUTCOME POINT

The secondary point of the study was defined as determining the effect of starting oral intake with warm water on postoperative pain.

DATA COLLECTION TOOLS

Information form: The form included six questions about individual characteristics and factors affecting bowel function (age, gender, chronic disease, body mass index, routine defecation frequency, and exercise status).^{11,13}

Constipation Risk Assessment Scale (CRAS):

The scale was developed by Richmond and Wright.¹⁵ Kutlu et al. carried out a validity and reliability investigation as Turkish. (Cronbach $\alpha=61.9$).¹⁴ Total score and subsection correlations ($r=0.47-0.57$) were

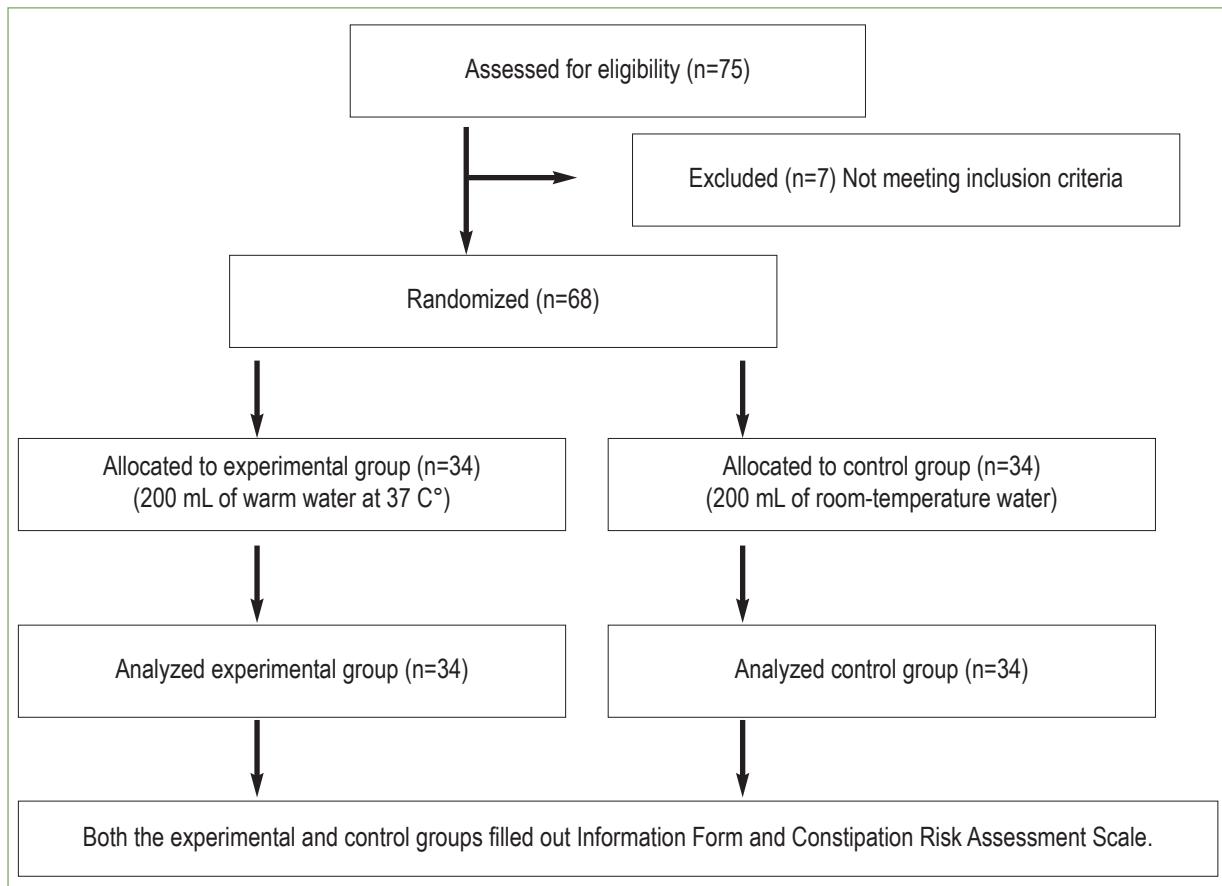


FIGURE 1: Flow diagram of the study.

found to be significant. The scale has a total of 4 subscales: hospital conditions, lifestyle, physiological and psychological status, and medications. The lowest score on the scale is 0, and the highest score is 63. At the end of the scale, the risk level of constipation is determined by summing the scores obtained from the scale. If the score of the scale is ≤ 10 , it is considered low risk, between 11 and 15 as moderate risk, and ≥ 16 as high-risk group.¹⁶

Postoperative follow-up form: The form was prepared by the researchers in line with the literature.^{4,13} The form included a chart evaluating the patients' flatulence, presence of defecation, laxative use, and mobilization status (number of steps). The chart covered a total of 4 days of postoperative follow-up, including 0-24 hours (day 0), 25-48 hours (day 1), 49-72 hours (day 2), and 73-96 hours (day 3).

DATA COLLECTION

In the routine of the service, patients who will undergo lung resection are usually admitted to the service one day before surgery. Patients admitted to the thoracic surgery service for lung resection were informed by the investigator, and informed consent was obtained in writing. According to the randomization table, the form was applied in the preoperative period.

In the postoperative period, patients were evaluated by physicians and nurses in terms of level of consciousness and the presence of any problem preventing oral intake, such as swallowing reflex, as part of routine practice. Patients in the EG and CG did not take any oral fluid or food except water until the 6th postoperative hour. All patients were mobilized at the 8th postoperative hour. A total of 200 mg of tramadol

hydrochloride on postoperative day 0 and 90 mg of tramadol hydrochloride on postoperative days 1, 2, and 3 were administered in the ward routine. On the second postoperative day, the patients were administered CRAS.^{7,11}

EG

In the literature, it was reported that the core temperature was 98.6 °F (37 °C) and 200 mL of water was sufficient to affect intestinal functions.¹³ Therefore, the first oral intake of the patients at the 6th postoperative hour was 200 mL of warm water at 37 °C in heat-insulated glasses. Standard procedures were then performed.

CG

Patients' first oral intake was started with 200 mL of water at room temperature at the 6th hour postoperatively, and other routine procedures were performed.

EVALUATION OF THE DATA

The SPSS version 22.0 (IBM, Armonk, NY, USA) was used to conduct the study's statistical analysis. Descriptive analyses, Mann-Whitney U, Fisher exact test, and Pearson chi-square analysis were used to evaluate the data. In the analysis of the obtained data, a normality test was first performed to determine whether the data were normally distributed. Pearson chi-square test was used to test the differences between the groups for gender, chronic diseases, and

preoperative exercise variables. Mann-Whitney U test was used to compare age, body mass index (kg/m²), frequency of defecation (weekly), patients' pain scores, and CRAS scores according to groups. Chi-square test was used to test the relationships between day 0 (gas flatulence), day 1 (gas flatulence, defecation, oral laxative), day 2 (defecation, oral laxative), and day 3 (gas flatulence, defecation, oral laxative) postoperative variables according to groups. For the results, p<0.05 was considered statistically significant.

ETHICAL APPROACH

Approval from the ethics committee was acquired from the Trakya University Faculty of Medicine Scientific Research Ethics Committee before starting the study (date: January 10, 2022, no: 2/17). Patients participating in the study were informed verbally, and written informed consent was obtained. This study was conducted in accordance with the Declaration of Helsinki.

RESULTS

When the findings of the study were analyzed, it was found that the mean age, gender, presence of chronic diseases, body mass index, defecation habits, and CRASs of the patients in the EG and CG were similar between the groups (p>0.05). It was found that CG patients exercised more than EG patients before surgery (p=0.028) (Table 1).

TABLE 1: Features of patients (n=68).

Features		Experimental group n (%) or $\bar{X} \pm SD$	Control group (n=34) n (%) or $\bar{X} \pm SD$	Test, p value
Age (year)		61.67±8.96	61.91±11.45	p=0.472 U=519.500
Gender	Female	6 (17.6)	9 (26.5)	p=0.380*
	Male	28 (82.4)	25 (73.5)	$\chi^2=0.770$
Chronic diseases	Yes	21 (61.8)	23 (67.6)	p=0.612*
	No	13 (38.2)	11 (32.4)	$\chi^2=0.258$
Preoperative exercise	Yes	14 (41.2)	24 (70.6)	p=0.015*
	No	20 (58.8)	10 (59.4)	$\chi^2=5.965$
Body mass index (kg/m ²)		27.63±5.03	26.08±4.99	p=0.151 U=461.000
Frequency of defecation (weekly)		3.52±1.23	3.32±1.22	p=0.297 U=500.000

*Pearson chi-square test; SD: Standard deviation; U: Mann-Whitney U test.

TABLE 2: Comparison of patients' bowel function and laxative consumption according to groups (n=68).

Postoperative day			Experimental group (n=34) n (%)	Control group (n=34) n (%)	Test, p value
0.	Gas flatulence	Yes	25 (73.5)	8 (23.5)	p=0.000*
		No	9 (26.5)	26 (76.5)	$\chi^2=17.015$
	Defecation	Yes	0 (0)	0 (0)	***
		No	34 (100)	34 (100)	
	Oral laxative	Yes	0 (0)	0 (0)	***
		No	34 (100)	34 (100)	
	1.	Gas flatulence	Yes	34 (100)	p=1.000**
		No	0 (0)	1 (2.9)	
		Defecation	Yes	11 (32.4)	p=0.272*
		No	23 (67.6)	27 (79.4)	$\chi^2=1.209$
		Oral laxative	Yes	3 (8.8)	p=1.000**
		No	31 (91.2)	31 (91.2)	
2	Gas flatulence	Yes	34 (100)	34 (100)	***
		No	0 (0)	0 (0)	
	Defecation	Yes	16 (47.1)	15 (44.1)	p=0.808*
		No	18 (52.9)	19 (55.9)	$\chi^2=0.059$
	Oral laxative	Yes	5 (14.7)	7 (20.6)	p=0.525*
		No	29 (85.3)	27 (79.4)	$\chi^2=0.405$
	Constipation risk		14.82±2.54	15.23±2.47	p=0.515
	Assessment Scale				U=525.500
	3.	Gas flatulence	Yes	34 (100)	p=0.500**
			No	0 (0)	
		Defecation	Yes	12 (35.3)	p=0.324*
		No	22 (64.7)	18 (52.9)	$\chi^2=0.971$
		Oral laxative	Yes	10 (29.4)	p=0.310*
		No	24 (70.6)	20 (58.8)	$\chi^2=1.030$

*Pearson chi-square test; **Fischer exact test; ***An analysis could not be performed because the rates were the same between the groups.

In patients who started oral intake with warm water, the first passing of gas occurred in a shorter time compared to the CG ($p<0.05$). Although the first defecation time was shorter than in the CG, there was no statistically significant difference between the groups ($p>0.05$). Although postoperative laxative use was found to be less in favor of the EG, no difference was found between the groups ($p>0.05$). The mean CRAS in the postoperative period was 14.82 ± 2.54 (intermediate level) in the EG and 15.23 ± 2.47 (intermediate level) in the CG (Table 2). Postoperative pain scores of the patients in the EG were similar ($p>0.05$) (Table 3).

DISCUSSION

There isn't enough study, except for a limited number of gastrointestinal system surgeries, to determine

the effect of starting the first postoperative oral feeding with warm water on bowel function.

In the study, the mean CRAS was 14.82 ± 2.54 (moderate) in the EG and 15.23 ± 2.47 (moderate) in the CG. Similar to our study, on the second postoperative day, Şendir et al. determined the mean score of CRAS as 12.73 ± 4.75 (moderate risk) in their study in orthopedic patients and Ucuza and Aldanmaz determined the mean score of CRAS as 12.98 ± 4.84 in their study in general surgery patients.^{7,17} Factors such as prolonged postoperative bed rest (8 hours), use of opioid analgesics due to high pain level after thoracotomy, and body mass index above normal (EG: 27.63 ± 5.03 , CG: 26.08 ± 4.99) were reported to affect the patients.^{17,18} In this study, factors such as body mass index and pain score, which are among the factors that may increase the risk of constipation, were

TABLE 3: Patients' pain scores according to groups (n=68).

Pain scores	Experimental group (n=34) $\bar{X} \pm SD$	Control group (n=34) $\bar{X} \pm SD$	Test/p value
0 th day (highest)	7.85±1.37	7.20 ±1.62	p=0.093 U=445.000
0 th day (lowest)	3.02±1.11	2.91 ±0.79	p=0.747 U=553.000
1 st day (highest)	3.91±1.23	4.14±1.18	p=0.300 U=498.000
1 st day (lowest)	2.05±0.69	2.14±0.55	p=0.388 U=523.500
2 nd day (highest)	3.02±0.75	3.20±0.80	p=0.247 U=496.000
2 nd day (lowest)	1.55±0.50	1.61±0.55	p=0.707 U=551.500
3 rd day (highest)	1.38±0.49	1.58±0.55	p=0.126 U=469.500
3 rd day (lowest)	1.52±0.50	1.44±0.50	p=0.470 U=527.000

SD: Standard deviation; U: Mann-Whitney U test.

found to be similar between the groups, and the mobilization times of the patients were standard, which ensured that the confounding factors were kept under control. It was found that the number of patients with flatulence on postoperative day 0 in the EG was statistically significantly higher than in the CG. Maru et al., reported that warm water with honey reduced the level of postoperative constipation in patients undergoing coronary artery bypass graft.¹⁹ Göymen et al. conducted a study with the participation of patients undergoing cesarean section, and similar to our study, it was determined that patients who were given warm water had a shorter gas release time compared to the CG.²⁰ Lee et al. it was determined that the group given warm water before colonoscopy had less pain and discomfort than the group given cold water and no water.²¹ Zuo et al. determined that 220 mL of 37°C warm water given to patients with irritable bowel syndrome caused less discomfort and distension than 4°C water.²² In the study, 37°C warm water given to the EG stimulates the hypothalamus, the heat-sensitive receptors, and the effector system emits a signal that causes peripheral vasodilation and sweating. Therefore, vasodilation in the blood vessels of the gastrointestinal tract leads to an increase in the level of hormones such as gastrin and motilin. These hormones have a stimulating effect on the intestinal wall

and contribute to increased motility.⁹ It can be stated that warm water shortens the gas flatulence time due to its physiological effect. In this study, factors such as pain intensity, oral intake time and mobilization time, which are among the factors that may affect the gas out flow time, were found to be similar between the groups, and the standard oral intake and mobilization times of the patients ensured that the confounding factors were kept under control. However, it was determined that patients in the CG exercised more than the EG before surgery. It has been reported that preoperative exercise has positive effects on postoperative bowel functions.²³⁻²⁶ The fact that the EG patients exercised less before surgery is an important finding in measuring the effectiveness of warm water after surgery. The results of the study revealed that the patients were able to pass gas in a shorter time thanks to warm water and their complaints such as distension and pain due to gas decreased.

IMPLICATIONS FOR NURSING PRACTICE

In the literature, most of the patients have difficulty passing gas for various reasons in the postoperative period and experience constipation. Intestinal dysfunction, which is a major problem for patients, leads to different problems and decreases the quality of life.

This study will contribute to the literature in terms of preventing constipation, reducing the use of medication, and improving the quality of care.

LIMITATIONS

The results of the study are limited to the sampled group. In addition, it was not possible to control the type and amount of food for 3 postoperative days after warm water intake. These conditions constitute the limitations of the study.

CONCLUSION

The findings of the study showed that starting oral feeding with warm water after thoracotomy was effective on gas flatulence. Surgical nurses should perform a risk assessment for constipation after thoracotomy and inform patients about the effectiveness of starting their first oral intake with warm water.

Source of Finance

During this study, no financial or spiritual support was received

neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: Ayşe Gökçe Işıklı; **Design:** Ayşe Gökçe Işıklı, Zeynep Kızılçuk Özkan, Fazlı Yanık; **Control/Supervision:** Ayşe Gökçe Işıklı, Zeynep Kızılçuk Özkan, Fazlı Yanık; **Data Collection and/or Processing:** Ayşe Gökçe Işıklı; **Analysis and/or Interpretation:** Ayşe Gökçe Işıklı, Zeynep Kızılçuk Özkan, Fazlı Yanık; **Literature Review:** Ayşe Gökçe Işıklı, Zeynep Kızılçuk Özkan, Fazlı Yanık; **Writing the Article:** Ayşe Gökçe Işıklı, Zeynep Kızılçuk Özkan, Fazlı Yanık; **Critical Review:** Ayşe Gökçe Işıklı, Zeynep Kızılçuk Özkan, Fazlı Yanık; **Materials:** Ayşe Gökçe Işıklı.

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