



Research Article

Effects of Heating Therapy on Pain, Anxiety, Physiologic Measures, and Satisfaction in Patients Undergoing Cystoscopy

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SUMMARY

Purpose: Cystoscopy is the most common procedure used to diagnose urological diseases; however, it is invasive and can be associated with pain and anxiety. Although pain relieving medications, such as lidocaine lubricants, are used during cystoscopy, the procedure still causes discomfort. Therefore, non-medical intervention is needed to reduce pain and anxiety during the procedure and increase patient satisfaction. The aim of this study was to evaluate the effect of heating therapy on pain, anxiety, physiologic measures, and satisfaction during cystoscopy.

Methods: This was a single-blinded, single-center, randomized controlled trial. A total of 145 participants who underwent cystoscopy between August 2017 and October 2017 were recruited and randomly assigned to an experimental or control group. Before and after cystoscopy, all the participants self-reported the degree of pain they felt, while pain was objectively assessed by trained nurses. Anxiety was evaluated using the validated Korean version of the State-Trait Anxiety Inventory. Blood pressure and pulse rate were also recorded as physiologic measures. After cystoscopy, satisfaction was measured in the experimental group only using the Korean version of the Client Satisfaction Questionnaire.

Results: Heating therapy reduced both subjective and objective pain and anxiety in the experimental group compared to the control group. Heating therapy also decreased the systolic and diastolic blood pressure and pulse rate in the experimental group compared to the control group. Women reported significantly greater satisfaction than men.

Conclusion: Heating therapy during cystoscopy is a convenient and effective nursing intervention that decreases pain and anxiety and enhances patient satisfaction.

The study has been registered with the Clinical Research Information Service Registry, and the trial registration number is [12616000803493].

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Introduction

Cystoscopy is now preferentially recommended over invasive testing for the evaluation of asymptomatic microscopic hematuria and thus the identification of bladder cancer or other urological diseases [1–3]. However, even though cystoscopy is the most common procedure in daily urology practice, it is invasive and can be associated with pain and discomfort [4]. In particular,

conscious patients are directly exposed to various stimuli during cystoscopy, which increases anxiety [5]. The pain and anxiety associated with cystoscopy can activate the sympathetic nervous system [6], resulting in various physiological responses, such as increased cardiac output, elevated blood sugar level, peripheral vascular contraction, and elevated blood pressure (BP) [7].

A variety of medical interventions, such as intra-urethral injection of lidocaine lubricant [8] or flexible cystoscopy [9], have been used to alleviate pain and anxiety during cystoscopy. Flexible cystoscopy is generally less painful than rigid cystoscopy; however, it is expensive, visualizes a smaller area, and requires more skill from urologists, and is therefore not favored [10,11]. In addition, some studies have reported that lidocaine lubricants can relieve pain and discomfort during cystoscopy [12]. However, some other authors have described self-reports of discomfort from patients who were administered lidocaine lubricants during cystoscopy

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[13]. Thus, despite the use of these medical interventions, patients undergoing cystoscopy still complain of post-procedural pain and anxiety [2].

Heating therapy involves the use of heat to relax the muscles [14], facilitate blood circulation [15,16], and promote metabolism [17], thus relieving pain [18–20]. It is inexpensive, saves time, and requires no special training or skill [16,20]. Furthermore, heating therapy elicits a sympathetic reaction that increases blood circulation in areas other than those directly in contact with heat [21,22]. Heating therapy can also relieve pain by temporarily increasing the threshold of pain delivery fibers [18].

Generally, acute pain causes anxiety, which increases the fear of pain, depression [23], sleep disturbances [24], and interferes with concentration and cognition [25]. Anxiety is triggered by a threat stimulus or an anticipated threat. As such, it increases attention to the trigger stimulus, leading to physiological arousal and avoidance actions [26]. Anxiety around pain causes individuals to avoid the stimulus and over-react to the body sensations that accompany it.

According to previous studies on the use of non-pharmacological interventions during cystoscopy, music therapy is an effective intervention that lowers pain and anxiety in patients during cystoscopy [27–29]. In another study, playing a video appeared to be the best distraction method during cystoscopy [30]. Hand-holding during cystoscopy has also been shown to reduce patients' anxiety, pain, and dissatisfaction [31]. Recently, two studies demonstrated that heating therapy is an effective intervention; however, only females were evaluated in those studies [32,33].

Therefore, the aim of the present study was to measure the effects of heating therapy on pain, anxiety, physiological measures that are affected by pain and anxiety, and satisfaction in patients undergoing cystoscopy in South Korea. The objectives were to determine: (1) whether the experimental group experienced more pain relief than the control group; (2) whether the experimental group experienced lower anxiety than the control group; and (3) whether the satisfaction differed between men and women in the experimental group.

Methods

Study design

This was a single-blinded, single-center, randomized controlled trial (RCT). It was conducted for 3 months, from August 2017 to October 2017.

Setting and sample

We included patients who were to undergo cystoscopy for the diagnosis and treatment. The inclusion criteria were as follows: (1) patients older than 18 years; (2) had sufficient intellectual capacity to communicate and comprehend the details of the study; (3) understood the purpose of the study; (4) provided informed consent; and (5) had urinary problems such as blood in the urine, urinary tract infections, overactive bladder, pelvic pain, etc. We excluded patients diagnosed with bladder cancer as their diagnoses may induce anxiety. Patients who were already in pain were excluded because their pain could not be differentiated from pain due to cystoscopy.

Initially, 166 eligible patients were assessed for possible inclusion in the trial during their scheduled visit for cystoscopy at the urology outpatient clinic of [masked for blinded review]. Of these, seven patients did not meet the inclusion criteria, five patients declined to participate, and eight patients had other reasons for not participating in the study. A total of 146 patients were randomized at a 1:1 ratio into two groups using computer-generated random

numbers. Seventy-three patients each were allocated to the control and experimental groups. However, only 72 patients were enrolled in the control group because one patient refused to complete the post-intervention survey and dropped out. Figure 1 shows the Consolidated Standards of Reporting Trial diagram of the procedure of patient enrollment, randomization, and analyses in this study.

The sample size for the RCT was calculated using G*power 3.1.5 freeware [34], based on an effect size of 0.7 for pain intensity according to the methods used in a previous study on the effect of music therapy during cystoscopy [35] since there was no study on heating therapy for cystoscopy in urology when we planned our study. With a statistical power of 0.95, a two-tailed significance level of 0.05, and an allocation ratio of 1 (control vs. experiment), we estimated a sample size of 110 patients in total. We set the attrition rate at 33.0% considering high dropout rates in human health RCT [36]. Thus, the recruitment target was 146 patients.

Ethical considerations

Ethical approval for this study was provided by the Gil Hospital Institutional Review Board [No. (GCIRB2017-242)]. The study has been registered with the Clinical Research Information Service Registry, and the trial registration number is [12616000803493]. Patients were informed that their participation was voluntary and that they could withdraw from the study at any time. They were reassured that their withdrawal would not prevent them from receiving the care that they would normally receive. The participants were identified using research codes, and the research information remained confidential.

Measurements

Pain

The patients' subjective pain was assessed immediately after the procedure using a combined numeric rating scale and face rating scale to maximize our understanding of the self-reported pain associated with cystoscopy. Patients were asked to indicate how much pain they felt from 0 (no pain) to 10 (the worst pain).

Before beginning the study, one male and one female nurse were trained to assess pain and check pain monitoring. After training, they consistently measured pain values to assess the patients undergoing cystoscopy. Using the same methods described by Suh in 1990, they observed the patients' pain objectively during the cystoscopy procedure, monitoring four areas: (1) sweating; (2) changes in facial expressions; (3) changes in posture; and (4) changes in the voice [37]. A five-point Likert scale (1–5) was used to score each area, with the total score ranging from 4 (least pain) to 20 (most pain). In the present study, Cronbach's alpha for pain was 0.82.

Anxiety

We measured the anxiety level using the validated Korean version of the State-Trait Anxiety Inventory (STAI), which comprises two subscales of 20 multiple-choice questions each. The STAI was developed by Spielberger, Gorsuch and Lushene in 1970 [38] and was translated into Korean by Kim and Shin in 1978 [39]. Each subscale of the STAI, a 5-point scale (1–5), is summed up to obtain a total score between 20 and 80 points, with larger scores indicating greater anxiety levels [38,39]. In the present study, we measured STAI trait anxiety, which can affect state anxiety. Cronbach's alpha for STAI trait anxiety was 0.82, whereas that for STAI state anxiety was 0.88.

Physiological measures

The physiological measures we recorded included BP and pulse rate (PR), both of which could be affected by pain and anxiety [6].

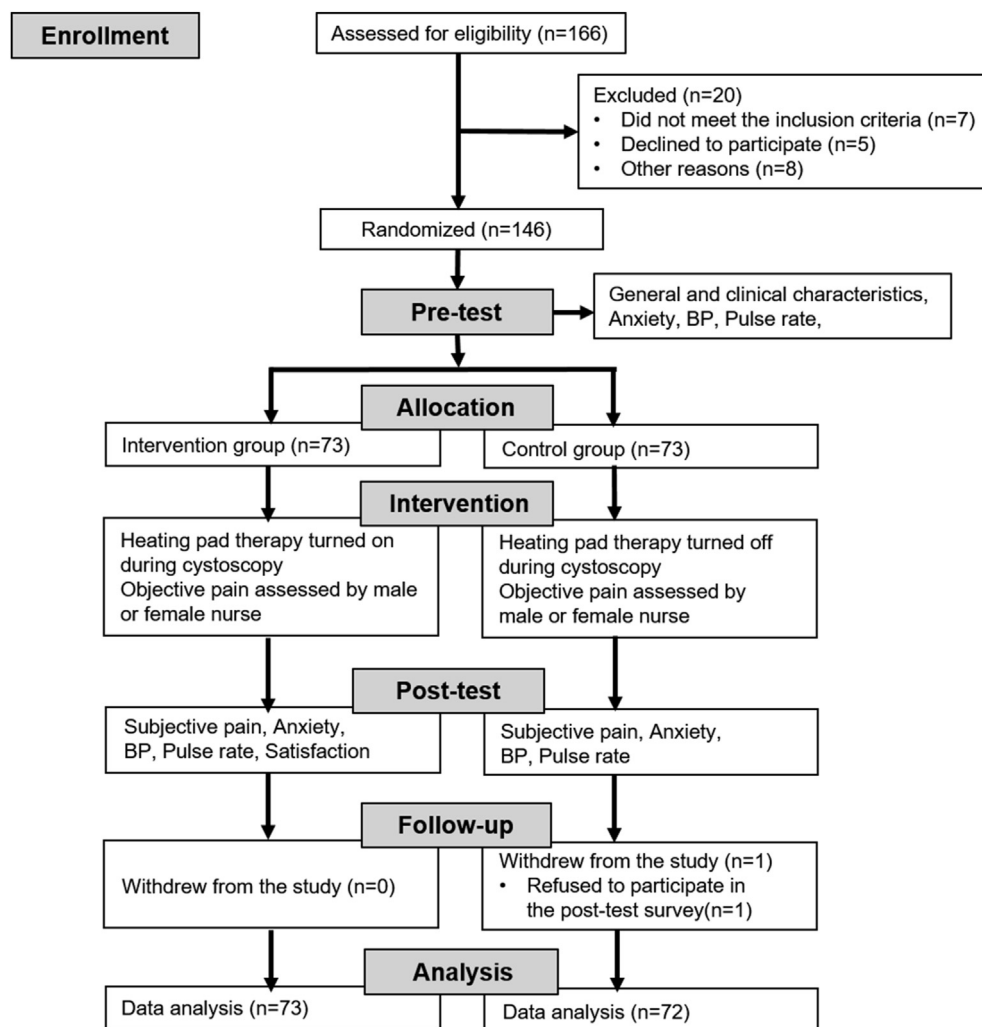


Figure 1. CONSORT Flow Diagram. CONSORT = Consolidated Standards of Reporting Trial.

BP and PR were measured thrice on each patient's left brachial artery using an electronic OMRON M3 Comfort® HEM –7134-E BP monitor (Omron Healthcare Co., Ltd. Kyoto, Japan), with 30 seconds between each measurement. An interval of no less than 1 minute was allowed between measurements, and the total measuring time was within 5 minutes. The measurements were taken within 10 min before and after the cystoscopy procedure. We used the average BP and PR values for analysis.

Satisfaction

Patient satisfaction was assessed using the Korean version of the Client Satisfaction Questionnaire (CSQ-8 Korean). The CSQ-8 was developed by Attkisson and Greenfield in 1994, and they permitted the use of the CSQ-8 Korean through a confirmation e-mail [40]. The questionnaire consisted of eight questions, each answered on a four-point scale (score range of 1–4) with the total score ranging from 8–32; higher values indicate higher satisfaction. In the present study, Cronbach's alpha for satisfaction was 0.90.

Procedure

Cystoscopy was performed in a 1-day outpatient clinic by eight qualified urologists following a standard protocol. All cystoscopies were performed with the patients placed in the dorsal lithotomy position; no additional manipulations, such as stent removal or

bladder biopsy, were performed. Before each cystoscopy procedure, the external genital area was disinfected using povidone-iodine, and 10 mL of 2.0% lidocaine jelly was instilled in the intra-urethral area. Cystoscopy was performed using a rigid cystoscope (Karl Storz, Tuttlingen, Germany) connected to a digital video monitor, which was used for all procedures.

In the experimental group, the electric heating pad therapy was initiated before disinfection and lidocaine gel injection and continued throughout the rigid cystoscopy procedure. The pad was warmed to a temperature between 40°C and 45°C and applied to the lower abdomen or sacrum area of the patient. The control group underwent cystoscopy with the electric heating pad therapy turned off. All patients viewed their procedures on a video monitor while they were being performed, and the urologist briefly mentioned each step of the procedure (i.e., instillation of analgesic, insertion of the scope, and intravesical scoping). The duration of the entire procedure was 20 minutes per patient. The urologist performing the treatment and the two nurses assessing objective pain, BP, and PR were blinded to the allocation; therefore, variables other than the experimental treatment were not affected.

Data collection

Data were collected after all participants provided informed consent. Most patients provided self-reported consent; however,

we helped some elderly patients who had difficulty in reading the small letters on the survey. Before cystoscopy, a pre-test was carried out. Sociodemographic and clinical characteristics were recorded, and the state and trait anxiety levels were measured within 10–15 min. BP and PR were measured 10 min before cystoscopy. During the procedure, one male and one female nurse who assisted with the cystoscopy observed the patients' pain objectively. The post-test assessment, which included the evaluation of subjective pain, state anxiety, and BP and PR measurements 10 min after cystoscopy, was then carried out. Satisfaction was measured only in the experimental group.

Data analysis

We used IBM SPSS 25.0 for data analysis (IBM Corp, Armonk, NY, USA). Nominal variables were expressed as numbers and percentages (%) and compared using the Chi-squared test, whereas continuous variables were presented as means with standard deviations. First, the Kolmogorov–Smirnov test was conducted to assess the normal distribution of all continuous variables. Since STAI-S anxiety, subjective and objective pain, and satisfaction scores were not normally distributed, they were compared between groups using the Mann–Whitney U test. STAI-S anxiety, subjective and objective pain scores, and satisfaction were compared between the two groups using the Student's t-test for normally distributed data. Additionally, systolic and diastolic BP and PR were analyzed using an analysis of covariance (ANCOVA) model to control the covariates (history of cystoscopy and the basic values of dependent variables) and identify the effects of heating therapy on the experimental group. Anxiety (STAI-S) and subjective and objective pain were analyzed using ranked ANCOVA after rank transformation to correct the covariates. All $p < .05$ were considered statistically significant.

Results

Baseline characteristics and homogeneity test

The demographic data and clinical variables are presented in Table 1. The average ages of the experimental and control groups were 63.05 and 65.50 years, respectively, and most of the participants in both groups were men. There were no statistically significant differences between the two groups in terms of age, sex, education level, reason for cystoscopy, history of bladder surgery,

and STAI-T. However, the control group showed a significantly higher frequency of history of cystoscopy than the experimental group ($\chi^2 = 10.15, p = .001$).

Homogeneity test for the outcome variables of the two groups pre-intervention

We assessed STAI-S anxiety and physiological measures such as BP and PR pre-intervention (Table 2). Pain was not measured pre-intervention because none of the participants had pain before cystoscopy. Systolic ($t = 2.30, p = .023$) and diastolic ($t = 2.73, p = .007$) BP were significantly higher in the experimental group than in the control group. However, PR and STAI-S anxiety were not significantly different between the two groups.

Effect of heating therapy on the outcome variables of the two groups

The effects of heating therapy on pain, STAI-S anxiety, systolic and diastolic BP, and PR in the two groups are presented in Table 3. In this study, ANCOVA or ranked ANCOVA was used to control the covariates (history of cystoscopy and the basic values of dependent variables). Post-intervention, subjective ($F = 25.25, p < .001$) and objective pain ($F = 35.55, p < .001$) were significantly lower in the experimental group than in the control group. In addition, STAI-S anxiety ($F = 55.74, p < .001$), systolic ($F = 6.91, p = .010$) and diastolic ($F = 10.57, p = .001$) BP, and PR ($F = 33.97, p < .001$) were significantly decreased in the experimental group compared to the control group.

Satisfaction

Satisfaction of the participants in the experimental group was measured after cystoscopy (Table 4). The mean total satisfaction score was 27.86. Total satisfaction reported by women after heating therapy was significantly greater than that reported by men ($Z = -2.25, p = .024$). In particular, women felt more satisfied than men in terms of the following: (1) "anxiety reduction" ($Z = -1.99, p = .046$); (2) "deal more effectively with problems through heating therapy" ($Z = -2.08, p = .037$); and (3) "intention of coming back to heating therapy" ($Z = -2.07, p = .038$).

Discussion

Heating therapy has been used for decades to relieve muscle pain, such as back pain and dysmenorrhea [41,42]. Nevertheless, in the nursing clinical area, the scientific evidence for the analgesic effectiveness of heating therapy is limited because well-designed research studies are lacking [18]. The results of this RCT provide important nursing evidence on pain and anxiety in patients undergoing cystoscopy. In the present study, we evaluated the use of heating therapy as a non-medical nursing intervention for the

Table 1 Homogeneity Test for the General and Clinical Characteristics of the Two Groups ($N = 145$).

		Exp. ($n = 73$)	Con. ($n = 72$)	χ^2/t	p
		Mean (SD)/N (%)			
Age, years		63.05 (11.04)	65.50 (11.34)	-1.32	.190
Gender	Men	39 (53.4)	48 (66.7)	2.64	.104
	Women	34 (46.6)	24 (33.3)		
Education level	Below middle school	33 (45.2)	42 (58.3)	2.50	.114
	Above high school	40 (54.8)	30 (41.7)		
Reason for cystoscopy	Diagnosis	57 (78.1)	48 (66.7)	2.36	.124
	Treatment	16 (21.9)	24 (33.3)		
History of cystoscopy	Yes	36 (49.3)	54 (75.0)	10.15	.001
	No	37 (50.7)	18 (25.0)		
History of bladder surgery	Yes	33 (45.2)	39 (54.2)	1.16	.281
	No	40 (54.8)	33 (45.8)		
STAI-T		47.19 (7.23)	48.48 (5.11)	-1.25	.215

Exp. = experimental group; Con. = control group; SD = standard deviation; STAI-T = state-trait anxiety inventory-trait anxiety.

Table 2 Homogeneity Test for the Anxiety and Physiological Measures of the Two Groups ($N = 145$).

		Exp. ($n = 73$)	Con. ($n = 72$)	t/Z	p
		Mean (SD)			
Anxiety (STAI-S) ^a		56.26 (6.74)	57.27 (5.52)	-0.76	.450
BP, mmHg	Systolic	137.55 (19.41)	130.79 (15.78)	2.30	.023
	Diastolic	81.49 (10.28)	76.89 (9.99)	2.73	.007
PR, beats/min		77.64 (12.54)	75.65 (10.83)	1.02	.308

Exp. = experimental group; Con. = control group; BP = blood pressure; PR = pulse rate; SD = standard deviation; STAI-S = state-trait anxiety inventory-state anxiety.

^a Mann–Whitney U-test.

Table 3 Comparison of the Pain, Anxiety, and Physiological Measures of the Two Groups (N = 145).

Variables	Group	Pre-intervention		Post-intervention		F	p
		Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)		
Pain*	Subjective	Exp.(n = 73)	-	4.10 (1.30)	25.25	<.001	
		Con.(n = 72)	-	5.15 (1.17)			
	Objective	Exp.(n = 73)	-	6.96 (2.30)	35.55	<.001	
		Con.(n = 72)	-	9.18 (2.42)			
Anxiety (STAI-S)*	Exp.(n = 73)	56.26 (6.74)	43.78 (5.48)	55.74	<.001		
	Con.(n = 72)	57.27 (5.52)	50.87 (5.70)				
BP, mmHg	Systolic	Exp.(n = 73)	137.55 (19.41)	132.30 (20.32)	6.91	.010	
		Con.(n = 72)	130.79 (15.78)	133.61 (17.77)			
	Diastolic	Exp.(n = 73)	81.49 (10.28)	77.32 (8.88)	10.57	.001	
		Con.(n = 72)	76.89 (9.99)	78.93 (11.82)			
PR, beats/min	Exp.(n = 73)	77.64 (12.54)	74.07 (11.77)	33.97	<.001		
	Con.(n = 72)	75.65 (10.83)	78.04 (11.61)				

*ANCOVA or ranked ANCOVA after rank transformation were applied to adjust for history of cystoscopy and the baseline values of dependent variables.

Exp. = experimental group; Con. = control group; BP = blood pressure; PR = pulse rate; SD = standard deviation; STAI-S = state-trait anxiety inventory-state anxiety.

management and relief of pain, reduction of anxiety, and increase of satisfaction in patients undergoing cystoscopy. Although many medical intervention studies have been conducted to evaluate the ideal therapy for the reduction of pain and discomfort during cystoscopy, only a few nursing intervention studies are available.

Heating therapy showed an effective reduction in the score for subjective and objective pain. The results demonstrating relieved pain in the present study are consistent with those of the other two studies on women who underwent cystoscopy in which the experimental group experienced less pain when compared with the control group [32,33]. This pain reduction may have occurred because heating therapy increases blood flow [14,19] and temporarily increases the threshold of pain delivery fibers [43]. According to review articles, heating therapy, by increasing the temperature of the skin and muscle has the following physiological effects: (1) pain relief, (2) increased blood flow and metabolism, and (3) increased elasticity of the connective tissue [44]. An increase in tissue temperature stimulates vasodilation and increases tissue blood flow, which promotes healing by increasing the supply of nutrients and oxygen to the site of injury [18]. As a result, the rate of local tissue metabolism is also increased by warming, which may further promotes healing and relieve pain [44].

Heating therapy also resulted in significantly lower anxiety in patients undergoing cystoscopy. These results were consistent with those reported by the cystoscopy [32] and urodynamic studies [33] conducted on women. They reported that heating therapy significantly lowered the state anxiety scores of the study subjects compared to those of the control subjects. Heating therapy relieves tension and stress and helps relieve feeling [45]. Heating treatments such as spa or balneotherapy also have anxiolytic effects and have previously been applied to ameliorate stressful interventions [46,47].

Previous non-pharmacological intervention studies on patients who were undergoing urological procedures involved music therapy

[29,35,48], hand-holding or use of a stress ball [30,31], viewing of the cystoscopy video with explanation [49], virtual reality distraction [50], and heating therapy [32,33]. The authors of one study that involved music therapy suggested that music therapy was the most effective intervention for the reduction of pain and anxiety [51]. Although very few studies have investigated heating therapy compared to music therapy, previous studies on heating therapy demonstrated excellent effects in terms of reduction of pain and anxiety [32,33]. To identify the effects of heating therapy in patients undergoing cystoscopy in the future, more studies of heating therapy as a non-pharmacological nursing intervention are needed.

We tried to identify the effects of heating therapy on the regulation of BP and PR. Before the initiation of treatment in the present study, the systolic and diastolic BPs of the participants in the experimental group were higher than those of the participants in the control group; thus, there was no homogeneity between the two groups. To solve this problem, we used ANCOVA to compare the effect of heating therapy. As the results show, the decrease in systolic BP, diastolic BP, and PR after the procedure were significantly higher in the experimental group than in the control group. According to previous studies, heating therapy could reduce the resting heart rate and noradrenaline release [52] and also decrease the BP by improving the endothelium-dependent dilatation [37], arterial stiffness, and intima media thickness [53]. In addition, heating therapy showed positive effects on the cardiovascular system according to a review article that consisted of articles published over a period of 25 years [45]. Therefore, heating therapy is a useful nursing intervention for patients undergoing cystoscopy.

Unlike our results, a previous study indicated that although heating therapy decreased the anxiety, pain, and distress of women undergoing cystoscopy, their systolic BP, diastolic BP, and PR were increased [32]. In another urodynamic study, heating therapy was used by Kim et al in 2018 to treat women with stress urinary incontinence, and their results showed no significant difference in

Table 4 Comparison of Satisfaction According to Sex in the Experimental Group that Received Heating Therapy.

	Total (n = 73)	Male (n = 39)	Female (n = 34)	Z	p
	Mean (SD)				
Total score of satisfaction with heating therapy (range: 8–32 score)	27.86 (3.60)	26.95 (3.80)	28.91 (3.08)	−2.25	.024
1. Quality of heating therapy	3.55 (0.50)	3.49 (0.51)	3.62 (0.49)	−1.11	.267
2. Pain relief conferred by heating therapy	3.27 (0.71)	3.13 (0.73)	3.44 (0.66)	−1.87	.062
3. Anxiety reduction by heating therapy	3.41 (0.74)	3.23 (0.84)	3.62 (0.55)	−1.99	.046
4. Recommend heating therapy to a friend	3.47 (0.50)	3.36 (0.49)	3.59 (0.50)	−1.95	.052
5. Satisfaction with application time of heating therapy	3.38 (0.57)	3.33 (0.48)	3.44 (0.66)	−1.25	.210
6. Deal more effectively with problems through heating therapy	3.52 (0.65)	3.36 (0.63)	3.71 (0.63)	−2.08	.037
7. Overall satisfaction with heating therapy	3.59 (0.49)	3.49 (0.51)	3.71 (0.46)	−1.88	.060
8. Intention of coming back to heating therapy	3.67 (0.47)	3.56 (0.50)	3.79 (0.41)	−2.07	.038

the BP and PR measurements between the experimental and control groups [33]. In both of these studies, a small sample of 37 individuals each was assigned to the experimental and control groups; therefore, objective physiological BP and PR may not have had a significant effect. In the future, various strict randomized studies might be needed to investigate whether heating therapy mitigates the changes in physiologic measures induced by cystoscopy.

Finally, patient satisfaction is a commonly used indicator of the quality of medical services and the effectiveness of nursing interventions [54]. In the present study, the satisfaction survey regarding heating therapy was only administered to the experimental group because it addressed satisfaction with heating therapy during cystoscopy and thus could not be administered to the control group. To identify patient satisfaction with the nursing intervention, we compared the responses of the participants who received heating therapy. When the score of total satisfaction was converted into 100%, women reported 90% satisfaction and men reported 84% satisfaction. Specifically, women were more satisfied in terms of the following survey items: “anxiety reduction by heating therapy,” “deal more effectively with problems through heating therapy,” and “intention of coming back to heating therapy.” Therefore, heating therapy can be considered an effective nursing intervention for women undergoing cystoscopy as it may provide psychological stability and physical relaxation, thus reducing anxiety and discomfort. A plausible reason for these results may be that women tend to favor heating therapy more than men in Korean culture [55].

There were some limitations to the present study. First, measurement of patients' subjective pain and anxiety during the cystoscopy examination was done by memory immediately after the examination because it is difficult to measure pain and anxiety levels during cystoscopy. This should be considered when interpreting the relationship between BP/PR and pain/anxiety during the test. Second, despite using a single-blinded, RCT, participants might have known those who were in the control or experimental group depending on whether the warm heating pad was applied after cystoscopy. Therefore, we suggest the use of three test groups, including a control group with the application of a heating pad which is turned off, the experimental group with the application of a heating pad which is set to a low level of heating, and other experimental group with the application of a warm heating pad. Third, although the same cystoscopy protocol was used for each patient, the procedure was not conducted by the same urologist. In future studies, it is necessary to have the same urologist perform the cystoscopy procedure to reduce confounding factors. Moreover, the outcomes should be interpreted with caution because we included men with benign prostatic hypertrophy, which can cause pain during cystoscopy. Lastly, post-cystoscopy pain tends to persist in some patients and may occasionally last up to 2–3 days after the procedure; therefore, we suggest that in future studies, [4].

Conclusion

Heating therapy reduces the pain and anxiety in patients undergoing cystoscopy and decreases their BP and PR, which are physiological indicators of pain and anxiety. Considering the high satisfaction score recorded in the present study, we believe that heating therapy is a useful independent nursing intervention. Moreover, as heating therapy using an electric heating pad is simple, convenient, and cost-effective, it may be considered an effective non-pharmacological nursing intervention.

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Conflict of interest

The authors declare no conflicts of interest.

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