

# Effects of Aroma Foot Bath on Urination Status and Stress related to Urination in Patients with Benign Prostatic Hyperplasia (BPH)

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**Purpose:** The purpose of this study is to evaluate effects of aroma foot bath on urination status (Prostatic Symptom and bother score due to urinary symptoms) and stress related to urination in patients with benign prostatic hyperplasia (BPH). **Methods:** This study consists of pre- and post-tests in a non-equivalent group design. The 52 BPH patients selected by random sampling in G City were assigned to two groups (experimental group  $n=26$ , control group  $n=26$ ). Data of their general characteristics, urination status and stress related to urination were collected using self-reported questionnaires. Aroma Foot Bath was performed to the experimental group for 15-20 minutes every day for a week. Descriptive statistics and independent t-test were used for the analyses in this study with the SPSS/WIN 21.0 version program. **Results:** Prostatic symptom and bother score due to urinary symptoms in the experimental group were improved than those in the control group ( $t=-7.94$ ,  $p<.001$ ). Compared to the control group, the stress related to urination in the experimental group ( $t=-8.78$ ,  $p<.001$ ) was significantly reduced ( $t=-5.21$ ,  $p<.001$ ). **Conclusion:** The results of this study indicate that aroma foot bath is effective in improving urination status and reducing stress related to urination in BPH patients.

**Key Words:** Aromatherapy, Feet, Baths, Urination disorders, Stress, Psychological

## INTRODUCTION

### 1. Necessity of the Study

With westernized diet and changes in life environments, BPH (Benign Prostatic Hyperplasia) patients are increasing in Korea. According to a report [1] BPH showed 13.7% increase annually as it has increased 67.3% for 5 years from 2006 to 2010. By age, old age over 50s occupies 90.5% in BPH population. Considering the trend that BPH is prevalent in old age, it is expected that old BPH patients keep increasing with the ageing population.

BPH is a typical disease clinically causing lower urinary tract symptoms in males meaning increase in prostate volume. Major symptoms of BPH are lower urinary tract symptoms related to storage and discharge disorder of bladder including pollakisuria, nocturia, overactive bladder, delayed urination, and severed urination. It is reported that urination related lower urinary tract symptoms

make important effects on BPH patients, their families and society [2]. For example, previous studies reported that quality of sleep was degraded and physical health related life quality was lowered [3,4]. Additionally urination issues may cause urination related anxiety or psychological problems such as depression, which may lead to lowered mental health related quality of life [4,5]. Diverse physical and mental issues caused by BPH have been reported. Therefore, it is necessary to assess the effects of BPH symptoms in order to manage BPH patients properly. However, few studies have researched the urination related stress of BPH patients.

The most effective treatment to remove BPH caused lower urinary tract symptoms is surgical extirpation. However, even though there is pathologically confirmed BPH and various BPH symptoms, it is not necessarily removed through operation. According to level of discomfort and pains that the patient feels, primary treatment will be designated. With increased BPH patients various medicines

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such as alpha-reductase inhibitors and  $\alpha$  blockers have been developed and effectively applied to clinical treatment [6]. As recently BPH specific medicines have been developed, scope of pharmacotherapy has been continuously expanded [7]. However, some patients refuse to take medication because of side effects such as hyposexuality, gynecomastia and vertigo. Typical male pattern alopecia losing hair from forehead to crown is known to have direct and clear connection with BPH pharmacotherapy [8]. Although pharmacotherapy mitigates symptoms of BPH as such, it has some side effects. Therefore, public remedies are increasingly sought after. Most of previous studies dealt with prostate cancer patients [9], and there are few studies on nursing interventions to improvement symptoms of BPH patients.

According to a previous study [10], medical expenses of old aged patients with chronic disease requiring long-term treatment such as urologic diseases including prostate have enormously increased. To improve the situation caused by increased medical cost, it is addressed that countermeasures related to spontaneous cures such as oriental herb therapy, manipulated therapy, hydrotherapy, herb and biological therapy and mental and physical therapy should be made [10]. Hydrotherapy means all the methods using water for inner and outer health and cosmetic purposes. When water at a certain temperature contacts skin directly or indirectly, capillary vessels of skin are dilated, blood flow increases, blood vessel is expanded and bodily waste is removed.

Foot bath is a division of hydrotherapy putting two feet in warm water approximately 40°C. It is reported that foot bath makes your blood smooth, antagonism of autonomic nervous system normalized, brain tension lowered and body functions effectively improved as your whole body becomes warm starting from toes when you have a foot bath [11]. Recently, studies verifying effects of foot bath are increasing. The previous Korean studies have verified effects of foot bath on stress, fatigue, lower leg edema and sleeping of students, operation room nurses and other diverse populations [12,13]. Overseas studies also verified effects of foot bath and there is a report that it has effects on respiratory pulse [14]. Although foot bath is expected to have diverse effects, it has not been sufficiently researched up to now. Therefore, studies that can help actual health issues should be continued. Lee et al. [13] proposed a study verifying effects of aroma foot bath therapy. Oh and Gang [12] reported that physical and psychological stress and fatigue have decreased more in fermented extract foot bath group and aroma oil foot bath group than in simple foot bath group.

Aroma therapy is one of alternative therapies that various effective ingredients in essential oils improve incongruity of body and mind, balance them, encourage bodily strength and enables body to promote natural healing. Aroma oil directly goes into bloodstream through skin or makes effects through chemical transformation by reacting to neurotransmitter, hormone and enzyme. Essential oil absorbed in our body through many different paths circulates the whole body and continues healing process through chemical reactions to hormones and enzymes while staying in specific organs with affinity for longer time such as days [15]. It is not accumulated in the body unlike general chemicals but is metabolized in liver. It has mostly been discharged through urination and some of it is discharged through breath, stool and sweat [15]. There are many different kinds of essential oils. It seems like more than 300 kinds. Out of them 40 kinds of essential oils are usually used ones and it is more effective to mix 2 or 3 kinds together which have similar effects rather than using a single oil [16]. Juniper berry and fennel are known to have effects in blood circulation and detoxification, and lavender is reported to have effects in stress mitigation [11]. Juniper berry has been known to have effects in backache, arthritis, bladder infection and urinary tract infection which are caused by coldness in the body, as it has warm characteristics. Fennel can be used for urogenital disease because of diuretic and detoxification ingredients [11]. Lavender is reported to help stress and blood pressure management in many previous studies [17]. Therefore, it is meaningful to verify if foot bath which warms patient's body and helps bodily waste and fatigue materials discharged by activating blood circulation to mitigate BPH patients' symptoms and aroma therapy in which patients can smell aroma with nose and absorb good ingredients through skin have effects of natural healing in that it provides basic materials for evidence centered nursing application. However, previous studies related to BPH related intervention have focused on medication, thermal treatment device or acupuncture [18,19] and few studies on interventions that can be applied to patients easily from the perspective of nursing have been made. Accordingly, this study was tried to secure grounds to utilize aroma foot bath therapy as nursing intervention to identify urination status and mitigate urination related stress of BPH patients.

## 2. Hypotheses

To achieve the purpose of this study, the following hypotheses were set.

Hypothesis 1. There is difference in urination status be-

tween experimental group with aroma foot bath and control group without aroma foot bath.

Hypothesis 2. There is difference in urination related stress between experimental group with aroma foot bath and control group without aroma foot bath.

## METHODS

### 1. Design

This study is a nonequivalent control group pretest-posttest design quasiexperimental study to identify effects of aroma foot bath on urination status and urination related stress of BPH patients.

### 2. Subjects

The subjects of this study were 52 patients at home in G city who are neither inpatients nor outpatients of the hospital after being diagnosed as BPH. Screening criteria are like the followings.

- Those who do not have cognitive impairments and can communicate verbally
- Those who understand study purpose and give consent to participate in the study
- Those who are diagnosed as BPH as middle-aged men over 40
- Those who have no history of cancer including prostate cancer and urogenital surgeries
- Those who do not have open wounds or bleeding disorders on foot

For the purpose of the study, minimal sample size for t-test was calculated. When setting number of groups=2, significant level .05, effect size .80, and power  $(1-\beta)=.80$ , it was found that 26 are needed per group. Considering missing data, 30 people per group were recruited. Excluding 8 subjects who stopped foot bath in the middle of the experiment or answered the survey insincerely, 52 subjects were selected. After getting written consent from candidates who agreed on participation, they were placed in experimental group and control group randomly through coin tossup.

### 3. Measures

#### 1) Urination status

Urination status was measured by International Prostatic Symptom Score; I-PSS [20,21], which BPH Conference hosted by World Health Organization (WHO) had approved. For the purpose of the study, permission to use was

acquired from the developer and Korean language translator. I-PSS is composed of 2 areas or 8 questions such as lower urinary tract symptoms (feeling of residual urine, pollakisuria, intermittent urination, feeling of urgency, weak urination, delayed urination and nighttime urination) and discomfort from urination symptoms. The range of each lower urinary tract symptom excluding nighttime urination was from 0 (None at all) to 5 (almost always). Nighttime urination was measured by the times they wake up for urination as 0 (Null) to 5 (5 times). They were measured using 6 Likert scale. By summing points of each question, total score of lower urinary tract symptoms was determined and the range of the score was from 0 to 35. Higher points mean severe urination disorder. They were classified according to total score such as Mild (0~7), Moderate (8~19), and Severe (20~35) [20,21].

The question asking discomfort from urination disorder was 'What do you feel if this urination status continues?' They were asked to answer from 'Very satisfied (0)' to 'Cannot live like this (6)'. The range of score is from 0 to 6 and lower point means less discomfort from urination disorder. Reliability of the tool, Cronbach's  $\alpha$  was .85 in previous study [20] and .79 in current study.

#### 2) Urination related stress

Urination related stress was measured in Visual Analog Scale (VAS; 0=No stress, 10=Very stressful) asking them to select the most appropriate number relating the stress that they current feel because of urination disorder. Range of score is from 0 to 10 and higher point means severer urination related stress.

### 4. Procedures

This study was performed from July to November in 2013 in the order of preparation, preliminary test, pretest, experimental treatment and posttest. In this study, subjects were recruited through intention sampling method for example the researcher went to churches or companies where many males gathered and posted recruitment bulletin asking participation or explained the purpose of study and subject selection standards to relatives and asked them to introduce right candidates. When candidates volunteered and wanted to participate in the study, the researcher visited those candidates and explained study purpose and processes. Survey was performed asking subjects read and answer the survey questions for themselves.

#### 1) Preparation by researcher

Before the study, the first researcher acquired aroma

therapist certificate in 2012 and asked two other currently working professional aroma therapists to advice selection and blending of aroma oils for the experiment.

## 2) Preliminary test

In the preliminary test, aroma oil mixing rate, appropriateness, adverse reaction to aroma and application time were applied to 3 males who have same conditions of subjects of this study to see if there is any problem in aroma foot bath application and if there are things to be supplemented or modified. Three subjects participating in preliminary test did not have adverse reaction to aroma and answered that they body and mind became a lot more comfortable after foot bath.

## 3) Pretest

Before applying foot bath experiment to groups, both experimental group and control group were asked to answer the questions about general characteristics, health related characteristics, urination status and urination related stress.

## 4) Foot bathing method

Before the experiment, the researcher explained purpose of the study, data collection method and program contents to experimental group and demonstrated the methods and order of aroma foot bath after training. After checking if they perform foot bath repeatedly, the researcher provided experimental group with aroma essential oil in a light-protected bottle. In this study, the researcher blended 20 drops of juniper berry, 20 drops of fennel and 6 drops of lavender essential oils (total 46 drops), put it in 10ml brown bottle and provided experimental group with the bottle based on previous studies and literature [11,22] after consulting with 2 professional aroma therapists for the validity of the blending.

Subjects performed foot bath with aroma blended water at home once a day for a week. Foot bath was performed in the evening when subjects came home from work at a certain space at a certain time. Water temperature was maintained at 38~40 degrees [12] and temperature was checked by thermometer. Water height was up to wrist and the subjects had foot bath for 30 minutes [24]. After foot bath, they dried their feet and wore socks to keep body temperature. Previous study [13] reported that minimum 3 to 10 times foot bath made effects on subjects, emphasizing as many times as possible every day. However, in this study subjects were working so they could not have foot bath many times a day. Considering characteristics of subjects, the researcher asked them to have foot bath once a

day for a week intensively. For the experimental period (a week) the researcher made a phone call every day to check if they had foot bath.

Experimental group had aroma foot bath for a week and control group lived a usual everyday life without aroma foot bath.

## 5) Posttest

Survey was executed the day after foot bath experiment completed using the same method of pretest. Control group had posttest at the same time when experimental group had posttest. In posttest, open questions were given to experimental group besides major variables so that they could subjectively describe their feelings after aroma foot bath.

## 5. Ethical Considerations

The content and method of this study was approved by IRB (Institution Review Committee) of Chosun University (IRB-13-019). Before experiment, the researcher explained purpose, methods and procedures of the study to all subjects and received written consent from the subjects. The researcher also explained that they could withdraw from the study participation at any time without any disadvantages. After data collection was completed, control group had the same education on aroma foot bath as experimental group for ethical equality.

## 6. Data Analysis

Collected data were statistically analyzed using SPSS 21.0 program. Analysis methods are as follows.

- Homogeneity tests on general characteristics, health related characteristics, pre urination status and urination related stress of experimental group and control group were made through  $\chi^2$  test, Fisher's exact test and independent t-test.
- Difference in urination status and urination related stress between experimental group and control group before and after experiment was identified through independent t-test.

## RESULTS

### 1. Homogeneity Test on General Characteristics

Two groups were homogeneous as there was no significant difference in general characteristics of experimental group and control group (Table 1).

## 2. Homogeneity Test on Pre Dependent Variables

Two groups were homogeneous as there was no significant difference between experimental group and control group in the homogeneity test on major variables before experiment (Table 2).

## 3. Urination status

The level of urinary symptoms of experimental group reduced by 6.50 from 20.77 to 14.27 while that of control group reduced by 1.35 from 18.50 to 17.15. Thus there was difference between two groups ( $t=-5.56, p<.001$ ).

Discomfort from urinary symptoms of experimental group reduced by 1.23 from 3.73 before experiment to 2.50 after experiment while that of control group reduced by 0.30 from 3.62 to 3.31, which confirms difference between two groups ( $t=-4.60, p<.001$ ) (Table 3).

## 4. Urination related stress

Urination related stress of the experimental group decreased by 1.88 from 6.62 to 4.73, while control group by 0.54 from 6.19 to 5.42, which confirms difference between two groups ( $t=-5.79, p<.001$ ) (Table 3).

**Table 1.** Homogeneity Test of Characteristics of Subjects

Characteristics	Categories	Exp. (n=26)	Cont. (n=26)	$\chi^2$	p
		n (%)	n (%)		
Age (year)	40~49	9 (34.6)	8 (30.8)	0.09	.768
	≥ 50	17 (65.4)	18 (69.2)		
Marital status <sup>†</sup>	Married	26 (100.0)	25 (96.2)		1.000
	Divorce	0 (0.0)	1 (3.8)		
Educational level <sup>†</sup>	High school	5 (19.2)	0 (0.0)		.051
	≥ University	21 (80.8)	26 (100.0)		
Religion <sup>†</sup>	Yes	24 (92.3)	19 (73.1)		.140
	No	2 (7.7)	7 (26.9)		
Economic status <sup>†</sup>	Moderate	24 (92.3)	0 (0.0)		.490
	Poor	2 (7.7)	26 (100.0)		
Health status <sup>†</sup>	Healthy	5 (19.2)	2 (7.7)		.419
	Unhealthy	21 (80.8)	24 (92.3)		
Drinking	Yes	6 (23.1)	10 (38.5)	1.44	.229
	No	20 (76.9)	16 (61.5)		
Caffeine intake	Yes	19 (73.1)	20 (76.9)	0.10	.749
	No	7 (26.9)	6 (23.1)		
Regular exercise	Yes	15 (57.7)	13 (50.0)	0.31	.578
	No	11 (42.3)	13 (50.0)		
Other disease	Yes	22 (84.6)	18 (69.2)	1.73	.188
	No	4 (15.4)	8 (30.8)		
Medication for BPH	Yes	20 (76.9)	19 (73.1)	0.10	.749
	No	6 (23.1)	7 (26.9)		

Exp.=experimental group; Cont.=control group; <sup>†</sup> Fisher's exact test.

**Table 2.** Homogeneity Test of Pretest Dependent Variables

Variables	Exp. (n=26)	Cont. (n=26)	t	p
	M±SD	M±SD		
Urinary status				
Prostatic Symptom	20.77±5.00	18.50±3.98	1.81	.076
Bother score due to urinary symptoms	3.73±0.72	3.62±0.75	0.56	.576
Stress due to urinary symptoms	6.62±0.80	6.19±0.80	1.90	.063

Exp.=experimental group; Cont.=control group.

**Table 3.** Effects of Aroma Foot Bath on Urination Status and Stress related to Urination

Variables	Groups	Pretest	Posttest	Difference	t	p
		M±SD	M±SD	M±SD		
Urinary status						
Prostatic symptom	Exp. (n=26)	20.77±5.00	14.27±3.82	-6.50±4.34	-5.56	< .001
	Cont. (n=26)	18.50±3.98	17.15±4.36	-1.35±1.87		
Bother score due to urinary symptoms	Exp. (n=26)	3.73±0.72	2.50±0.86	-1.23±0.91	-4.60	< .001
	Cont. (n=26)	3.62±0.75	3.31±0.79	-0.30±0.47		
Stress due to urinary symptoms	Exp. (n=26)	6.62±0.80	4.73±0.78	-1.88±0.99	-5.79	< .001
	Cont. (n=26)	6.19±0.80	5.42±0.86	-0.54±0.65		

Exp.=experimental group; Cont.=control group.

## DISCUSSION

This study was tried to verify if aroma foot bath had effects on urination status and urination related stress of BPH patients. The results of this study showed that experiment group with aroma foot bath had improvement in urinary symptoms and discomfort from urination disorder. Although there were studies reporting that aroma therapy or foot bath therapy had improved physical symptoms of subjects [13,25], there were no studies on the effects of those therapies on BPH patients' urination status. Therefore it is difficult to compare the results. However, considering that subjects fell under severe group before experiment as 20.77 point at urinary symptoms but they advanced to moderate group as 14.27 point in average, it is estimated that aroma foot bath has mitigated BPH patients' urinary symptoms. Lim [23] reported that subjects taking foot bath everyday showed improved physiological changes such as stress, blood pressure, pulse, muscle stiffness, skin temperature and blood concentration than those taking foot bath 3 times a week in their study on adult females in their 20s and 30s. Based on such report, it can be guessed that taking foot bath every day for a week may help subjects to reduce stress and discomfort.

In this study experiment group showed significantly more decrease in discomfort from urinary symptoms than control group. Experimental group subjects were asked to express their subjective feelings besides major variable measurement. Most of subjects expressed positive feelings such as 'I felt changes in blood circulation', 'Foot odor was removed', or 'I feel listless and comfortable', 'I had a good sleep.' Kim and Moon [5] reported that mental health quality of life of BPH patients was degraded as their lower urinary tract symptoms increased, which shows physical changes in BPH patients make psychological and mental areas, too. A previous study [25] reported that herb artwork program in the space where aroma essential oil is set

out significantly reduced anxiety of subjects who seemed to have anxiety all the time because of broken home. It seems that addition of aroma oil has provided subjects with psychological comfort as well as improvement in urinary symptoms. It shows that we may expect synergy effect by combining aroma therapy with foot bath.

In this study, candidates using medication were also included in subjects because the researchers wanted to identify if this intervention would make effects on those who had medication but whose symptoms were not mitigated. According to the study result, aroma foot bath therapy made subjects comfortable by making effects on sense of discomfort from urinary symptoms of BPH patients. Some studies [26] proposed negative opinions against foot bath. However, the previous study was on four limbs ulcer patients. It reported that shower would be preferred to foot bath. It is probably because foot bath on the lesions directly is not appropriate. Thus, excluding some patients who are not appropriate for foot bath, foot bath is considered to be effective to patients with physical symptoms. Further studies are needed to verify consistent effects of aroma foot bath on more diverse subjects.

It is found that aroma foot bath has significant effects on urination related stress that participants subjectively perceive. Although urination related stress of experimental group with aroma foot bath was 6.62 out of 10, it decreased to 4.73. It is significant difference from control group which shows decrease by 0.54 while experimental group shows decrease by 1.88. It is consistent with previous study result [27] that perceived stress of subjects with aroma pendant decreased. Additionally, aroma foot bath made significant effects on stress of test-takers, which supports the results of the current study [12]. Although it is difficult to make direct comparison because there are few studies researching effects on stress of BPH patients, considering previous studies reporting that [26] women with irritable bladder syndrome had higher physical and psychological stress than

those without syndrome and that BPH patients perceived lower quality of life related with physical health when lower urinary tract symptoms increased [5], urination related issues will heighten stress of subjects. In previous studies on various populations [29,30] stress was reported to make adverse effects on health related life quality of subjects. Therefore, studies to develop interventions to mitigate stresses of subjects with urogenital issues are needed. It is meaningful that this study verifies if aroma foot bath can mitigate urination related stress of subjects. If we can reduce stress of subjects through these efforts, we may be able to contribute to improvement of quality of life in subjects.

## CONCLUSION

This study was conducted to verify if aroma foot bath had effects on urination status and urination related stress of BPH patients. Results say that aroma foot bath has positive effects on urination status (urinary symptoms and discomfort from urinary symptoms) and urination related stress. As this study sampled subjects with intention sampling method out of BPH patients in a specific area, it is difficult to generalize the results. However, it is meaningful that it verifies effects of aroma foot bath which can be done easily at home.

Based on the results of this study, the following proposals can be made. The effects of aroma foot bath should be verified through repetitive studies with extended number of subjects. In this study, short-term effects of aroma foot bath on urination status and urination related stress were identified with a week's aroma foot bath experiment. In the future, it is needed to identify the point when urination status is improved. It is also needed to identify mechanism of aroma foot bath how it contributes to mitigation of BPH patients' symptoms and to develop interventions to improve quality of life.

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