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The Effect of Acupressure on Dysuria and Post-void Residual (PVR) Urine in Patients with Benign Prostatic Hyperplasia (BPH)

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Abstract

Background: The side effects and cost of chemical treatments have resulted in efforts to find more effective treatments with fewer side effects for benign prostatic hyperplasia (BPH) patients. We aimed to investigate the effect of acupressure on post-void residual volume (PVR), and dysuria in patients with BPH.

Materials and Methods: This study is a single-blind, randomized clinical trial. Thirty patients with mild PBH in Qaem and Imam Reza Hospitals of Mashhad University of Medical Sciences were randomly selected into two intervention (15 patients), and control groups (15 patients) via the non-random sampling method. The intervention group received 12 minutes of acupressure with a pressure of 3-4 kg in the correct points (Pang Guangshu, Guanyuan, Shenmen, and Sanyinjiao), and the control group received acupressure in the sham points for three minutes at each point three times a week for two weeks. The data collection tools were a sample selection form, demographic information form, WAS scale, IPSS scale, and ultrasound to determine PVR. Dysuria and PVR were recorded in the two groups before intervention and 48 hours afterward, and results were compared in the SPSS (version 16.0).

Results: After the intervention, the mean PVR in the intervention group was 32.4±7.59, showing a significant decrease compared to the control group (39.6±9.24, $p<0.05$). Similarly, the mean dysuria in the intervention group was 2.33±1.45, significantly lower compared to the control group (4.27±2.40, $p<0.05$).

Conclusion: Applying six sessions of acupressure and pressure of 3-4 kg on the four points of BL-28 (Pang Guang Shu), CV-4 (Guan yuan), HE-7 (Shenmen), and SP-6 (Sanyinjiao) for three minutes can reduce the mean of PVR and dysuria in patients with BPH.

Key Words: Acupressure, Benign prostatic hypertrophy, Clinical trial, Dysuria, Post-void residual.

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1- INTRODUCTION

Prostate enlargement is a common disease in aging men. This condition, also known as benign prostatic hyperplasia (BPH), can cause significant health complications and costs for patients. Untreated BPH can block the flow of urine to the bladder and cause problems in the bladder, urinary tract, or kidneys (1). BPH is the most common benign tumor involvement in men, and its histological symptoms are seen in more than 90% of men over 80 years. The etiology of this disease is not fully known, although factors such as inflammation, obesity, metabolic disorders, and aging play a role in its occurrence (2, 3). The symptoms of this disease can be divided into obstructive (e.g., pausing during urination, decreased urinary pressure, retention, insufficient emptying of the bladder, and spending excessive energy to urinate), and irritative (e.g., urinary urgency, frequent urination, and nocturia). Although these conditions are not life-threatening, clinical manifestations in the form of lower urinary tract symptoms reduce the patient's quality of life (4-9). Evidence shows that the most common manifestation in BPH patients is bladder outlet obstruction, followed by urinary retention (10).

Urinary retention is an acute emergency condition characterized by a sudden inability to urinate, along with pain in the lower abdomen, with acute and chronic forms (11, 12). Failing to empty more than 500 ccs of urine in four hours or longer can lead to functional and structural disorders in the bladder, increased pressure in the pelvis, renal calyces and kidney parenchyma, urinary tract infection, stone formation, structural damage to the bladder, ureter, and kidney, and kidney edema, and, if prolonged, to kidney failure and eventually death (13). A two-year study conducted on 310 men found urinary retention due to BPH in 53% of patients (12). Other studies have shown that the histological prevalence of BPH increases from approx. 20% in men aged 41-50 to 45% in men aged 51-60, and more than 90% in men over 80 years old (14). Also, this disease is the primary cause of most urinary symptoms in men over 50 and the cause of prostatectomy in 20-30% of men over 80 years old (15). Currently, the common and conventional way to alleviate urinary retention by nurses is using a hot water bag on the suprapubic area, changing the position, opening the faucet, and, in case of failure, using a bladder probe. Reducing the operation and complications of probing necessitates finding a non-invasive, uncomplicated, and practical method for patients with urinary retention (16). The treatment of PBH includes chemical drugs (alpha-blockers, antiandrogens, and anticholinergics), surgery, and herbal medicine (17, 18).

The low effectiveness of common chemical drugs and the numerous complications of drug treatments and surgery have created interest in non-pharmacological methods with fewer complications (19). Acupressure is one of the non-drug methods that is non-invasive, relatively cheap, and without side effects (20). One of the main advantages of acupressure is the simplicity of application and the possibility to learn and be applied by the patients, so patients can use it with simple training to help treat and care for themselves (21). Acupressure involves applying pressure with fingers to specific points on the body surface to stimulate the body's inherent and natural ability to regulate actions and treatment (22).

In summary, acupressure is the use of touch techniques to balance the energy flow of the human body (23). Studies have reported the positive effect of acupressure in alleviating several disease symptoms (24-27). However, no study has so far been conducted to investigate acupressure with the aim of reducing the symptoms of urinary retention in BPH patients.

Therefore, to alleviate the difficult, irritating obstructive symptoms in BPH patients and the benefits of non-medicinal treatments compared to drugs, and to reduce the costs imposed on families, the present study aimed to investigate the effect of acupressure on post-void residual volume (PVR), and dysuria in BPH patients. The study was conducted on patients referred to the urology clinics of Imam Reza (AS), and Qaem (AS) teaching hospitals of Mashhad University of Medical Sciences in Mashhad, Iran.

2- MATERIALS AND METHODS

2-1. Study design and population

The study was a two-group, single-blind, randomized clinical trial study on patients referred to the urology clinics of two medical training centers (Qaem and Imam Reza teaching hospitals) affiliated with Mashhad University of Medical Sciences in Mashhad, Iran, in 2022. Only one person (i.e., an acupressure specialist) knew about the patients' treatment methods. The therapist and the sonographer did not know about the patients' treatment groups, also the sample sizes did not know how the samples were allocated in the experimental and control groups.

2-2. Method

The procedure involved 30 patients aged 45 years and older who were referred to urology clinics with complaints of urinary symptoms diagnosed with PBH. They entered the study based on examinations, including prostate examination, para-clinical (PSA test) tests, and history, with the approval of the attending physician, and were randomly assigned to intervention and control groups. The patients had no urological disease except PBH (mild, based on the IPSS scale), had not taken PBH-related drugs in the past six months, and had no history of using acupressure.

2-3. Sample size

The sample size was determined based on the values obtained from the pilot study and considering a confidence factor of 95% and a test power of 80% using the sample size form. In the pilot study, ten people were randomly selected for each group of the target population, and the mean and standard deviation (SD) of the two variables of dysuria (painful urination) scores and PVR were determined before and after the acupressure intervention. A sample size of 30 (15 in each group) was selected by comparing the averages of the two variables and using the following sample size form. Sampling was done by the simple random sampling method per the entry and exit criteria.

$$n = \frac{\left(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta}\right)^2 (S_1^2 + S_2^2)}{(\bar{x}_1 - \bar{x}_2)^2} \approx 30$$

Where,

$Z_{1-\frac{\alpha}{2}} = 1.96$

$Z_{1-\beta} = 0.85$

$S_1^2 = 9$

$S_2^2 = 7$

$\bar{x}_1 = 38$

$\bar{x}_2 = 32$

$(\bar{x}_1 - \bar{x}_2)^2 = 36$

2-4. Measuring tools

The data collection tools were the sample selection form, demographic information (e.g., age, marital status, level of education, and history of underlying diseases), the Visual Analogue Scale (VAS) for measuring dysuria severity, the international prostate symptom score (IPSS) scale for assessing the severity of patient's clinical symptoms, and ultrasound to determine PVR.

2-4-1. Sample selection form: This form was used for checking the

inclusion/exclusion criteria during the research, prepared according to the objectives of the research, valid sources and articles, and consultation with supervisors and advisors. The questions of the used forms are objective, and their reliability has been confirmed in many studies (28, 29), so there was no need to recheck the reliability. This form was completed via interview, observation, and the review of the patient's health record; the research units were selected according to the criteria in the form. This study used the qualitative content validity method to determine the scientific validity of the form. The designed form was given to six academic staff (two nurses, an epidemiologist, a medical education specialist, and two urology specialists), who were requested to express their corrective opinions.

2-4-2. Demographic information form: It included information about age, marital status, level of education, and history of underlying diseases.

2-4-3. WAS scale to measure dysuria severity: This scale measures the intensity of a person's pain in the range of zero to 10 (**Figure 1**). A score of 10 is considered the most severe pain, and a score of zero is considered no pain, as determined by the patient (30). A score of 1-3 indicates mild pain, 4-7 indicates moderate pain, and 8-10 indicates severe pain (31). The validity and reliability of this index are confirmed in previous studies (32-35). In Iran, the reliability of this scale has been confirmed with a correlation coefficient of r=0.88 (36). WAS scale was completed for patients in two groups before and 48 hours after the intervention.

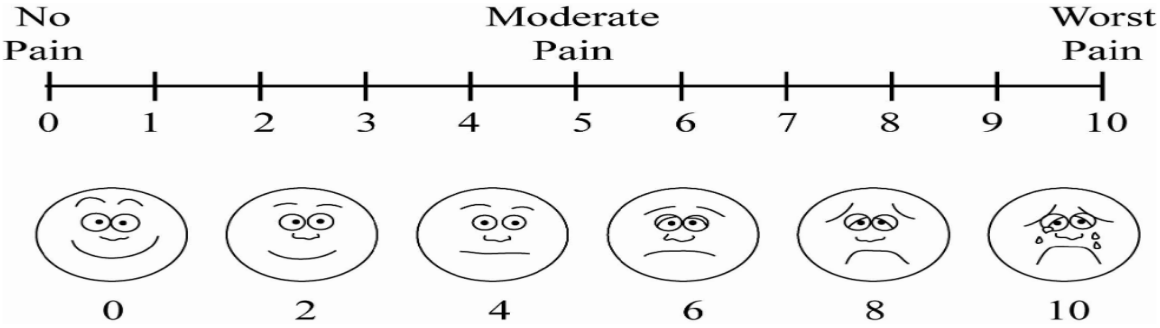

Fig. 1: Visual Analogue Scale.

2-4-4. IPSS scale: The severity of urinary symptoms was recorded based on IPSS, which has already been translated into Persian, and its validity and reliability have been confirmed in various domestic and foreign studies (37-39). In this scale, seven questions are asked about prostate symptoms, and each question is given a score of 0-5. Based on these scores, the patients are divided into three groups in terms of prostate symptoms. The first category contains subjects with mild symptoms (a score of 0-7), the second category contains patients with moderate symptoms (8-19), and the third category involves subjects with severe symptoms (20-35). The minimum score is zero, and the maximum is 35. Higher scores indicate more severe disease symptoms (40, 41). In this study, IPSS was completed for patients in both groups before and after acupressure intervention.

2-4-5. Post-void residual volume (PVR) measurement: The PVR of the patients was checked and recorded before and 48

hours after the acupressure intervention using abdominal ultrasound by an ultrasound specialist who did not know how the two groups were allocated. The procedure was as follows. In the beginning, all BPH patients with symptoms of obstruction and urinary retention were introduced to the researcher by the treating doctor. After explanations on how to implement the project, the patients were selected non-randomly according to the sample selection form and the inclusion criteria and then randomly entered into one of the two study groups (receiving acupressure), and the control group (receiving sham acupressure) (42, 43). The allocation of samples in the intervention and control groups was random in the form of two blocks: by placing the samples in groups of two, the first person chose one of the two closed envelopes and, based on that, was placed in one of the two test or control groups. The next person was placed in the other group.

2-5. Qualification of the researcher

The researcher passed an acupressure training workshop to conduct acupressure sessions and teach it to patients and was approved by a doctor specializing in acupressure.

2-6. Inclusion Criteria

The conditions for entering the study were willingness to participate in the study, an age of 45 years and older, diagnosis of BPH by the attending physician, the confirmation of PVR above 100 ml by abdominal ultrasound, mild clinical symptoms based on the IPSS scale, and no coagulation disorders.

2-7. Intervention

Intervention sessions were planned by the researcher to be compatible with the living conditions and time of patients and within a specific period (two weeks in the form of days). Then, the researcher applied acupressure instructions for specific points on selected patients in the studied groups. Interventions for all samples were performed by a single researcher to prevent distortions as much as possible. According to the standard, the frequency of acupressure in chronic conditions is six sessions every other day for two weeks (44, 45). The treatment was a combination of self-pressure by the patient (four acupressure sessions in the middle of the day and at a specified time), and acupressure by the researcher (first and last session). The first session before the intervention was conducted to complete the questionnaires and teach acupressure to the patient by the researcher, and the last session was again to complete the questionnaires and perform acupressure by the researcher. The researcher applied a pressure of 3 to 4 kg on each point during the experiment Before starting, the therapist practiced the applied pressure on a digital scale and calibrated his hand.

The researcher taught the acupressure method, the desired points, the technique of pressing the points, and the duration of applying pressure precisely to the two groups. This process was done through oral training and showing pictures, individual practical demonstration of skills, and written training through the presentation of educational pamphlets. In this way, the acupressure points were marked under the supervision of an acupuncturist in an educational pamphlet so the patient could press the specified areas according to the learned principles. Also, during the acupressure period, the researcher was in contact with the patients through phone and video communication, ensured that the patient performed the technique correctly, and reminded the patient to perform the acupressure technique at a specific time.

The intervention group used the acupressure technique on points SP-6 (San yin jiao), HE-7 (Shenmen), and BL-28 (Pang Guangshu), which were paired and

located on both sides of the body according to the gender (male), on the points on the right side of the patient's body, and on point CV-4 (Guan yuan), which is single and one-sided and in the midline of the front of the body (**Figure 2**). According to acupressure standards, even and bilateral points can be performed only on the right or left side of the body, depending on the gender of the person. As the studied patients were men, the procedure was done on their right side (46). In this way, each point in every session received three stages, with each stage involving 1 minute of pressure and 2 minutes of rest, amounting to a total of 3 minutes for each point and 12 minutes of acupressure in each session. The correctness of the desired point was confirmed when the patient felt warmth, heaviness, swelling, or numbness at that point (44).

The sham acupressure (control) group received acupressure at sham acupoints BL-13 (Fei shu), HE-3 (Shao hai), and SP-4 (Gong sun), which are paired and bilateral only on the right side of the patient's body, and CV-24 (Cheng jiang) point, which is single and unilateral. The acupressure technique was performed on these points (**Figure 3**) with the same quality and time as the main points. These points were chosen from places where the patient did not feel pain.

2-8. Data Analysis

The data were analyzed with the SPSS software (version 16.0) using the central indicators of mean, standard deviation, percentage, and frequency. The two groups were compared using an independent t-test for the normality of quantitative variables, the Mann-Whitney test for the non-normal distribution and rank variables, and the chi-square test for nominal variables. A P-value less than 0.05 was considered statistically significant.

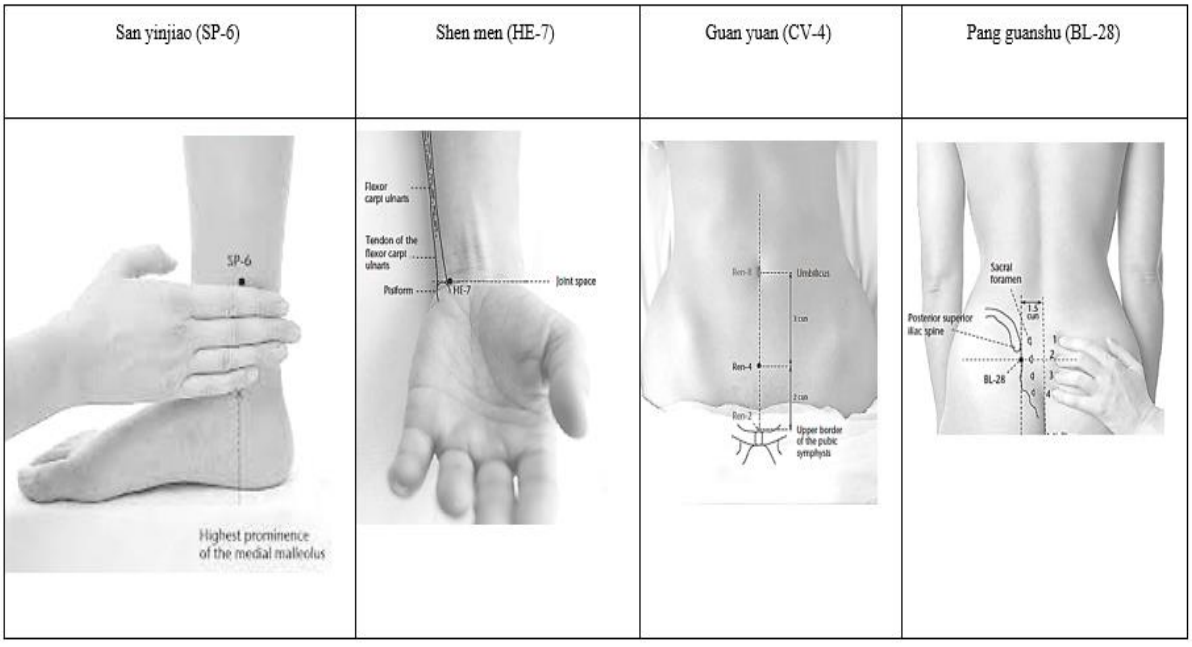

Fig. 2: Points used in the acupressure group.

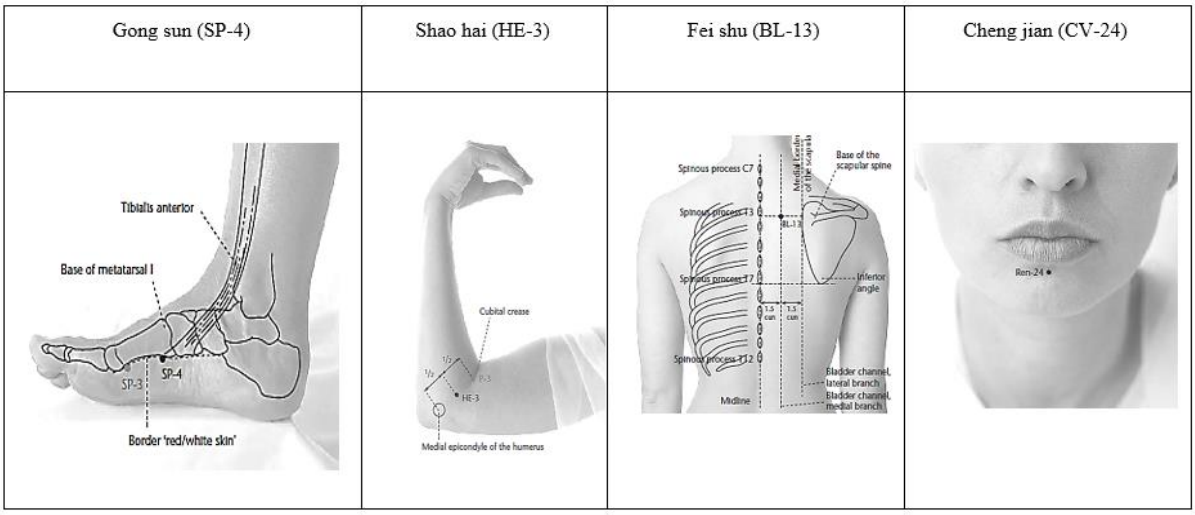

Fig. 3: Points used in the sham (control) group.

3- RESULTS

Intervention and control groups were homogeneous and did not differ significantly in demographic variables. As the mean age of the intervention group was 57.73±7.68, and the mean age of the control group was 60.20±8.45 years, the Shapiro-Wilk test did not show a statistically significant difference between the two groups ($p>0.05$). A total of 80% of the intervention group and 100% of the control group were married. In addition, 60% of the intervention group and 40% of the control group had a high school education. The findings of Fisher's exact test found no significant difference between the two groups in terms of education and marriage ($p>0.05$). The results also showed that 66.7% of the intervention group and 60% of the control group had risk factors related to HBP. The Chi-square test showed no significant difference between the two groups in terms of risk factors ($p>0.05$).

3-1. The effect of acupressure on dysuria severity

The two-way analysis of variance (ANOVA) test showed that the average intensity of dysuria in the pre-intervention phase was 4.67±2.97 in the intervention group and 4.47±3.07 in the control group. Tukey's post-hoc test showed no significant difference in the average dysuria of the two patient groups before the intervention ($p=0.827$), and the two groups were homogeneous in terms of dysuria. In the post-intervention phase, the average intensity of dysuria was 2.33±1.45 (out of 10) in the intervention group and 4.27±2.40 (out of 10) in the control group. Tukey's post-hoc test showed that after the intervention, the average intensity of dysuria in the intervention group was significantly lower than in the control group ($p=0.031$). Therefore, it can be concluded that acupressure reduced the symptoms of dysuria in patients with benign prostatic hypertrophy (**Table 1**) (**Figure 2**).

Table 1: Pair-by-pair comparisons of dysuria mean of groups and times.

Time	Intervention	Control	Mean difference	P-value
	Mean± SD	Mean± SD		
Before intervention	4.67±2.97	4.47±3.07	-0.200	0.827
48 hours after the intervention	2.33±1.45	4.27±2.40	1.933	0.031
Mean difference	-2.333	-0.200		
P-value	0.011	0.855		

SD: Standard deviation.

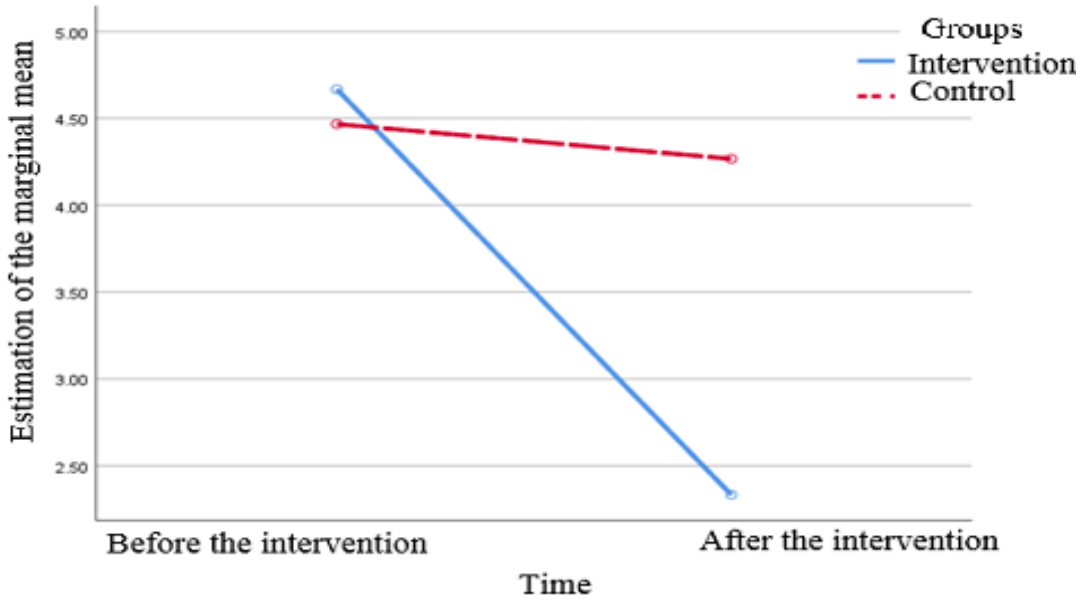

Fig. 2: Mean dysuria in intervention and control groups before and after intervention.

3-2. The effect of acupressure on PVR urine

The analysis of the variance test showed that before the intervention, the mean PVR urine in the intervention and control groups was 39±8.81 ml and 40.07±9.80 ml, respectively. The follow-up test found no significant difference between the two groups before the intervention (p=0.657). After the intervention, the mean PVR urine in the intervention and control groups was 32.4±7.59 and 39.6±9.24, respectively. The results of Tukey's post-hoc test showed that after the intervention, the mean PVR urine in the intervention group was significantly lower than the control group (p=0.042). Therefore, acupressure has reduced the PVR urine in patients with BPH (**Table 2**) (**Figure 3**).

Table 2: Pair-by-pair comparisons of PVR urine mean in control and intervention groups.

Time	Intervention (ml)	Control (ml)	Mean difference	P-value
	Mean± SD	Mean± SD		
Before intervention	8±39.81	40.9±7.80	1.067	0.657
48 hours after the intervention	32.7±4.59	39.9±6.24	7.200	0.042
Mean difference	-6.600	-0.467		
P-value	0.049	0.891		

PVR: Post-void residual urine

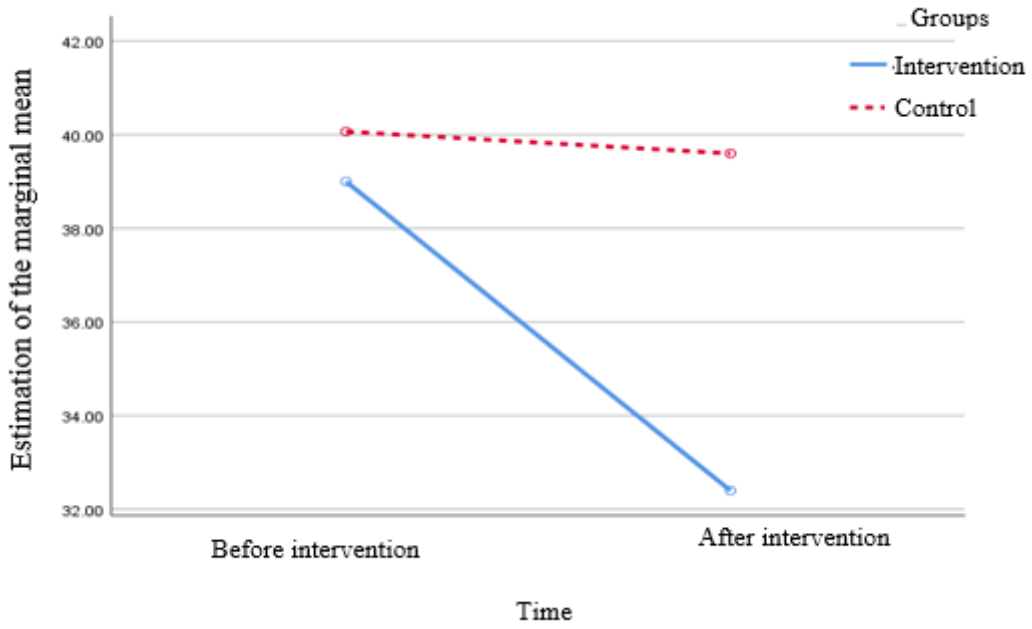

Fig. 3: The mean residual volume of urine of the two intervention and control groups before and after intervention.

4- DISCUSSION

The aim of this study was to investigate the effect of acupressure on PVR and dysuria in patients with BPH. The results showed that acupressure on the correct points (SP-6, HT-7, BL-28, and CV2) for 3 minutes can reduce the mean PVR and the severity of dysuria in patients with benign prostatic hypertrophy.

Urinary retention is an acute emergency characterized by the sudden inability to pass urine, accompanied by lower abdominal pain. Clinically, it is usually diagnosed by the presence of symptoms of discomfort, pain, pressure to urinate, and an enlarged and palpable bladder but can also be without symptoms of pain and discomfort (12). Not emptying more than 500 ml of urine in 4 hours or longer can lead to functional and structural disorders of the bladder, increased pressure in the pelvis, renal calyces and kidney parenchyma, urinary tract infection, stone formation, structural damage to the bladder, ureter, and kidneys, and swelling

in the kidneys. Its prolonged occurrence may lead to kidney failure and death of the patient (13). Non-pharmacological methods for pain control are gaining importance and are progressing (48). Pain relief is the basis of nursing care (49). As pain management is one of the fundamental rights and is an important component of the nursing process (50, 51), nurses should be aware of the psychological and physical aspects of pain and use effective strategies to manage it and improve the quality of life of BPH patients. Although there are countless drugs for pain control today, their excessive use can be costly and lead to many side effects (52).

In recent years, non-pharmacological methods, known as complementary treatments, have generated interest. Acupressure is one of the main sub-branches of complementary medicine and is a non-pharmacological method that is non-invasive, relatively cheap, and without side effects (53). The general goal of acupressure is to increase the energy of the body. There are specific points on the body known as acupuncture points (acupoints). These points are highly capable of directing energy. In traditional Chinese medicine, it is believed that this is achieved by balancing the Qi in the body. Qi travels through 12 main energy pathways called meridians, each connected to specific internal organs or pressure points (55, 54).

In acupressure, applying pressure with fingers to specific points on the body surface is used to stimulate the body's inherent natural ability to regulate actions and treatment (56). Acupressure recognizes 760 standard points in the body. In addition, more than 1000 other points have been discovered in this field, most of which do not conform to the principles of traditional Chinese medicine and are considered non-standard points (24). In acupressure, the stimulation of points is applied by palm, fist, or fingers (57). One of the main advantages of acupressure is the simplicity of application and the possibility of learning and using it by the patients themselves. Therefore, it is easily available, and patients can use it with simple training to help with treatment and self-care (58).

The findings of the present study showed that after the acupressure intervention, the mean dysuria in the intervention group was significantly lower than in the control group ($p=0.031$). This indicates that acupressure reduced the symptoms of dysuria in patients with BPH.

BPH is one of the common diseases of the urinary system in middle-aged and elderly men that causes lower urinary tract symptoms. The main clinical manifestations include bladder irritation symptoms (e.g., urinary frequency, urgency, and nocturia), and urinary obstruction symptoms (e.g., prolonged urination time, intermittent flow, and progressive dysuria). Dysuria symptoms become more severe in older patients, harming their quality of life (58, 59).

Performing acupressure techniques and pressure on the BL 28 and BL 13 points directed to the disease site can stimulate bladder Qi and improve BPH symptoms by affecting diuresis and strengthening bladder muscles. Based on the theory that the meridians can cure the diseases through which they circulate, stimulating these acupuncture points mainly affects diseases of the genitourinary system. From a neuroanatomical point of view, these acupuncture and acupressure points are located in the second and third posterior part of the sacrum, where the S2 and S3 sacral nerves pass, respectively (60). Yuan et al. (2019) evaluated the effectiveness of electric acupuncture on BL 32 and BL 33 points at different depths in the treatment of benign prostatic hypertrophy. They showed that after treatment at both depths, symptoms of dysuria, urinary frequency,

nocturia, and residual volume improved in the intervention group compared to the control group, and there was a significant difference between BPH symptoms and quality of life between intervention and control groups ($p<0.05$) (61). These results are consistent with the present study, even though the points and methods used to improve urinary tract symptoms were different.

The findings of the present study showed that after the intervention, the mean PVR in the intervention group was significantly lower than the control group ($p=0.042$), indicating that acupressure decreased PVR in BPH patients.

Dai et al. (2019) conducted a study to investigate the combined effect of auricular acupressure with acupuncture and movement in the treatment of urinary retention after surgery. The results showed that PVR and urination time in the intervention group were significantly lower than in the control group ($p=0.03$) (62). These findings are consistent with the present study, with the difference that acupressure was used only in the ear area and not in other points to improve bladder function.

A study by Lu et al. (2022) showed that the residual volume of urine in the intervention group was significantly lower than in the control group, which was statistically significant between the two groups (63), and in line with the results of the present study. Wang et al. (2013) conducted a study on whether acupressure can relieve urinary retention after radical hysterectomy in patients with cervical cancer. The results showed that the PVR for cervical cancer patients in the acupressure group decreased on days 7, 14, and 21, which was statistically significant ($p<0.01$), and consistent with the results of the present study (26). Lee et al. (2020) investigated the effect of Moxibustion as a complementary treatment on lower urinary tract symptoms associated with benign prostate enlargement. It was found that PVR was not significantly different in 12 weeks after the start of complementary treatment from before the intervention (64). The results are inconsistent with the present study. A reason for this discrepancy can be the use of a different technique for complementary treatment. It can also be due to an error by the operator or sonographer. Chen et al. (2019) conducted a study to investigate the effect of acupuncture on urinary retention. The results showed that acupuncture treatment significantly reduced PVR in the intervention group (65).

In general, studies have shown acupressure and acupuncture can be an effective alternative to control symptoms of the lower urinary tract in patients with BPH, including the feeling of incomplete emptying of the bladder, frequent urination, and intermittent flow of urine, weak flow of urine, pain or difficulty during urination (dysuria), nocturia, and urgency (66-74). Therefore, considering the high prevalence of urinary retention in patients with BPH, the results of the present study suggest learning and use of acupressure in nursing care as it is inexpensive and easy to teach (75, 76).

4-1. Suggestions

It is recommended to conduct research with a larger sample size and a longer intervention period and to compare other complementary medicine methods such as acupuncture and the use of medicinal plants on urinary retention in patients with BPH.

4-2. Study Limitations

Performing acupressure in four sessions is the responsibility of the patient, and the control of its quantity and quality is beyond the responsibility of the researcher. The individual differences between people and the patient's ability to perform acupressure, which is beyond the researcher's control, were left to the

person accompanying the patient. The small number of samples and treatment sessions is another limitation of the present research.

5- CONCLUSION

The results of this study showed that six sessions of acupressure with a pressure of 3-4 kg on each of the four points of Pang Guangzhou (BL-28), Guan Yuan (CV-4), Shen Men (HE-7), and Sanyingiao (SP-6) for 3 minutes, can reduce the mean of PVR and dysuria severity in patients with BPH. Owing to the high prevalence of urinary retention in patients with benign prostatic hypertrophy and the low cost of acupressure, as well as the absence of identification and reporting of its complications or adverse effects, it is recommended to teach this technique to nurses and its application in clinics and urology departments as a nursing intervention and an effective, available complementary method. Pain relief is the basis of nursing care, and it is suggested to continue studies to increase nursing knowledge in this field.

6- CONFLICT OF INTEREST: None.

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