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# The effect of complementary medicine on maternal health promotion: An experimental study

Leili Hafizi, Nastaran Razmjoo<sup>1</sup>, Fatemeh Yousefi<sup>2</sup>, Hoda Azizi<sup>3</sup>

## Abstract:

**BACKGROUND:** During the immediate post delivery period, women are particularly susceptible to distension of the bladder. Complementary and alternative medicine is becoming an established intervention modality within the contemporary health care system. However, very little is known about the impact of foot reflexology on the urinary system. The aim of this study was to evaluate the effect of the most popular type of complementary therapy (the foot reflexology) on first voiding time following elective cesarean section without urinary catheter.

**METHODS:** This experimental study was performed on 61 pregnant women in Pastor Hospital, Mashhad, Iran, who met the inclusion criteria. Accordingly, participants were randomly allotted to either treatment or control groups. The intervention group received a single 20-min foot reflexology session at 2–3 h after the surgery. The time taken for first void was recorded by research assistant that blinded to the allocation of groups. The findings were recorded and analyzed with the SPSS software by using of Chi-square, independent *t*-test, Mann–Whitney, and Fisher exact methods  $P < 0.05$  was considered as statistically significant.

**RESULTS:** Using General Linear Model (GLM) for controlling of confounding variables, the results of *t*-test showed significant differences between two groups in terms of first voiding time ( $P = 0.001$ ) following surgery.

**CONCLUSION:** It seems that the use of foot reflexology as a nursing care plan to prevent urinary retention after cesarean section without urinary catheter does shorten first voiding time and increase maternal satisfaction.

## Keywords:

Complementary medicine, experimental study, women's health

## Introduction

One of the most common complications in the early postpartum is urinary retention which can cause problems for the mother.<sup>[1]</sup> Hence, one of the most important duties of mother caregivers in this period is the evaluation and promotion of normal bladder function.<sup>[2]</sup> On the other hand, bladder distention and urinary retention after the surgery are issues which cause discomfort and dissatisfaction of patient and has attracted the low level of attention.<sup>[3]</sup> Today, cesarean is one of the

most commonly used obstetric surgeries<sup>[4]</sup> in way that the rate of cesarean has been reported to be 26%–60% in Iran.<sup>[5]</sup> The risk of bladder distention and subsequent urinary retention in cesarean is more than normal delivery. The causes of this increased risk include the use of anesthetic agents, systemic opioids, postoperative inertia, cramping pain, and injection of intravenous fluids.<sup>[6]</sup> Full bladder can cause bleeding in the postpartum period, increase pain, maternal discomfort, and permanent damage to the bladder muscles.<sup>[7]</sup> Hence, nursing care should be taken to prevent the occurrence of bladder distention and

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Department of Obstetrics and Gynecology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran, <sup>1</sup>Department of Midwifery, Faculty of Nursing and Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran, <sup>2</sup>Department of Midwifery, School of Nursing and Midwifery, Dezful University of Medical Sciences, Dezful, Iran, <sup>3</sup>Department of Chinese and Complementary Medicine, School of Persian and Complementary Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

## Address for correspondence:

Mrs. Fatemeh Yousefi,  
Dezful University of Medical Sciences,  
Dezful, Iran.  
E-mail: fatiyousefi@yahoo.com

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urinary retention. One of the common interventions during the cesarean is to place the Foley catheter and one of the reasons for this is the prevention of bladder distension and urinary retention after cesarean. Of course, due to the presence of tissue damage in the urethra, urinary tract infection (UTI), urinary problems after cesarean and patient's discomfort, some studies have investigated the effect of lack of use of urinary catheter following cesarean and in the end, most of these studies have concluded that indwelling urinary catheter in women who are hemodynamically stable is not necessary.<sup>[8,9]</sup> The reported incidence rates of urinary retention after cesarean section vary from 3.3% to 39.2%, depending on the definitions used and catheterization has been consistently associated with UTIs.<sup>[10]</sup>

In order to prevent urinary retention in mothers on whom urethral catheter has not been indwelled during the operation, the use of a safe and inexpensive method for the early return of sensing in the urinary bladder for urination after cesarean seems to be a wise approach. Recently, complementary and alternative medicine has been used extensively in preventing disease and promoting public health. Complementary medicine has a comprehensive approach which provides spiritual, psychological, and physical support. Among complementary health approaches, reflexology is one of the most popular practices and has been taught in institutes with qualifications for over 50 years in many countries.<sup>[11]</sup> Reflexologists believe hands and feet are the mirror of the body and plan of the body is manifested in the legs and hands. Therefore, particular stimulation of those affects related organs and systems. Reflexology has been used to treat various diseases such as pain relief, stress and anxiety,<sup>[12]</sup> and urinary retention.<sup>[13]</sup> Many studies have been done on the effects of foot reflexology during pregnancy, childbirth, and nausea which have used this method to treat some of the most common problems of pregnancy such as nausea and vomiting and constipation as well as shortening the length of the labor, to increase contractions and reducing pain in mothers and also after delivery to improve lactation.<sup>[14,15]</sup> Reflexology has also been used to treat one of the most common problems of multiple sclerosis patients with urinary tract symptoms. A study of Siev-Ner *et al.* showed that reflexology can be useful in the treatment of urinary symptoms in patients with multiple sclerosis.<sup>[16]</sup> Although in the study of Mak *et al.*, reflexology did not affect the treatment of urinary symptoms of multiple sclerosis.<sup>[17]</sup> Reflexology causes deep relaxation of the muscles and stimulates the free circulation of blood and lymph into cells and tissues.<sup>[18]</sup> The deep relaxation caused by this method helps in the functioning of the parasympathetic nervous system and helps the body to overcome stress and the function of the organs of the body improves by activating the parasympathetic system and in the urinary system leads to effective contraction of

the muscle of the detrusor.<sup>[19]</sup> The results of the Kesselring study (1998) showed that women in the foot reflexology group were more able to void without problems, after the indwelling catheter had been removed, than did women in the comparison groups. There was also a tendency in the foot reflexology group for the indwelling catheter to be removed earlier than in the control group.<sup>[20]</sup> Khosravan *et al.* also carried out a study to evaluate the effect of reflexology on postsurgical urinary retention. The results of their study showed that there was a significant difference between the two groups in eliminating urinary retention and its duration without the need for catheterization.<sup>[13]</sup> Evan refers to a case in his study entitled reflective therapy in which a woman was unable to urinate after giving birth with forceps and after removing the Foley catheter and reflexology was performed in areas related to kidneys, bladder, and urinary tract for 20 min. The patient felt pressure on the bladder within ½ h and had excreted about 1.5 l of urine.<sup>[21]</sup> But Ernst indicated the absence of convincing evidence on the effectiveness of reflexology to treat any medical condition in his review study.<sup>[22]</sup>

Considering the importance of early postpartum voiding and the lack report in similar studies in the field of urinary function after cesarean without urinary catheter and foot reflexology, this study was carried out with the objective of determining the effect of foot reflexology on the time of first urinary excision in women after elective cesarean without urinary catheterization.

## Methods

This double-blind, clinical trial with two groups was carried out on 61 pregnant women who referred to Pasteur hospital in Mashhad for elective cesarean. The researcher acted on sampling and concluding the test after receiving approval from the Ethics Committee of the University with a letter from the Faculty of Nursing and Midwifery of Mashhad and its presentation to Pasteur hospital. The sample size was calculated to be 45 individuals based on a pilot study performed on 20 individuals from the research units with confidence coefficient of 99%, power of 90%, and with the use of formula for comparing the means in two independent groups based on mean and standard deviation of the time of the first urinary excretion and the final sample was calculated to be 56 (28 individuals in each group) with consideration of 25% sample drop.

$$n_1 = n_2 = \frac{(S_1^2 + S_2^2)(Z_{\frac{\alpha}{2}} + Z_{1-\beta})^2}{\bar{X}_1 - \bar{X}_2^2}$$

Sampling was unpredictable (easy) in this research in this way that the researcher referred to the women's ward of Pasteur Hospital and selected each pregnant woman

who referred to hospital for elective cesarean and had the condition to enter the study. The research units were randomly assigned to one of the intervention and control groups using a random number table and 64 patients were studied in this study and three individuals were excluded due to spinal anesthesia (2 cases) and nonhealthy infant (1 case) and a total of 61 individuals completed the study. In this study, researcher provided informed consent for pregnant women referring for elective cesarean and explained the purpose of the research to them. At the beginning, questionnaire relating to personal data, pregnancy history, and physical characteristics was completed by the researcher. The criteria for entering the study included: Age between 18 and 35, reading and writing literacy, having single infant and low-risk pregnancy. Lack of specific medical condition, lack of labor pain, lack of intense emotional excitement in the past 6 months, lack of cuts, burns, fungal infections, varicose and veins, and exclusion criteria at baseline and during the study included: Having urinary problems and history of urinary retention, presence of abnormal complications during and after surgery (bladder injury, intraoperative bleeding, uterine bleeding, pelvic adhesions, bladder distension during surgery, and extension of surgical incision), blood transfusion, catheterization during or immediately after the surgery. Furthermore, people who were not alert and unable to communicate and cesarean was not performed on them under general anesthesia were excluded from the study. The tool used in this study were forms related to social demographic profile and the reproductive history and observation and examination including information during cesarean operation, postoperative care for recording vital signs, volume of intravenous liquid intake, anxiety level of research unit based on visual anxiety scale, pain severity based on visual acuity scale in the first 6 h after cesarean, time of first urination, and the satisfaction of research units about postcesarean care using 100 mm visual fitting scale. Content and face validity method was used to determine the validity of the form of social and reproductive history, the form of observation and examination which were researcher made tools in this way that preparatory forms were set after studying books and articles related to the field of research under the guidance of the supervisors and counselors and were then presented to 10 faculty members of Mashhad University of Medical Sciences, and the final tool was developed after review and consideration of the necessary suggestions and amendments. Equivalent reliability was used to determine the reliability of the tool. Time for cutting the skin was considered to be the time of zero. Researcher would record variables such as the length of operation, the estimated bleeding volume by the anesthetist and the gynecologist, the volume of intravenous fluid, the amount of analgesia (pethidine 25 mg 20 mg) that was injected after the end of the operation in form of observation during the operation. The

severity of pain and anxiety was evaluated 2 h after the cut of the skin with the help of a researcher who was unaware of the allocation of the groups. Two to three hours after operation, 10 min of reflexology was performed for the intervention group in addition to the routine care of the hospital. Routine care was provided for the control group. It should be noted that the researcher has received theoretical education in the field of reflexology by studying valid sources and viewing the images and films related to the reflexology as well as practical skills necessary from specialist prior to the beginning of the project and his qualifications for reflexology were confirmed by him and the supervisor. Furthermore, the method of work was approved by Chinese medicine experts and supervisor professor. Reflexology intervention was performed in one session for 20 min in both legs. The intervention was in this way that 2 min of general massage was done to prepare the legs for the intervention group and then 2 min of specific reflexology was performed for kidney urinary tract, bladder, and pituitary glands on the foot. The location of these areas is shown in Figure 1. General massage means the same precautions for warming up the feet. Furthermore, a nonaromatic vegetable oil such as sesame oil was used to reduce the friction between the researchers' hands with the research unit's feet. Given that simple massage or touch could have therapeutic effect and this project was with two groups, only routine care was provided for the control group to show the real effect of reflexology but researcher was present alongside of the research unit for 20 min in order to eliminate the effect of the presence of the researcher and was available to the research unit in case of complications and also to answer the questions. Research units were under control after the intervention until the first urinary excretion which was recorded in the related form by a researcher who

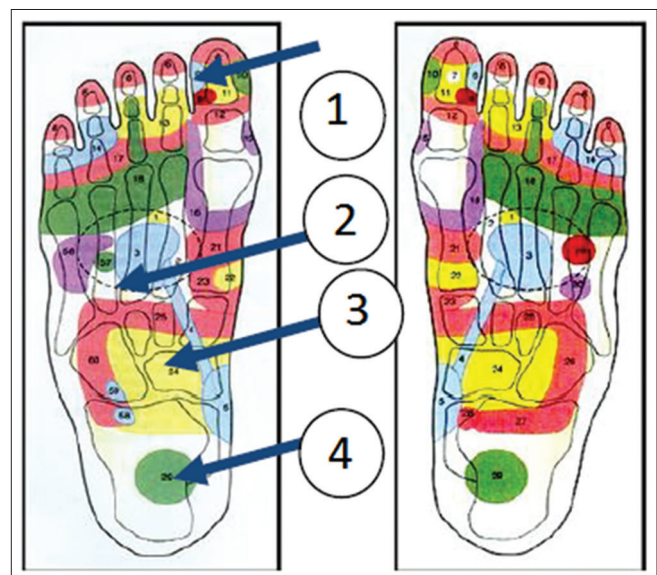


Figure 1: Position of the points of intervention in this research. (1) Pituitary, (2) Kidney, (3) Urethral duct, (4) Bladder

was not aware of the allocation of groups. Data analysis was done using the SPSS software version 14.0 (Chicago: SPSS Inc) and independent *t*-test, Mann–Whitney, Chi-square, Fisher exact test, and paired *t*-test. In all tests, the significance level was considered to be <0.05.

## Results

The mean age of the participants was  $28.52 \pm 4.04$  years and mean age of gestational age was  $277.73 \pm 9.05$  days. The two groups did not have a significant difference in age, gestational age, weight, educational level, family income, occupation, and civil status. The results showed that there were no significant differences between the two groups in terms of having willing pregnancy, number of deliveries, and cesarean and normal delivery ( $P > 0.05$ ) [Table 1]. The two groups did not have a significant difference in the level of preoperative anxiety, duration of hospitalization,

preoperative duration, duration of operation, and volume of intraoperative bleeding, ( $P > 0.05$ ) [Table 2]. The mean time of first urinary excretion of the units was 379.60 min. The mean time of first urinary excretion in the reflexology group was 257.23 min, and it was 498.03 min in the control group. The results of independent *t*-test showed that the two groups had a significant difference in the time of first urinary excretion ( $P < 0.001$ ) [Table 3].

## Discussion

The results of the study showed that the mean time of first urinary excretion in the reflexology group was  $257.23 \pm 59.76$  min, and it was  $498.03 \pm 75.10$  min in the control group and there was a statistically significant difference between the two groups in a way that the intervention group had a urine output earlier than the control group. After adjusting the effect of confounding variables, the two groups had a significant difference

**Table 1: Frequency distribution of women in two groups of reflexology and control**

Variable		Group			Test type
		Reflexology, n (%)	Control, n (%)	Total, n (%)	
Wanted pregnancy	Is	28 (45.9)	27 (44.3)	55 (90.2)	Fisher exact test, $\chi^2=0.669$ , df=1, $P=0.671$
	Is not	2 (3.3)	4 (6.6)	6 (9.8)	
	Total	30 (49.2)	31 (50.8)	61 (100.0)	
Number of delivery	First delivery	19 (31.1)	21 (34.4)	40 (65.6)	$\chi^2=0.131$ , df=1, $P=0.717$
	Second delivery	11 (18.0)	10 (16.4)	28 (34.4)	
	Total	30 (49.2)	31 (50.8)	61 (100.0)	
Abortion history	Has	6 (9.8)	6 (9.8)	12 (18.0)	$\chi^2=0.004$ , df=1, $P=0.949$
	Does not have	24 (39.3)	25 (41.0)	49 (82.0)	
	Total	30 (49.2)	31 (50.8)	61 (100.0)	
Cesarean history	Has	9 (14.8)	6 (9.8)	15 (24.6)	$\chi^2=0.932$ , df=1, $P=0.334$
	Does not have	21 (34.4)	25 (41.0)	42 (75.4)	
	Total	30 (49.2)	31 (50.8)	61 (100)	
History of normal delivery	Has	2 (3.3)	4 (6.6)	6 (9.8)	$\chi^2=0.669$ , df=1, $P=0.671$
	Does not have	28 (45.9)	27 (44.3)	52 (90.2)	
	Total	30 (49.2)	31 (50/8)	61 (100.0)	

**Table 2: Comparison of the mean preoperative anxiety, duration of fasting, preoperative serum and duration of hospitalization in two groups of reflexology and control**

Variable	Group, SD±mean		Test type
	Reflexology	Control	
Preoperative anxiety	58.33±25.87	69.35±25.94	Independent <i>t</i> -test $t=1.566$ Fd=59 $P=0.123$
Fasting time (h)	9.10±2.02	8.51±1.80	Mann-Whitney test $Z=1.323$ $P=0.186$
Preoperative intravenous fluids (ml)	94.02±170.66	53.98±148.36	Mann-Whitney test $Z=1.506$ $P=0.132$
Duration of admission before surgery (h)	1.63±0.76	1.70±0.73	Mann-Whitney test $Z=0.481$ $P=0.630$

SD=Standard deviation



**Table 3: Comparison of mean time of first urinary excretion in reflexology and control groups**

Variable	Group, SD±mean		Independent t-test
	Reflexology	Control	
Time of first urination (min)	257.23±59.76	498.03±75.10	$P<0/001$ , $t=-13/853$ , $df=59$

SD=Standard deviation

in the time of first urinary excretion in a way that the reflexology group had a urinary excretion about 100 min earlier than the control group. According to the results, 96.7% of the reflexology units had urinary excretion up to 6 h after cesarean, while only 38.7% of the patients in the control group had urinary excrement by this time. Kesselring *et al.* (1998) showed in a study aimed at the effect of reflexology on urinary rejection after abdominal surgery on 130 participants who were randomly assigned to three groups of reflexology, massage, and speaking that after 15 min of intervention women who were in the reflexology group, were able to pass urine earlier than the other two groups after removing the urinary catheter and also catheter of this group was released earlier than the other two groups. There was no voiding reference to difference between the time intervals of the three groups in terms of the time of first urinary excretion after the removal of catheter. Furthermore, there was no control of the intervention and effective variables on the time of the first urinary excretion.<sup>[20]</sup> In this study, women had catheter for 24 h after surgery but there was no urinary catheterization in the present study. Study of Kesselring *et al.* is in line with the present study in terms of earlier postoperative urinary excretion in reflexology group but the research sample were nonpregnant women who were admitted for abdominal surgery while the research sample in the present study were women in whom there was a number of physiological changes in the urinary system during pregnancy in addition to the effects of surgery such as anesthetic drugs and narcotics, pain, and anxiety. In the beginning of the third trimester, the bladder capacity increases, and its tone decreases and bladder sensation decreases. Khosravan *et al.* studied the effect of reflexology on urinary retention after surgery. Moreover, the results of their study showed that there was a significant difference between the two groups in eliminating urinary retention and its duration without the need for catheterization. The presence of urinary retention was considered to be the basis for initiating an intervention in this study while reflexology therapy has been used to reduce the time of first urination and as a result of prevention of urinary retention in the present study. Furthermore, Khosravan *et al.* only used reflexology on the location related to bladder on foot.<sup>[13]</sup> Nasr *et al.* carried out a research in Egypt to compare the effects of lack of use of urinary catheter during cesarean and use of urinary catheterization on 420 pregnant women.<sup>[8]</sup> The time of the first urinary excision after

the operation in the group who did not have a catheter under general anesthesia was  $10.67 \pm 2.42$  h. In this study, as in the present study, this time was calculated after the cut of the skin. This difference in the time of first urinary excretion in the study of Nasr *et al.* with the control group in the present study in which first urinary excretion time was approximately 8.5 h might be due to the amount of anesthetic and analgesic drugs after the operation which has not been referred to in the study of Nasr *et al.* In his study, Qorishi (2003) has also considered the time of first urinary excretion after cesarean without urinary catheter under general anesthesia and spinal anesthesia in 42.5% of subjects to be 8–11 h and 40.9% of subjects in cesarean without urinary catheter group to be 5–8 h. Indications of cesarean can be considered as the differences between the present study and the Qurishi study in which elective and emergency cesareans were performed without urinary catheter.<sup>[23]</sup> Meanwhile, Chai *et al.* have described the most important cause of urinary retention after cesarean to be lack of progress in labour.<sup>[24]</sup> Perhaps, the reason for the higher urinary excretion time after cesarean in the study of Qorishi compared to the present study is performing cesarean without progress in labour while the start of precesarean labour in the present study was a criterion for the exclusion from research. Senanayake has also reported the first urinary excretion after cesarean without urinary catheter to be about 8.76 h after cesarean section.<sup>[25]</sup>

According to the above, it seems that foot reflexology is effective on the time of first urinary excretion after cesarean without urinary catheterization. Possible mechanisms that may be involved in this area are related to the effects of deep relaxation and pain reduction that reflexology produces. Reflexology reduces stress and helps the body regain its power. It also increases blood circulation in the organs of the body. This relaxation helps to balance the parasympathetic system. McVicar *et al.* showed in their study that systolic blood pressure and pulse rate decrease after reflexology which is in response to the reduction of sympathetic system activity.<sup>[12]</sup> In the urinary system, the activation of the sympathetic system causes an increase in the urethral duct and reduces the tonicity of the bladder muscle. Pain is also one of the risk factors for urinary retention after surgery. The results of this study showed that the average pain after 4 h from operation had a significant difference between the two groups in a way that more pain intensity was reported in the control group compared to the intervention group. One of the possible reasons for this decrease in pain in the intervention group might be pituitary's point stimulation is in the foot. Stimulation of this point increases the secretion of endorphins are endogenous opioids that are similar to morphine, and control the secretion of p-material (a chemical that transmits pain message to the cerebral

cortex to interpret and understand pain) and inhibits the transmission of pain and relieves pain.<sup>[26]</sup> The pain has reduced by 57.9% in the reflexology group and by 46.7% in the control group, and results showed that the difference between two groups has been significant in terms of pain reduction this means that the reflexology group has had 11.2% lower pain. In this study, we did not access to an ultrasound machine for measuring the volume of urine in the bladder to prevent bladder distension. In this case, bladders of all patients were drained before the operation and also the surgeon checked the bladder distention during the operation and urinary catheter was indwelled in these cases. This study is not without limitations. The sample of this study was only drawn from a private hospital and as such cannot be confidently claimed to represent the patients in other areas or public hospitals. Additional research is also needed which examines the effectiveness and safety of reflexology to prevent urinary retention in mothers who underwent regional anesthesia for cesarean section.

## Conclusion

According to the results of this study regarding the effect of foot reflexology on reducing the time of first urinary voiding after cesarean without urinary catheter and considering other studies regarding the use of reflexology in postoperative care, this nursing care intervention can be used in the postoperative period such as cesarean section and can be used to improve the patient's health and increase their satisfaction with care.

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## Conflicts of interest

There are no conflicts of interest.

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