

Original Article

Effect of Acupressure in Pericardium 6 Acupoint on Nausea and Vomiting after General Surgery

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ABSTRACT

Background: Nausea and vomiting are of the most common postoperative complications. Postoperative nausea and vomiting (PONV) can increase the patients' length of hospital stay, healthcare costs, and perioperative morbidity. **Objective:** The current study aimed to evaluate the effects of acupressure in preventing PONV in patients who have undergone general surgery with spinal anesthesia. **Methods:** This single-blind clinical trial was performed on 70 patients who had undergone general surgery and randomly assigned to an intervention and a control group. In the intervention group, the acupressure wristbands were fastened to one of the patients' wrist so that the pressing buttons were placed on the Pericardium 6 acupoint. In the control group, the wristbands without pressing buttons were loosely fastened on the desired point. The severity and episodes of nausea and vomiting were measured intraoperatively, 1, 3, and 7 h postoperatively. The data were analyzed via repeated measures analysis, *t*, and Chi-square tests. **Results:** Over time, the intervention significantly decreased the mean of nausea episodes ($P < 0.001$), nausea severity ($P < 0.001$), and vomiting episodes ($P < 0.001$) in the intervention group. In the comparison of the two groups, the repeated measures analysis showed that although after the intervention the values of all the three variables was lower in the intervention group than that of the control group, but these difference were only statistically significant in the episodes and the severity of nausea. **Conclusion:** The acupressure significantly reduced the severity and episode(s) of postoperative nausea, but it did not affect vomiting.

KEYWORDS: Acupressure, Nausea, Pericardium 6 acupoint, Vomiting

INTRODUCTION

Nausea and vomiting are of the most common postoperative complications^[1] and of important nursing diagnoses.^[2] The incidence of nausea and vomiting varies from 20% to 30% depending on the type of surgery and the factors related to the patient.^[3] Postoperative nausea and vomiting (PONV) in patients having undergone spinal anesthesia are multifactorial, and a number of factors such as physiological changes, intraoperative hypotension, visceral stimulation, and administration of opioids may affect it.^[4] PONV increases the length of stay, healthcare costs, and perioperative morbidity.^[5] A number of medicines are usually used to treat PONV. However, they bring

some complications. For instance, somnolence, extrapyramidal signs and symptoms, headache, and diarrhea may occur after administration of metoclopramide. Ondansetron may also causes diarrhea, headache, and transient changes in the level of hepatic enzymes.^[6] Therefore, nurses and physicians are seeking some noninvasive, inexpensive, and easy approaches to reduce PONV.^[7] Nonpharmacologic strategies such as hypnosis, acupuncture, acupressure, relaxation

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techniques, behavioral therapy, and guided imagery are recommended to prevent PONV.^[8]

Acupressure is a noninvasive method induced by manual stimulation.^[9] Several studies evaluated the effects of acupressure on reducing postoperative pain, nausea, and vomiting.^[10-12] A study reported the remarkable effects of acupressure in the Pericardium 6 (PC6) acupoint on postdelivery pain.^[11] Another study also revealed the significant effects of acupressure in PC2 acupoint located in the index finger on reducing PONV in patients who had undergone laparotomy.^[12] Some studies were carried out to evaluate the effects of PC6 acupressure on PONV and reported controversial findings.^[6,13] A number of studies have reported the significant effects of acupressure on decreasing PONV in patients undergone gynecologic surgeries,^[14] laparoscopic cholecystectomy^[13,15] and appendectomy.^[16] Conversely, a study reported that PC6 acupressure was not effective in declining PONV in patients who had undergone laparoscopic cholecystectomy.^[6] Another study on the effect of PC6 acupressure after abdominal surgeries reported that it has little effect and requires further studies.^[17] Most of the aforementioned studies have undertaken on patients who have received general anesthesia, and no study is available on the effect of PC6 acupressure on PONV in patients receiving spinal anesthesia.

Objective

The current study aimed to evaluate the effects of acupressure in PC6 acupoint on PONV in patients having undergone general surgery with spinal anesthesia.

METHODS

Study design and participants

The current study was a single-blind clinical trial performed on 70 male and female patients who were referred to Shiraz University of Medical Sciences and Health Services training hospitals and had undergone general surgery with spinal anesthesia.

The sample size was estimated using the findings of a previous study^[18] in which the effect of PC6 acupressure on PONV was assessed, and the postintervention mean and standard deviation of vomiting episodes in the experimental and the control group were 0.22 ± 0.71 and 1.9 ± 2.17 , respectively. Then, considering $\beta = 0.1$, $\alpha = 0.01$, $S_1 = 0.71$, $S_2 = 2.17$, $\mu_1 = 0.22$, and $\mu_2 = 1.9$, 20 individuals were estimated to be needed in each group. However, considering a possible dropout of 20% in repeated measures and for increasing the study accuracy, we recruited 35 cases in each group [Figure 1].

After sample size calculation, permuted block randomization was used to assign patients into two

groups in a 1:1 ratio. Then, 12 blocks of 6 were prepared, and the patients were consecutively assigned to the blocks until the sample size in each group was completed.

The inclusion criteria were being in the age range of 15–60 years old, having no problem in the PC6 acupoint, being candidate for a general surgery with spinal anesthesia, having no history of comorbidities leading to acute or chronic nausea and vomiting such as digestive and auditory disorders, having no history of nausea and/or vomiting during the past 24 h, having no addiction to opioids and alcohol, having no history of neurological disorders based on the patient's self-report, having a body temperature $<38^\circ$ centigrade, and having no history of using acupressure. A patient's decision to withdraw from the study, needing medication due to severe nausea and/or vomiting, and the emergence of unexpected intraoperative complications were considered as the exclusion criteria.

Research setting

The acupressure or control wristbands were fastened on PC6 point on one of the patients' wrists. The PC6 acupoint is located on the palmar side of the wrist two inches above the transverse crease of the wrist, between the tendons of palmaris longus and flexor carpi radialis. An easy way to find the point is to place three fingers across your wrist starting at the wrist crease; then, look at the point where this line crosses between the two tendons [Figure 2a].

Intervention and measurements

The acupressure wristband used in the current study was PsiBand [Figure 2b] designed by a company at the United States and assembled in China. To use the wristband, the researcher was trained in a short course under the supervision of an expert in Traditional Chinese Medicine (TCM).

The wristbands were fastened to the patients' wrists immediately before the spinal anesthesia started. In the intervention group, the acupressure wristbands were placed on the PC6 acupoint in a way that the pressing button compresses the desired point. The amount of pressure was set by turning the knob on the wristband while considering the size of the patient's wrists for obesity and slimming. The wristbands were in place for 7 h. The pressure of the wristband was so much that it causes no harm to the point and no disturbance in the radial artery blood flow and the venous return of the hand. A nurse periodically inspected the point and examined the radial pulse and the color and temperature of the hand. Moreover, a trained research assistant loosened the wristbands for 10 min and tightened them

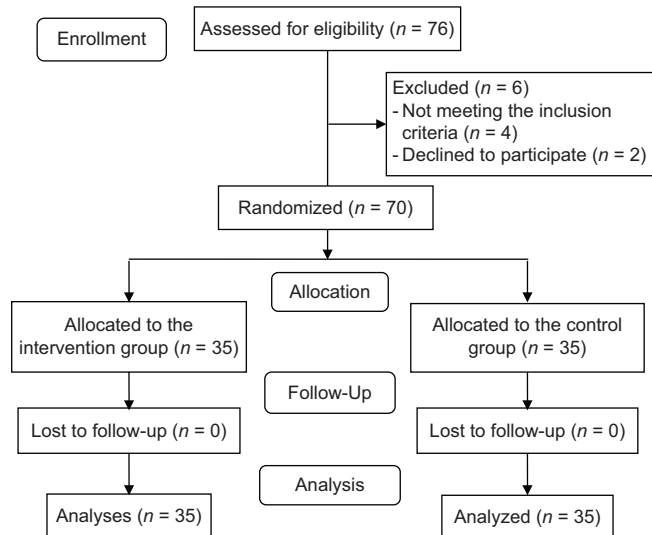


Figure 1: Flow diagram for the study

again hourly. In the control group, the acupressure wristbands without the pressing button were loosely placed on the PC6 acupoint and were kept in place for 7 hour. The severity and episodes of nausea and the episodes of vomiting were measured four times including intraoperative time, 1, 3, and 7 hour postoperatively.

Research instrument

A two-part instrument was used to collect the study data. The first part included questions on the patients' demographic variables such as sex, age, education level, occupation, and marriage. The second part was a visual analog scale (VAS). The VAS was a 10 cm line graded from 0 to 10. Descriptors were placed at each end of the line (0 = no nausea, 10 = the most severe nausea). Patients were asked to mark an X on the place that corresponded with the severity of nausea they experienced. Then, scores 0, 1–3, 4–7, and 8–10 were classified as no nausea, mild, moderate, and severe nausea, respectively. The validity and reliability of the VAS were confirmed in several studies.^[13,14] The episodes of nausea and vomiting were measured by recording their numbers. Recordings were done at the four aforementioned times.

Ethical considerations

The research project was approved by the local Ethics Committee of Shiraz University of Medical Sciences (Grant no.IR.SUMS.6396.31), and written informed consent was obtained from all the participants. The protocol was designed in accordance with the ethical principles of the Helsinki Declaration (World Medical Association, 2002). The patients were given a verbal lecture and written information about the goals and approach of the project, and then, they accepted to participate in the study. They all were also assured

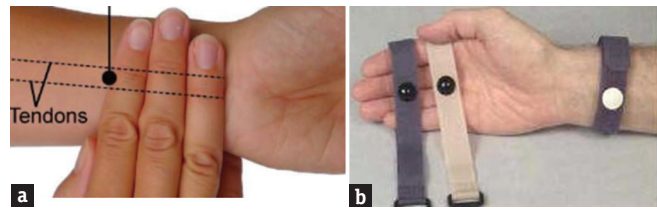


Figure 2: Location of Pericardium 6 acupoint (a) and wristbands on the Pericardium 6 acupoint (b) psi Band acupuncture bracelet for nausea and vomiting

about the confidentiality of their personal information, and then, all of them signed the study informed consent form. The research proposal was financially supported by endocrine and metabolism research center, Shiraz University of Medical Sciences and also was registered at the Iranian Registry of Clinical Trials with the registration number of IRCT2017061134475.

Data analysis

Data analysis was carried out using SPSS software version 16 (IBM Company Armonk, NY, USA). Independent samples *t*-test was used to compare the mean of quantitative variables between the two groups. Chi-square test was used to compare the nominal and categorical variables of the two groups. Repeated measures analysis was used to compare the mean nausea episodes, nausea severity, and vomiting episodes in the two groups through the four subsequent measurement time points. The Mauchly's test was used to examine the sphericity of the dependent variable. Wilks' Lambda test was used for interpreting the results and *t*-test for pairwise comparisons. The significance level in all testes was set at < 0.05 .

RESULTS

A total of 70 male and female patients were enrolled in the study; with the age ranged 15–60 years. The mean age in the intervention and control groups was 38.92 ± 12.11 and 35.91 ± 12.71 , respectively. The two groups did not significantly differ from each other respecting demographic characteristics except for the education level ($P = 0.027$) [Table 1].

In repeated measures analysis, the values of Mauchly's test were not significant ($P > 0.05$), so the assumption of sphericity was not violated. Then, the Wilks' Lambda test was used to interpret the effect of the intervention. The results showed that over time, the intervention significantly decreased the mean of nausea episodes ($P < 0.001$), nausea severity ($P < 0.001$), and vomiting episodes in the intervention group [$P < 0.001$; Table 2].

Furthermore, the repeated measures analysis showed that the interaction between the group and time on the

variables of nausea episodes and nausea severity were statistically significant but that was not the case in term of vomiting episodes [Table 2].

In the comparison of the two groups, the repeated measures analysis showed that although after the intervention the values of all the three variables was lower in the intervention group than that of the control group, these difference were only statistically significant in the episodes and the severity of nausea. However, due to the significant interaction between time and group

in some of the variables, *t*-test was used for between group comparisons of the three variables in all the four measurement time points. The results showed that the mean of all the three variables studied (i.e. nausea episodes, nausea severity, and vomiting episodes) were significantly lower in the intervention group than in the control group except for the nausea episodes at the 1 h postoperatively ($P = 0.304$), the nausea severity ($P = 0.560$), and the vomiting episodes ($P = 0.059$) at baseline intraoperative measurements [Table 2].

Table 1: Comparison of the two groups based on demographic variables

Variables	Groups ^a		P
	Intervention	Control	
Age (years)			
15-30	9 (25.7)	14 (40)	0.416 ^b
31-45	15 (42.9)	11 (31.4)	
46-60	11 (31.4)	10 (28.6)	
Sex			
Male	15 (42.9)	18 (51.4)	0.632 ^b
Female	20 (57.1)	17 (48.6)	
Marriage			
Married	21 (60)	21 (60)	0.999 ^b
Single	14 (40)	14 (40)	
Education			
Illiterate	2 (5.7)	2 (5.7)	0.014 ^c
Low literate	16 (45.7)	6 (17.1)	
Secondary school	11 (31.4)	10 (28.6)	
Academic	6 (17.1)	17 (48.6)	
Occupation			
Unemployed	8 (22.9)	8 (22.9)	0.970 ^c
Homemaker	14 (40)	11 (31.4)	
Self-employed	3 (8.6)	3 (8.6)	
Employee	9 (25.8)	11 (31.5)	
Retired	1 (2.9)	2 (5.7)	

^aData presented as *n* (%), ^bChi-square test, ^cFisher's exact test

DISCUSSION

Most of the earlier studies on the effect of acupressure on PONV have been conducted in patients receiving general anesthesia.^[10,14,19-21] However, in this study, we examined the effect of PC6 acupressure on PONV in patients receiving spinal anesthesia.

The present study showed that the mean episodes of nausea were less in the group received the PC6 acupressure than in the control group 1, 3, and 7 h postoperatively. The intervention group has also experienced less severe nausea than that of the control group at 3 and 7 postoperative hour. In line with our results, several studies examined the effect of acupressure of PC6 point^[12-16,20,22] or other acupoints^[21,23-27] on postoperative nausea episodes and reported its beneficial effects. Conversely, some studies reported that PC6 acupressure has no^[6] or little effect^[17] in declining postoperative nausea in patients undergoing laparoscopic and abdominal surgeries. Less nausea experience is effective in reducing patient suffering as a result, less anti-inflammatory drugs will be used after surgery. However, the inconsistencies between the studies might be attributable to several methodological factors such as incorrect determining of the location of

Table 2: Comparison of the mean and standard deviation of nausea episodes, nausea severity, and vomiting episodes in different time points

Variable/group	Intraoperatively	1 h postoperatively	3 h postoperatively	7 h postoperatively	P		
					Time	Time × group	Group
Nausea episodes							
Intervention	3.60 ± 0.95	2.74 ± 0.85	1.71 ± 0.67	1.11 ± 0.32	<0.001	0.041	0.044
Control	1.86 ± 0.81	2.97 ± 0.98	3 ± 0.97	6.54 ± 1.2			
<i>t</i> -test	<0.001	0.297	<0.001	<0.001			
Nausea severity							
Intervention	3.43 ± 0.95	2.62 ± 0.69	1.82 ± 0.66	1.23 ± 0.43	<0.001	0.042	0.047
Control	3.26 ± 1.42	4.26 ± 1.12	5.57 ± 0.78	6.66 ± 0.80			
<i>t</i> -test	0.558	<0.001	<0.001	<0.001			
Vomiting episodes							
Intervention	1.23 ± 0.43	1.03 ± 0.17	0.46 ± 0.41	0.26 ± 0.13	<0.001	0.341	0.441
Control	1.26 ± 0.46	1.34 ± 0.48	2.17 ± 0.12	2.94 ± 0.68			
<i>t</i> -test	0.778	<0.001	<0.001	<0.001			

^aData are presented as mean±SD. SD: Standard deviation

the PC6 point, insufficient duration, and the type and amount of pressure applied on the acupoint. Moreover, the study sample size and populations studied might have affected the results in various studies.

The present study also showed that PC6 acupressure could decrease the episodes of postoperative vomiting, especially from the 1st postoperative hour on. A number of recent studies also evaluated the effects of PC6 acupressure on nausea and vomiting after ambulatory surgeries^[28] and appendectomy^[19] and reported fewer episodes and less severity of nausea and vomiting in those who received acupressure than in the control groups. However, another study has reported that this method could not reduce nausea and vomiting after laparoscopic cholecystectomy.^[6] A study has also reported that PC6 acupressure had a better effect on postoperative nausea than on vomiting.^[29] In a recent study, the PC6 acupressure was neither clinically nor statistically effective in decreasing postoperative vomiting.^[30] The inconsistencies between the studies might again be attributed to the type of surgery, duration of intervention, and type and the gender of the patients studied.

Overall, given the current results and the findings of earlier studies, it appears that applying pressure on PC6 acupoint might decrease PONV. Due to the important role of acupressure in decreasing PONV, the allied health professionals and specially nurses can use this method as a noninvasive, inexpensive, and simple complementary method to decrease PONV.

Different theories exist as the mechanism of this intervention. The first is the energy balance theory. According to the TCM, there is a vital force in the human body that keeps the physical strength. This force is known as “Chi-square” or vital energy and flows through the inaccessible networks under the skin, called meridians. Perhaps, pressing the PC6 acupoint eliminates energy congestion in the chest and stomach, calms the mind, and helps reduce thirst, nausea, and travel sickness.^[31] Another theory is the neurohormonal response theory. Based on this theory, the electromagnetic signals cause the activation of endorphins and monoamines.^[32] An increase in the serotonin level may also reduce nausea and vomiting.^[33] The third theory is the psychological factors theory. In this theory, the presence of the person performing acupressure is considered as a stress reliever.^[34-37] However, a combination of the above reasons might affect the beneficial effects of acupressure on PONV.

A limitation of the current study was the probably different human physiological reactions to anesthesia that we were unable to measure it. Moreover, in the opposite

of many earlier studies, our patients were under spinal anesthesia and therefore were awake during the surgery. This might affect their psychological condition and their reaction to acupressure. The small sample size is also another factor which might limit the generalizability of our results. Moreover, the effect of acupressure might be affected by the patients’ age. Therefore, further studies with larger sample sizes and in different age groups such as adolescents, middle aged, and older adults are suggested. As for the different incidence of PONV in different surgeries, it is suggested that the effect of acupressure in different surgeries should be evaluated.

CONCLUSION

The mean episodes and severity of nausea in the intervention group was significantly lower than the control group. Vomiting episode in the intervention group was lower than the control group, but the difference was not significant. In the current study, acupressure of PC6 acupoint could reduce PONV in patients who have undergone spinal anesthesia. Therefore, it can be utilized by anesthetists and nurses in pre- and post-operative care. Nurses should be trained on using this nonpharmacologic method to treat PONV.

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Conflicts of interest

There are no conflicts of interest.

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