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Effectiveness of acupressure on pain management among mediosternotomy patients

Pritha L[*1], Valliammal S[2], Vijayaraghavan R[3]

[1]Research Scholar, Saveetha Institute of Medical and Technical Sciences, 162, Poonamalle High Road, Velappanchavadi, Chennai -600 077 , Tamil Nadu, India
[2]NIMHANS, College of Nursing, Hosur Road, 560029, Bangalore, India
[3]Saveetha Institute of Medical and Technical Sciences, 162, Poonamalle High Road, Velappanchavadi, Chennai-600 077, Tamil Nadu, India

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ABSTRACT

Acupressure is an alternative therapy that uses fingers and hands to stimulate acupoints and maintains the balance of energy. It was well documented that acupressure is effective in relieving different types of pains in patients with different conditions. The present study was undertaken to evaluate the effect of acupressure in pain and improving the bio-physiological parameters among mediosternotomy patients. The present study was conducted at Sri Sathya Sai Institute of Higher Medical Sciences, Whitefield, Bangalore. A total of twenty male and female patients those who undergo open-heart surgery via median sternotomy were part of the study after obtaining the written informed consent. After recording the demographic data, the participants were randomly grouped into control and intervention groups using random numbers generated by computer with 10 participants in each group. The intervention will be provided at PC6 acupressure point, situated on the inner side of the forearm, three fingers below the wrist joint, three times a day for four days. Numerical Rating Scale of pain was used to assess the pain of the Participants. There was a significant decrease in the pain score of the participants, followed by the acupressure. The study provides further evidence for the effectiveness of the acupressure in pain management and also recommends detailed research in this area.

*Corresponding Author

Name: Pritha L
Phone:
Email: prithashashu@gmail.com

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INTRODUCTION

Acupressure is an alternative therapy that uses fingers and hands to stimulate acupoints and maintains the balance of energy. It was well documented that acupressure is effective in relieving different types of pains in patients with different conditions. Earlier studies have recommended applying the acupressure as an alternative therapy in the management of the pain of the patients (Chen and Wang, 2014). Musculoskeletal pain was reported to decrease, followed by the acupressure. Further, there were no side effects followed by the acupressure. The major advantage of using the acupressure is that it reduces the usage of the analgesics and anti-inflammatory agents (Vas *et al.*, 2008). Worldwide nearly 2 mil-

lion people undergo sternotomy for surgery of heart every year. Followed by the surgery, the majority of the patients develop pain which must be managed. Analgesics are the commonly used treatment for the management of the pain. However, it is associated with severe side effects. Hence, there is a strong need for alternative therapy, which is effective and associated with no side effects. Acupressure PC6 acupoint stimulation has been practiced in various surgeries, but there is no study done by stimulating PC6 acupoint through touch on open-heart surgery patients. In this regard, the investigator is also interested in finding out the effect of using acupressure on pain and bio-physiological parameters for mediosternotomy patients. Hence, the present study was undertaken to evaluate the effect of acupressure in pain and improving the bio-physiological parameters among mediosternotomy patients.

MATERIALS AND METHODS

Study design

Experimental study with pre and post with control design.

Study setting

The present study was conducted at Sri Sathya Sai Institute of Higher Medical Sciences, Whitefield, Bangalore.

Study population

A total of twenty male and female patients those who undergo open-heart surgery via median sternotomy were part of the study after obtaining the written informed consent. After recording the demographic data, the participants were randomly grouped into control and intervention groups using random numbers generated by computer with 10 participants in each group.

Group Control (= 10): No intervention applied

Group Experimental (= 10): Acupressure was applied

The participants were recruited using the following criteria.

Inclusion criteria

1. Male and female participants between the age group of 19 and 60 years.
2. Patients those who report pain during deep inspiration with an intensity of at least 3 on a 0–10 rating scale under standard analgesia.

- Patients those who are extubated.
- Patients on the first operative day and conscious.
- Patients who can communicate through English, Tamil, Hindi and Kannada.
- Patients those who are willing to participate in a study.

Table 1: Distribution of participants on the basis of gender (Data was presented as frequency and percentage). (Exp-experimental group, Con- control group)

Gender	Exp-Frequency (percentage)	Con- Frequency (Percentage)
Male	6 (60)	9 (90)
Female	4 (40)	1 (10)

Table 2: Distribution of participants on the basis of age (Data was presented as frequency and percentage).(Exp-experimental group, Con-control group)

Age (years)	Exp-Frequency (percentage)	Con- Frequency (Percentage)
19-28	1 (10)	1 (10)
29-38	3 (30)	4 (40)
39-48	2 (20)	1 (10)
49-58	2 (20)	1 (10)
59-68	2 (20)	3 (30)

Table 3: Distribution of participants on the basis of education (Data was presented as frequency and percentage).(Exp-experimental group, Con- control group)

Education	Exp-Frequency (percentage)	Con- Frequency (Percentage)
No formal education	0 (0)	1 (10)
Primary	6 (60)	6 (60)
Secondary	1 (10)	3 (30)
Higher secondary	2 (20)	0 (0)
Graduate	1 (10)	0 (0)
Post Graduate	0 (0)	0 (0)
Other specify	0 (0)	0 (0)

Exclusion criteria

Table 17: Comparison of pre and post values of pain score among control and experimental groups (Data was presented as frequency and percentage). (Exp-experimental group, Con- control group)

Day-1			
Experiment group			
Test time	Pre	Post	p-value
5-6:00pm	9.10±0.32	6.70±0.48	<0.0001***
Control group			
5-6:00pm	9.10±1.32	9.10±1.32	1
Day-2			
Experiment group			
Test time	Pre	Post	p-value
5-6:00am	8.40±0.52	6.20±0.42	<0.0001***
12-1:00pm	7.70±0.67	6±0.00	<0.0001***
5-6:00pm	7.20±0.42	5.50±0.53	<0.0001***
Control group			
5-6:00am	8.20±0.42	8.20±0.42	1
12-1:00pm	7.40±0.70	7.40±0.70	1
5-6:00pm	6.60±0.70	6.60±0.70	1
Day-3			
Experiment group			
Test time	Pre	Post	p-value
5-6:00am	7±0	5.30±0.48	<0.0001***
12-1:00pm	6.10±0.32	3.90±0.57	<0.0001***
5-6:00pm	5.10±0.32	3±0.00	<0.0001***
Control group			
5-6:00am	6.10±0.74	6.10±0.74	1
12-1:00pm	5.80±0.63	5.80±0.63	1
5-6:00pm	5.10±0.74	5.10±0.74	1
Day-4			
Experiment group			
Test time	Pre	Post	p-value
5-6:00am	3.90±0.57	2.60±0.70	0.0002
12-1:00pm	3.70±0.48	2.10±0.32	<0.0001***
5-6:00pm	2.90±0.32	1.40±0.52	<0.0001***
Control group			
5-6:00am	4.70±0.67	4.70±0.67	1
12-1:00pm	4±0.67	4±0.67	1
5-6:00pm	3.80±0.42	3.90±0.32	0.5567

- Patients who are having post-operative complications.
- Patients with the emergency operation, chronic pain and hemodynamically unstable.
- Patients who underwent graft donor site from hands for CABG.

Acupressure

The intervention will be provided at PC6 acupressure point, situated on the inner side of the forearm, three fingers below the wrist joint, three times a day.

Assessment of pain

Numerical Rating Scale of pain was used to assess the pain of the Participants (Jensen *et al.*, 1986).

Ethical consideration

The study was approved by the Institutional Ethics Committee. A written, informed consent was obtained from all the participants. The study was performed in accordance with the "Ethical Guidelines for Biomedical Research on Human Partic-

Table 18: Comparison of pre values of pain score among control and experimental groups (Data was presented asfrequency and percentage). (Exp-experimental group, Con- control group)

Day-1			
Test time	Con Pre	Exp Pre	p-value
5-6:00pm	9.10±1.32	9.10±0.32	1
Day-2			
Test time	Con Pre	Exp Pre	p-value
5-6:00am	8.20±0.42	8.40±0.52	0.3566
12-1:00pm	7.40±0.70	7.70±0.67	0.3405
5-6:00pm	6.60±0.70	7.20±0.42	0.0320*
Day-3			
Test time	Con Pre	Exp Pre	p-value
5-6:00am	6.10±0.74	7±0	0.0012**
12-1:00pm	5.80±0.63	6.10±0.32	0.0937
5-6:00pm	5.10±0.74	5.10±0.32	1
Day-4			
Test time	Con Pre	Exp Pre	p-value
5-6:00am	4.70±0.67	3.90±0.57	0.0101*
12-1:00pm	4±0.67	3.70±0.48	0.2648
5-6:00pm	3.80±0.42	2.90±0.32	<0.0001***

Table 19: Comparison of post values of pain score among control and experimental groups (Data was presented as frequency and percentage). (Exp-experimental group, Con- control group)

Day-1			
Test time	Con Post	Exp Post	p-value
5-6:00pm	9.10±1.32	6.70±0.48	<0.0001***
Day-2			
Test time	Con Post	Exp Post	p-value
5-6:00am	8.20±0.42	6.20±0.42	<0.0001***
12-1:00pm	7.40±0.70	6±0.00	<0.0001***
5-6:00pm	6.60±0.70	5.50±0.53	0.0009
Day-3			
Test time	Con Post	Exp Post	p-value
5-6:00am	6.10±0.74	5.30±0.48	0.0102
12-1:00pm	5.80±0.63	3.90±0.57	<0.0001***
5-6:00pm	5.10±0.74	3±0.00	<0.0001***
Day-4			
Test time	Con Post	Exp Post	p-value
5-6:00am	4.70±0.67	2.60±0.70	<0.0001***
12-1:00pm	4±0.67	2.10±0.32	<0.0001***
5-6:00pm	3.90±0.32	1.40±0.52	<0.0001***

Table 4: Distribution of participants on the basis of occupation (Data was presented as frequency and percentage).(Exp-experimental group, Con- control group)

Occupation	Exp-Frequency (percentage)	Con- Frequency (Percentage)
Daily wages	5 (50)	3 (30)
Business	0 (0)	3 (30)
Private	2 (20)	3 (30)
Government	0 (0)	0 (0)
Retired	0 (0)	0 (0)
Homemaker	3 (30)	1 (10)

Table 5: Distribution of participants on the basis of family income (Data was presented as frequency and percentage). (Exp-experimental group, Con- control group)

Family income (rupees per month)	Exp-Frequency (percentage)	Con- Frequency (Percentage)
<10000	6 (60)	1 (10)
10001-20000	3 (30)	5 (5)
20001-30000	1 (10)	4 (4)
30001-40000	0 (0)	0 (0)
>40000	0 (0)	0 (0)

Table 6: Distribution of participants on the basis of family religion (Data was presented as frequency and percentage). (Exp-experimental group, Con- control group)

Religion	Exp-Frequency (percentage)	Con- Frequency (Percentage)
Hindu	8 (80)	5 (50)
Muslim	1 (10)	4 (40)
Christian	1 (10)	1 (10)
Others	0 (0)	0 (0)

Table 7: Prior information on acupressure (Data was presented as frequency and percentage). (Exp-experimental group, Con-control group)

Have you received any information on acupressure	Exp-Frequency (percentage)	Con- Frequency (Percentage)
Yes	0 (0)	0 (0)
No	10 (100)	10 (100)

Table 8: Co-morbid illness inthe participants (Data was presented as frequency and percentage).(Exp-experimental group, Con-control group)

Co-morbid illness	Exp-Frequency (percentage)	Con- Frequency (Percentage)
Angina or Exertion	3(30)	7 (70)
Hypertension	5 (50)	1 (10)
Dyspnea or exertion	2 (20)	2 (20)

Table 9: Duration of illness in the participants (Data was presented as frequency and percentage). (Exp-experimental group, Con-control group)

Duration of illness	Exp-Frequency (percentage)	Con- Frequency (Percentage)
< 1 year	3(30)	1(10)
1-5 years	6(60)	6(60)
6-10 years	1(10)	3(30)

Table 10: Surgical diagnosis in the participants (Data was presented as frequency and percentage).(Exp-experimental group, Con-control group)

Surgical diagnosis	Exp-Frequency (percentage)	Con- Frequency (Percentage)
Coronary artery disease	8(80)	8(80)
Mitral valve stenosis	1(10)	1(10)
Aortic valve stenosis	1(10)	1(10)

ipants, 2006" by the Indian Council of Medical Research and the Declaration of Helsinki, 2008.

Data analysis

Data was analyzed using SPSS 20.0. Data were expressed as frequency and percentage. Pain scores were expressed as mean and SD. A probability value of less than 0.05 was considered significant.

Table 11: Name of the surgery undergone by the participants (Data was presented as frequency and percentage).(Exp-experimental group, Con-control group)

Name of the surgery	Exp-Frequency (percentage)	Con- Frequency (Percentage)
On pump coronary artery bypass graft	7(70)	7(70)
Mitral valve replacement	1(10)	1(10)
Aortic valve replacement	1(10)	1(10)
Off-pump coronary artery bypass graft	1(10)	1(10)

Table 12: Location of water seal drain ages and the number of drains undergone by the participants (Data was presented as frequency and percentage). (Exp-experimental group, Con- control group)

Location of water seal drainage & number	Exp-Frequency (percentage)	Con- Frequency (Percentage)
Right & Left chest	10(100)	10(100)
2 Drains	10(100)	10(100)

Table 13: Location of pain in the participants (Data was presented as frequency and percentage).(Exp-experimental group, Con-control group)

Location of pain	Exp-Frequency (percentage)	Con- Frequency (Percentage)
Sternum & Leg	8(80)	8(80)
Only Sternum	2(20)	2(20)

Table 14: Frequency of experiencing pain in the participants (Data was presented as frequency and percentage). (Exp-experimental group, Con- control group)

Frequency of Experiencing pain	Exp-Frequency (percentage)	Con- Frequency (Percentage)
Never	0(0)	0(0)
Sometime	0(0)	0(0)
Mostly	0(0)	0(0)
Always	10(100)	10(100)

Table 15: Activities associated with pain sensation duration in the participants (Data was presented as frequency and percentage). (Exp-experimental group, Con- control group)

Activities associated with pain sensation duration	Exp-Frequency (percentage)	Con- Frequency (Percentage)
Cough	10(100)	10(100)
Physiotherapy	10(100)	10(100)
Wound dressing	2(20)	4(40)
Movement	7(70)	7(70)

Table 16: Medication given to the participants (Data was presented as frequency and percentage).(Exp-experimental group, Con-control group)

Medication	Exp-Frequency (percentage)	Con- Frequency (Percentage)
T. Paracetamol	10(100)	10(100)
Dose (1 Gram)	10(100)	10(100)
Route (Oral)	10(100)	10(100)
Frequency (BD)	10(100)	10(100)

RESULTS AND DISCUSSION

Distribution of participants on the basis of gender was presented in Table 1. Distribution of participants on the basis of age is presented in Table 2. Distribution of participants on the basis of education was presented in Table 3. Distribution of participants on the basis of occupation was presented in Table 4. Distribution of participants on the basis of family income was presented in Table 5. Distribution of participants on the basis of family religion was presented in Table 6. Prior information on acupressure was presented in Table 7. Co-morbid illness in the participants was presented in Table 8. Duration of illness in the participants was presented in Table 9. Surgical diagnosis in the participants was presented in Table 10. Name of the surgery undergone by the participants was presented in Table 11. Location of water seal drainages and the number of drains undergone by the participants were presented in Table 12. Location of pain in the participants was presented in Table 13. Frequency of experiencing pain in the participants was presented in Table 14. Activities associated with pain sensation duration in the participants were presented in Table 15. Medication given to the participants was presented in Table 16. Comparison of pre and post values of pain score among control and experimental groups was presented in Table 17. Comparison of pre -values of pain score among control and experimental groups were presented in Table 18. Comparison of post- values of pain score among control and experimental groups, were presented in Table 19.

The present study was undertaken to observe the effectiveness of acupressure on pain management among mediosternotomy patients. There was a significant decrease in the pain scores followed by the acupressure. Patients are undergoing the heart surgery experiences immense pain due to the opening of the sternum, damage of the tissues and inflammation (Mazzeffi and Khelemsky, 2011; Bjørnnes *et al.*, 2016). Management of postoperative pain of these patients is essential as ill management not only delays the discharge of the patient but also causes disorders of respiratory, digestive, cardiovascular and other systems (Choiniere *et al.*, 2014; Ghoneim and O'Hara, 2016). Both pharmacological and non-pharmacological therapies are currently used for the management of the post-operative pain of the patients.

Opioids are the most commonly used drugs in the management of the pain of the patients (Alavi, 2010). Though opioids relieve pain effectively, they are associated with side effects and also need a long-term stay of the patient in the hospital. Hence, the alternative therapies like acupuncture, music therapy, exercises etc. are widely used as they are associated with minimal or no side effects. One such method is acupressure. However, there are limited studies in this aspect. Hence, the present study was undertaken to provide scientific evidence to implement the acupressure also as a complementary therapy in the management of post-operative pain of the patients. Acupressure was reported as a safe method in relieving the pain of the patients (Vickers *et al.*, 2012; Lee *et al.*, 2013; Yu-Jeong *et al.*, 2013; Yamashita *et al.*, 1999). Acupressure is performed by applying the physical pressure on specific points of the body surface by means of energy circulation. Though it appears similar to the acupuncture, in this method, the pressure is applied only using the fingers, hands, palms, wrists and knees in order to provide an internal flow of energy. Thus, the method is non-invasive, effective and safer method compared to acupuncture.

The present study results provide scientific evidence for the effectiveness of acupressure in the management of the post-operative pain of the patients. The study results are in accordance with the earlier studies which explained that the acupressure is an effective method in relieving different kinds of pain (Kotani *et al.*, 2001; Goddard *et al.*, 2002).

CONCLUSION

There was a significant decrease in the pain score of the participants**,** followed by acupressure. The study provides further evidence for the effectiveness of the acupressure in pain management and also recommends detailed research in this area.

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