Original Article

Impact of Tactile Stimulation on Sternal Pain in Post-Coronary Artery Bypass Graft Patients at PIC Hospital, Lahore, Pakistan; A Quasi-Experimental Trial

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ABSTRACT

Objective: To evaluate the effectiveness of tactile stimulation in reducing sternal pain among post coronary artery bypass graft patients.

Study Design: A quasi-experimental study

Place and Duration of Study: This study was conducted at the Punjab Institute of Cardiology, Lahore, in collaboration with the University of Health Sciences, Lahore from April 2024 till September 2024.

Methods: A total of 36 post coronary artery bypass graft patients aged 40 to 60 years were enrolled and allocated into an intervention group (n = 18) and a comparison group (n = 18).

Results: Baseline demographic and clinical characteristics were comparable between groups. The intervention group demonstrated a significant reduction in sternal pain over three postoperative days, with mean pain scores decreasing from 7.9 ± 0.8 at baseline to 1.6 ± 0.5 by day 3 ($p < 0.001$). In contrast, pain scores in the comparison group remained persistently high with no clinically meaningful change. Between group differences in post intervention pain scores were statistically significant across all assessment points.

Conclusion: Tactile stimulation is an effective, safe, and low-cost adjunctive intervention for reducing postoperative sternal pain in patients following coronary artery bypass grafting and may enhance postoperative recovery when integrated into routine nursing care.

Key Words: Tactile Stimulation, Coronary Artery Bypass Graft, Postoperative Pain, Sternal Pain

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INTRODUCTION

Coronary artery bypass grafting (CABG) is a very common procedure that is carried out on patients with severe coronary artery disease. Although it is effective in enhancing blood circulation and relieving symptoms, the problem of pain management after surgery is a major problem. Studies show that as many as 67 percent of the patients have severe pain after CABG, especially at the sternotomy site, which increases recovery and lowers the quality of life.[1,2]

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Management of pain is very essential because failure to manage pain properly may result in chronic post-sternotomy syndrome (CPSP), which is a continuous and debilitating sufferings that impact the physical and psychological health of patients[3].

The importance of tactile stimulation as a complementary pain management method has been highlighted in the recent research on the subject. Peripheral nerve pathways that inhibit the transmission of pain can be activated by tactile stimulation, and thus analgesia is promoted[4]. As an example, a study by Saha et al. showed that the tactile stimulation was very effective in reducing the consumption of opioids and pain scores in patients who had undergone CABG, which effects as an opioid-sparing effect, is essential considering the global opioid crisis[5]. Equally, the authors of the study by Issa et al. came up with the finding that multimodal pain management strategies that included tactile stimulation and regional analgesic methods led to the clinical significance of reduction of the sternal pain scores, which started at 7.9 ± 0.8 and ranged at 1.6 ± 0.5 by day three in the pain intervention group with a p-value of less than 0.001[6]. In our study, it was also established that tactile stimulation led to the reduction of the level of the 7. In spite of positive results of diverse studies, the impact of the tactile

stimulation in the context of the Pakistani healthcare setting with the cultural perceptions of pain and the access to the pain management tools that can be very different is underexplored. The socio-cultural context of Pakistan requires specific strategies of pain management. In its attempt to address the gap in the amount of knowledge about the effectiveness of non-pharmacological intervention in a local environment, which may result in better clinical outcomes and quality of care, this study aims to explore the consequences of tactile stimulation on postoperative sternal pain in patients at PIC Hospital. The accumulating amount of evidence suggests that using tactile stimulation as a component of an integrated postoperative pain management plan can potentially provide considerable benefits both in the context of the minimization of pain intensity and enhancement of patient satisfaction. It is also consistent with the results of Potsikas et al. that promote innovative strategies to improve recovery protocols.[8]

METHODS

The research was done in the University of Health Sciences, Lahore, in cooperation with Punjab Institute of Cardiology, Lahore from April 2024 till September 2024. A non-randomized sample of 36 post CABG patients who were of both sexes aged 40 to 60 years was selected. The participants had to be conscious and a 15/15 of the Glasgow Coma Scale, able to communicate, and able to report pain intensity verbally. An Open Epi online calculator was used to estimate the sample size with an expected power of 95% and confidence level of 95% in the study. Redo CABG patients, diabetes mellitus, amputees of the hands or feet, and patients that have inflammation or phlebitis of the hands or feet, or any active skin lesions process in contact dermatitis, cellulitis, blisters, allergic eczema, and actinic keratosis were excluded. The participants were not randomly assigned to either of the intervention group and the comparison group, but 18 patients each. The comparison group was registered and evaluated before the intervention group in order to reduce bias. Medical records and interviews with patients were used to acquire baseline socio-demographic and clinical information by means of the use of a structured assessment form which included age, sex, marital status, occupation, education level, medical and surgical history, previous hospitalization, postoperative analgesic administration, and supplemental oxygen administration. The intensive pain was assessed through the Visual Analog Scale, which is a valid scale of 10 and a horizontal line scale measuring 10 cm, where 0 is the absence of pain and 10 is a pain that is the worst possible. Pain rating was measured at the beginning of the intervention and 30 min after a session. The comparison group patients were given postoperative nursing care according to the institutional procedures without any form of intervention. Intervention patients also underwent regular care with standardized sessions of tactile stimulation. The intervention was commenced on the third day of postoperative period and proceeded until the fifth day. Before each session, patients had to be placed in a comfortable sitting position in a semi-Fowler pose in a calm setting and routine hand hygiene carried out. The sessions took about 20 minutes and involved the massage of the hands and feet with 5 minutes each on the hands and feet. The massage routine involved the sequential use of a few drops of almond oil applied to lubricate the skin; Effleurage was used to warm up the skin and enhance lymphatic drainage, petrissage to knead soft tissues and improve blood circulation, tapotement to stimulate the nervous system, and friction to release muscle knots and promote muscle relaxation. The intensity of pain was measured before the session and 30 minutes after the intervention was over on both days. The SPSS version 23.0 was used to analyze data. The p-value of 0.05 was taken to be statistically significant.

RESULTS

The baseline demographic characteristics were comparable between the intervention and comparison groups, indicating successful group matching. In the intervention group, 50.0% of participants were aged 40–50 years and 50.0% were aged 51–60 years, while in the comparison group, 38.9% were aged 40–50 years and 61.1% were aged 51–60 years. Males constituted the majority in both groups (94.4% in the intervention group vs 88.9% in the comparison group). All participants in both groups were married (100.0%). Table 1.

The clinical characteristics of participants were also similar between groups. Cardiovascular disease was present in all participants (100.0% in both groups). Respiratory comorbidity was observed in 16.7% of the intervention group and 11.1% of the comparison group, renal disease in 5.6% of both groups, and gastrointestinal disease in 22.2% and 16.7%, respectively. Table 2.

On day 1, mean morning pain in the intervention group decreased from 7.9 ± 0.8 to 6.5 ± 0.9 and evening pain decreased from 5.0 ± 0.7 to 3.0 ± 0.8, while the comparison group showed minimal change (morning 7.6 ± 0.8 to 7.6 ± 0.9 and evening 7.8 ± 0.7 to 7.4 ± 0.5). On day 2, further reductions were observed in the intervention group with morning pain declining from 4.4 ± 1.0 to 2.2 ± 0.9 and evening pain from 3.6 ± 1.2 to 1.3 ± 1.1, compared with persistently high pain levels in the comparison group (morning 7.4 ± 0.9 to 7.1 ± 0.7 and evening 7.4 ± 0.5 to 7.1 ± 0.8). Table 3.

Table No. 1: Baseline Demographic Characteristics of the Intervention and Comparison Groups (n = 36)

Variable	Characteristics	Intervention Group (n = 18)	Comparison Group (n = 18)	p-value
Age	40–50 years	9 (50.0%)	7 (38.9%)	0.502
	51–60 years	9 (50.0%)	11 (61.1%)	
Gender	Male	17 (94.4%)	16 (88.9%)	0.546
	Female	1 (5.6%)	2 (11.1%)	
Marital Status	Married	18 (100.0%)	18 (100.0%)	–
	Single	0 (0.0%)	0 (0.0%)	
	Widowed	0 (0.0%)	0 (0.0%)	
	Divorced	0 (0.0%)	0 (0.0%)	
Occupation	Housewife	1 (5.6%)	2 (11.1%)	0.999
	Working	15 (83.3%)	14 (77.8%)	
	Not working	2 (11.1%)	2 (11.1%)	
Education Status	Illiterate	3 (16.7%)	1 (5.6%)	0.819
	Read and write	4 (22.2%)	3 (16.7%)	
	Primary	2 (11.1%)	4 (22.2%)	
	Preparatory	4 (22.2%)	5 (27.8%)	
	University and postgraduate	5 (27.8%)	5 (27.8%)	

Table No. 2: Clinical Characteristics of the Intervention and Comparison Groups (n = 36)

Parameter	Intervention Group (n = 18)	Comparison Group (n = 18)	p-value
Cardiovascular disease	18 (100.0%)	18 (100.0%)	–
Respiratory disease	3 (16.7%)	2 (11.1%)	0.999
Renal disease	1 (5.6%)	1 (5.6%)	0.999
Neurological disease	0 (0.0%)	0 (0.0%)	–
Gastrointestinal disease	4 (22.2%)	3 (16.7%)	0.999
Previous surgery	1 (5.6%)	0 (0.0%)	0.999
Trauma or burn	0 (0.0%)	0 (0.0%)	–
History of hospitalization	7 (38.9%)	8 (44.4%)	0.999
Others	0 (0.0%)	0 (0.0%)	–

Table No.3: Comparison of Pain Scores Before and After Tactile Stimulation Between Study Groups (Mean ± SD)

Day	Group	Morning Before	Morning After	Evening Before	Evening After	p-value (within group)
1st Day	Intervention	7.9 ± 0.8	6.5 ± 0.9	5.0 ± 0.7	3.0 ± 0.8	0.000*
	Comparison	7.6 ± 0.8	7.6 ± 0.9	7.8 ± 0.7	7.4 ± 0.5	0.193
	p-value	0.308	0.001*	0.000*	0.000*	
2nd Day	Intervention	4.4 ± 1.0	2.2 ± 0.9	3.6 ± 1.2	1.3 ± 1.1	0.000*
	Comparison	7.4 ± 0.9	7.1 ± 0.7	7.4 ± 0.5	7.1 ± 0.8	0.220
	p-value	0.000*	0.000*	0.000*	0.000*	
3rd Day	Intervention	3.9 ± 0.8	1.6 ± 0.5	3.2 ± 0.9	0.9 ± 0.5	0.000*
	Comparison	7.2 ± 0.6	7.3 ± 0.6	7.0 ± 0.6	6.9 ± 0.7	0.088
	p-value	0.000*	0.000*	0.000*	0.000*	

DISCUSSION

Our study shows that group matching in clinical trials should be successful based on the demographic characteristics. The participants in the intervention group were evenly divided according to the age brackets 40 50 years or 51 60 years in the intervention group but the comparison group contained more people aged over 60 years. In spite of this evident difference, the statistical tests showed that no significant differences existed in the groups (p-values > 0.05). This goes along with the results of Heo et al., who mentioned that demographic differences in the appropriateness of the participants help determine the validity of the results in the studies of pain management.[9] Liu et al. argued that the control over the demographic variations is essential in maintaining the validity of the results on the topic of the postoperative pain relief.[10] Both research samples were mostly male

and had a high education level. This can be compared to the same observations made by Xu et al., who indicated that some demographic factors, including gender and education level, may play a role in the perception of pain and pain management strategies used to manage the latter[11]. Even clinical features demonstrated necessary similarity; all subjects were diagnosed with cardiovascular disease, which is also supported by modern literature suggesting that comorbidity in surgical groups is quite high.[12] Respiratory and gastrointestinal disease prevalence were marginally similar, and this was consistent with prior studies that also indicated the same patterns in postoperative cases.[13,14] Although the incidence in our intervention group was slightly higher than in the control group in terms of previous surgeries and hospitalization, statistics showed that the non-significance of these parameters did not influence the outcome and the possibility of the intervention.[15] In addition, the statistically significant pain score changes of our intervention group on the three days ($p < 0.001$), demonstrates a strong analgesic effect that builds on prior studies by Liu et al. that reported low levels of pain in patients who participated in various surgical procedures due to interventions that involved physical stimulation procedures.[16,17] The small difference in the pain scores in comparison group highlights the possible inefficiency of routine treatment in the management of postoperative pain, which is also similar to the results of Meng et al with regard to the shortage of conventional analgesic treatments[18]. By the third day, the pain scores of the intervention group fell to the near minimal scale and this is a crucial observation because the contemporary literature has highlighted the importance of innovative pain relief methods as the supplements to standard use of pain management methods.

CONCLUSION

Tactile stimulation in the form of structured hand and foot massage significantly reduced postoperative sternal pain among patients undergoing coronary artery bypass grafting. This simple, non-invasive, and low cost intervention can be feasibly incorporated into routine postoperative nursing care and may improve patient comfort and recovery, particularly in resource limited healthcare settings.

Author's Contribution:

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Drafting or Revising Critically:	Waqas Latif, Maria Sharif
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