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Original Article

Physiotherapy Practice Patterns for the Management of Patients undergoing Cardiac Surgery

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ABSTRACT

Background: This study explores physiotherapy practices in managing patients undergoing cardiac surgery in Lahore's hospitals. It focuses on evaluating pre and postoperative physiotherapy techniques, identifying common practices, and examining their alignment with evidence-based guidelines.

Objective: This prospective survey aimed to determine the pre and postoperative physiotherapy treatment used on patients undergoing open heart surgery.

Methods: The current survey involved physiotherapists working in cardiothoracic units throughout Lahore. A cross-sectional, descriptive study was carried out to know the practice of physiotherapy following routine open-heart surgery in Lahore. Patients having neurological symptoms, restricted lung disease, obstructed lung disease, cardiac vise unstable, under emergency procedure and excesses weight were not considered.

Results: In this survey, 90% (66 out of 73) of physiotherapists routinely provided preoperative physiotherapy. During the post-operative period, 96% (70 out of 73) applied various physiotherapy treatments. Of the respondents, 97% considered physiotherapy vital after surgery. The survey also found 91.8% (67 out of 73) of physiotherapists emphasized early mobilization, 94.5% (69 out of 73) used deep breathing exercises, and 84.9% (62 out of 73) implemented coughing/huffing techniques.

Conclusion: This survey provides an overview of current physiotherapy practices in the leading hospitals of Lahore in cardiac surgeries. Although, patients are provided with commonly used physiotherapy procedures, but in order to enhance the evidence-based practice, physiotherapists working in the cardiothoracic units should limit and improve their current treatment techniques and conduct new researches by taking benefits from the evidence based guidelines.

Keywords; Open heart surgery, physiotherapy, post-operative management, awareness, obstructed lung disease, restricted lung disease.

INTRODUCTION

Coronary artery disease (CAD) is the predominant cause of acute myocardial infarction which occurs due to deposition of atherosclerotic plaque in the epicardial coronary arteries (1). These conditions are surgically treated by different procedures such as cardiopulmonary bypass grafting that requires exposure of the heart and great vessels through a median sternotomy percutaneous transluminal coronary angioplasty (PTCA) is carried out on coronary arteries with proximal, localized lesions (2, 3).

Valvular heart diseases (VHD) include different diseases i.e. Aortic stenosis (AS), which results from thickening and calcification of the aortic valve leaflets, Aortic regurgitation (AR), which is due to abnormalities in the aortic valve or from aortic root dilatation, Mitral stenosis (MS) is caused by heavy calcification of the mitral valve and Mitral valve regurgitation (MR), which may result from abnormalities of the annulus, valve leaflets, chordae tendineae, or papillary muscles. Isolated tricuspid stenosis (TS) occurs rarely, but tricuspid regurgitation (TR) is commonly occurring mitral valve disease, which leads to pulmonary hypertension, RV dilatation, and tricuspid annular dilatation (4, 5).

In 1893, Dr. Daniel Hale William from Chicago successfully operated a patient with having stab wound involving the pericardium and the heart; hence, he introduced cardiac surgery for the first time. Theodore Tuffier performed the first Aortic surgery to open a

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stenotic valve on 13 July 1912. On May 2, 1960, coronary artery bypass surgery was successfully performed by Dr. Robert H. Goetz on a human being at Eden Hospital in New York City. CABG is an often-used open procedure in cardiac surgeries (3, 6).

Following cardiac surgery procedure, there is an indication of change in lung functioning and other associated clinical manifestations, which results in reduction in lung volume, functional residual capacity, impaired mucociliary clearance, and dysfunction in gaseous exchange which results in the postoperative pulmonary complications (PPC) that is defined as an abnormality in pulmonary function, which produces the disorder of lungs like atelectasis, pulmonary collapse, consolidation, pleural effusion, persistent air leaks, and pneumonia (7, 8).

On the basis of evidence the preoperative physiotherapy treatment and techniques for patient's care are not well established. Occasionally, physiotherapists assess the patients before operation, then reassess while still intubated in the postsurgical period. Following that period, physiotherapy treatments were initiated and continued after the extubation and shifting of patients in recovery room (9). Patients were treated with different techniques like deep breathing exercises, incentive spirometry, and gradual mobilization throughout the hospital stay. Proper education about sternal restriction, supported coughing, pain management, posture correction and healthy life style all were given to the patients before discharge from the hospital (10). Challenging the need for this traditional protocol, several studies have argued that this management is not necessary for all patients and consequently may not be the finest use of physiotherapy resources (11, 12).

Physiotherapy is done to reduce post-operative respiratory complications, such as arterial hypoxemia, atelectasis, and pulmonary infection which are the main causes of morbidity and mortality after open heart surgery. Such physiotherapy protocol is also used to reduce secondary problems such as pain, and stiffness, improve mobility functions, and make quality of life better after surgery (13, 14).

On the contrary, positive expiratory pressure (PEP) therapy using a blow bottle device reduces atelectasis and improves pulmonary function more effectively than deep breathing with no device or no deep breathing exercises but evidence do not hold up its clinical implications (15).

According to some researchers, thoracic and upper limb range of motion (ROM) exercises have been shown to be beneficial. Patients who have undergone open heart surgery are suggested to do progressive mobilization and walk training, the patients who walked the longer distance, recover earlier and had greater walking capacity with mental satisfaction at discharge from hospital (16).

The rationale of study was to determine the current pre and post operative physiotherapy practice patterns used to improve the pulmonary function by preventing and reducing the post-operative pulmonary complications and improving ADLs of the patients undergoing different procedures for the treatment of cardiac diseases and using some unique physical therapy approaches how patients are treated with various techniques both actively and passively.

MATERIALS AND METHODS

The study employed a cross-sectional survey to collect data over six months from various hospitals in Lahore. Data from seventy-six participants was gathered using convenience sampling. Participants were physiotherapists from cardiothoracic units who handled pre and postoperative sessions and rehabilitation for patients undergoing cardiac surgeries, specifically CABG and valvular replacement. Excluded from the study were patients with thoracic and cardiac surgeries other than CABG and valvular replacement, particularly those with neurological dysfunctions or prolonged intubation.

Data collection involved using a questionnaire titled "Physiotherapy management of patients underwent cardiac surgery in Sweden Questionnaire MOBILIZATION AND EXERCISE," developed by Elisabeth Westerdahl in 2011. After obtaining the necessary permissions, the questionnaires, focusing on pre- and postoperative physiotherapy practices for cardiac surgery patients, were distributed to physiotherapists working in government sector cardio-thoracic centers. The responses gathered from these questionnaires were then analyzed to understand the physiotherapy management approaches in the context of cardiac surgeries.

RESULTS

There was no gender specification in this study. Out of 73 physiotherapists, there were 38 (52.1%) males and 35 (47.9%) were females. The mean age of physiotherapists was found to be 28±4.46 years, with minimum and maximum age of 25 and 42 years respectively. Mean experience was 5±2.79 years with minimum and maximum experience of 1 and 14 years respectively.

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Table 1 Preoperative information provided to patients undergoing cardiac surgery (N=73)

Information	Yes	No	no response
Sternotomy Restrictions	57(78.1)	12(16.4))	4(5.5)
POD pulmonary complications	59(80.8)	13(17.8)	1(1.4)
Deep Breathing exercises	69(94.5)	4(5.5)	-
Coughing/huffing technique	62(84.9)	11(15.1)	-
Exercises for UE & thorax	58(79.5)	15(20.5)	-
Exercises for LE	63(86.3)	27(37)	-
Techniques of getting in & out of	64(87.7)	7(9.6)	2(2.7)
Bed			
Techniques of getting in & out of	59(80.8)	13(17.8)	1(1.4)
Chair			
Early mobilization	67(91.8)	6(8.2)	-

Note: UE: Upper extremity, LE: Lower extremity, POD: Postoperative data.

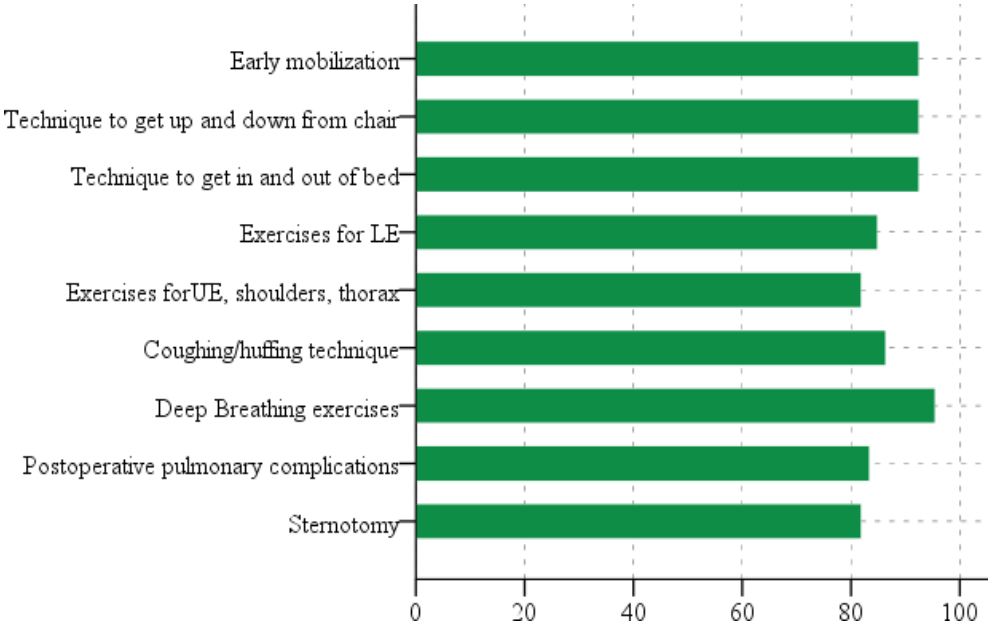

Figure 1 UE, LE & POD

In this study 90% of the physiotherapists provided the patients with preoperative information. The frequencies are given. The frequencies of information parameters are sternotomy restrictions 57(78.1%), postoperative pulmonary complications 59(80.8%), Deep breathing exercises 69(94.5%), coughing/huffing techniques 62(84.9%), exercise for upper extremity, shoulder, thorax 58(79.5%), exercises for lower extremity 63(86.3%), techniques to get in and out of bed 64 (87.7%), techniques to get up and down from chair 59(80.8%) and early mobilization 67 (91.8%).

Table 2 Assessment of cardiac surgery patients in connection with physiotherapy treatment (PT)

	Physiotherapy treatment			
Assessment Factors	Before PT	During PT	After PT	Do not assess
Breathing pattern	42(68.9)	33(54.1)	25(49)	3(5.9)
Ability to cough	38(74.5)	29(56.9)	25(43.8)	3(9.4)
Dyspnea score	24(75)	20(62.5)	13(40.6)	3(9.4)
Pulse oximetry	31(77.5)	25(62.5)	17(42.5)	4(10)

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	Physiotherapy treatment			
Arterial blood gases	27(75)	20(55.6)	17(47.2)	4(11.1)
Chest X-ray	27(73)	22(59.5)	19(51.4)	3(8.1)
Auscultation	31(72.1)	27(62.8)	23(53.5)	4(9.3)
Pulmonary function test	26(74.3)	21(60)	16(45.7)	4(11.4)
Heart rate/blood pressure	35(74.5)	28(59.6)	23(48.9)	4(8.5)
Pain assessment	32(72.7)	28(63.6)	19(43.2)	4(9.1)
Mobility getting in/out of bed, chair Exercise tolerance test	36(73.5) 27(71.1)	33(67.3) 22(57.9)	23(46.9) 17(44.7)	4(8.2) 3(7.9)
Functional scores (ADL)	29(76.3)	25(65.8)	16(42.1)	4(10.5)
ROM (shoulders, UE)	42(77.8)	31(57.4)	24(44.4)	4(7.4)
ROM (thorax)	34(79.1)	29(67.4)	17(39.5)	4(9.3)

Data is presented as n (%age) of physiotherapists
Note: ADL: activity daily limitation, ROM: Range of motion, UE: Upper extremity

Before PT, the average assessment frequency was 47 (71.2%), encompassing factors like breathing pattern, cough ability, Dyspnea score, pulse oximetry, arterial blood gases, chest X-ray, auscultation, etc. During PT, the average was 37 (56%) and after PT, the average was 41%.

Table 3 Postoperative Physiotherapy interventions of patients undergoing cardiac surgery (N=73)

Techniques	POD 1	POD 2	POD 3	POD 4
Mobilization	15(28.3)	21(42.9)	15(30.6)	13(26.5)
Sitting on edge of bed/chair	15(29.4)	18(37.5)	16(33.3)	16(33.3)
Standing	13(28.9)	19(45.2)	16(38.1)	15(35.7)
Walking in the room	13(28.9)	19(44.2)	16(37.2)	14(32.6)
Thoracic/UE-ROM exercises	11(25.6)	17(42.5)	14(35)	12(30)
LE- ROM exercises	10(23.3)	18(45)	14(35)	13(32.5)
Positioning, side lying	13(26.5)	19(41.3)	16(34.8)	15(32.6)
Postural drainage	16(29.6)	20(40.8)	15(30)	15(30)
Relaxation techniques	15(28.3)	20(40.8)	13(26.5)	13(26.5)
Posture exercises	12(27.3)	17(40.5)	14(33.3)	14(33.3)

Data is presented as n (%age) of physiotherapists
Note: ROM: Range of motion, UE: upper extremity, LE: lower extremity, POD: post- operative day

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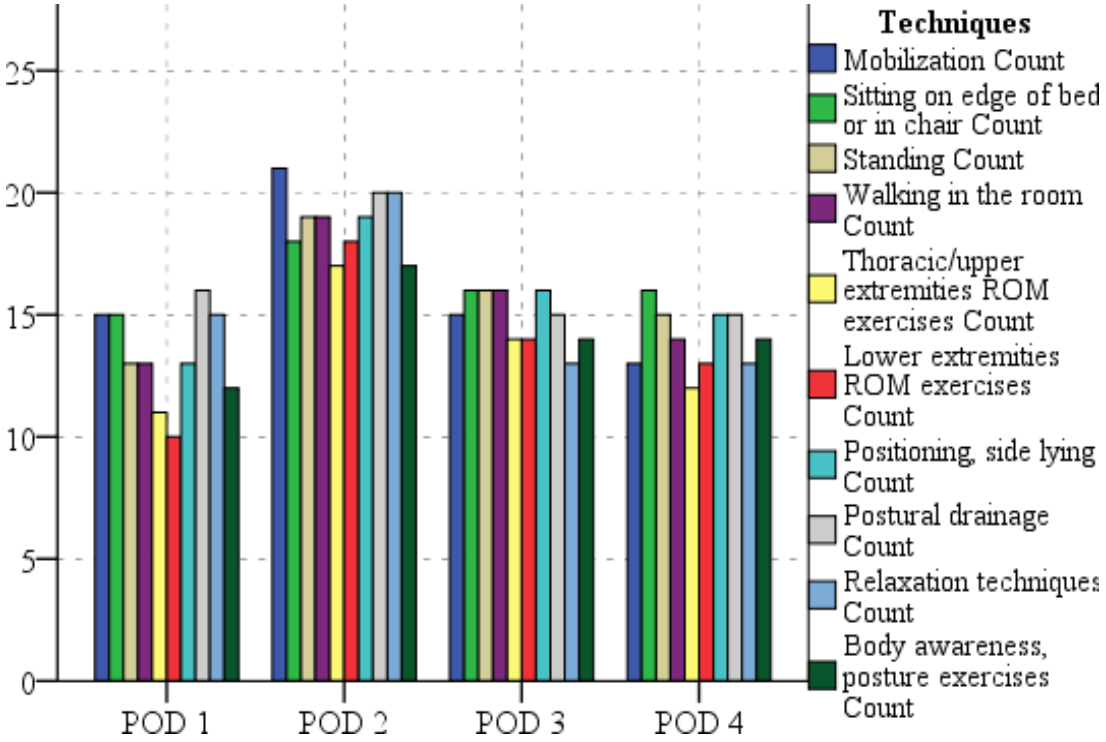

Figure 2 POD Data

Out of 73 physiotherapists, 70 (90%) performed post-operative rehabilitation. Techniques applied and their day-to-day frequencies are mentioned in Table 3. Moreover, on discharge, average of 78% of physiotherapists instructed their patients to perform their exercises 3 times a day which included 80% of physical activity, breathing exercises and ROM exercises while 84% recommended their patients to perform upper extremity exercise daily.

DISCUSSION

To the best of our knowledge, this was the first study reporting on practice patterns adopted by physiotherapists in Lahore for patients of cardiac surgery. According to the results of a survey, physiotherapists in Lahore were involved in the pre and post operative assessment and management of patients.

A cross sectional observational study was conducted to evaluate the use of current physiotherapy treatment patterns for the management of patients undergoing cardiac surgery and to identify the most common techniques used as interventions by the physiotherapists to prevent and treat the pre and postoperative complications

Riaz et al. (2017) reported in their study done in Karachi that 95% of respondents performed routine preoperative physiotherapy; however, 100% treated all patients during post-operative period of open heart surgery. In this survey across leading hospitals of Lahore, 97% of the physiotherapists considered physiotherapy necessary after cardiac surgery. 90% of physiotherapists routinely provided the patients with preoperative information, while 96% of physiotherapists were using postoperative interventions to treat the patients (11).

Sultanpuram et al. (2016) described in study that physiotherapy practice patterns for patients undergoing thoracic surgeries in India and reported that more than 90% of the responders practiced physiotherapy interventions both the pre- and the postoperative phase(17). While Lomi and Westerdahl et al. (2013) stated that 93% of the physical therapists instructed the patients to perform breathing exercises on a regular basis postoperatively (13).

Hirschorn et al. (2008), concluded in his study that 92.5% of physiotherapist used early mobilization as an intervention for the cardiac surgery patients. In the agreement of above study, our study reported that 91.8% of the respondents are using this information to provide patients with early mobility (18).

On the basis of evidence, the preoperative physiotherapy treatment and techniques for patient's care are not well established. Occasionally, physiotherapists assess the patients before operation, then reassess; however, still intubated even (19).

Following that period, physiotherapy treatments got initiated and continued after the extubation and shifting of patients in recovery room. Patients were treated with different techniques like deep breathing exercises, incentive spirometry, and gradual mobilization throughout the hospital stay (20). Proper education about sternal restriction, supported coughing, pain management, posture correction and healthy lifestyle all were given to the patients before discharge from the hospital. Challenging the need for this

traditional protocol, several studies have argued that this management is not necessary for all patients and consequently may not be the finest use of physiotherapy resources.

CONCLUSION

This survey offers insights into the prevalent physiotherapy practices in Lahore's major hospitals for cardiac surgeries. It reveals that 97% of physiotherapists deem physiotherapy essential post-cardiac surgery, and 96% utilize postoperative interventions for patient treatment. However, to align with evidence-based practice, physiotherapists in cardiothoracic units need to refine and update their treatment techniques, and should engage in further research, leveraging evidence-based guidelines to enhance treatment efficacy.

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