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To Evaluate The Effect Of Prehabilitation Programme On The Quality Of Recovery In Pre-Infirmity And Infirm (Frail) Patients Undergoing Heart Valve Surgery

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ABSTRACT
INTRODUCTION: The surgical regards, prehabilitation was determined as a process that prepares the patient in advance adjacent to inconvenience and indolence through physiotherapy to get better their efficient and vital competence and endurance.
OBJECTIVE: To evaluate the effect of prehabilitation programme on the quality of recovery in pre-infirmity and infirm (frail) patients undergoing heart valve surgery.
METHOD: The randomized control trial with single blinding method and non-probability convenient sampling technique was used to conduct this study. 68 control and interventional group patients were included from the twin city (Rawalpindi and Islamabad). Patients awaiting heart valve surgery for repair or replacement, both genders, Mild to moderate valvular diseases, New York Heart Association (NYHA) grade I and II, Pre-frail to moderately frail patients with a CFS of 4–6, Patients with an estimated 6-8 weeks of surgical waiting list time, Able to perform 6 minute walk test (6MWT) at baseline with Rating of Perceived Exertion (RPE) <13. The study population was assessed via 6MWT, Clinical FrailtyScore,15 item quality of recovery questionnaire, WHO disability assessment schedules 2.0 score, BORG RPE scale. Participants
randomized to the intervention arm were given prehabilitation (three times per week, supervised by a physiotherapist) in addition to current usual care. 6MWT was used as an estimation of individual peak oxygen uptake and hence oxygen uptake reserve (HRR) for exercise prescription.
RESULTS: The mean and standard deviation of Evidence of frailty score in interventional group is 4.05±0.91 and in control group is 4.0±1.25. For the variable of 6MWT (feet) results showed that there is no significant difference between control and interventional group at preoperative with p-value (0.78) and postoperative 2ndmonth with p-value (0.14), however there is a significant difference at postoperative4 week with p-value (0.001). For the Quality of Recovery 15 item questionnaire
results showed that their no significance at any stage baseline (p=0.77), preoperative (p=0.36), postoperative 1st follow-up (p=0.28) and postoperative 2nd follow-up (p=0.10).
CONCLUSION: These findings indicate that Prehabilitation has more positive impact at postoperative 8 week than post-operative 1st month. While prehabilitation alsoenhance the recovery phase and decreasing the risk of disability by improving the health of firm and infirm patients. The effect of prehabilitation increased from
preoperative level (prior to surgery) to post-operative 8 week follow up after surgery specifically in heart valvular patients.

KEYWORDS: prehabilitation, pre-infirmity, infirm patients, heart valve surgery,

INTRODUCTION

Prehabilitation aims to improve overall health and wellness before major surgery (1). By means of intervening in the preoperative period to adjust behavioral and lifestyle risk factors, the 'physiological reserve' and reduce their response to surgical stress response (2). Prehabilitation should be based on multifaceted and health care zone, which required professionals who has expertise and input in a wide range (3).
Heart valvular surgery is a one way to treating the heart valve dysfunction. As a minimum one out of four heart valves is faulty (4). The four valves (mitral, aortic, tricuspid and pulmonary) collectively keep blood flowing appropriately in your body (5). In a while, sufferer chosen for the operation would be admit in hospital to remain in contact and for the preoperative clinical assessment just before the elective procedure, generally 30 days before the operate, except for the postpone or drop off owing

to the patient's health and condition (6). Any postponement in surgical treatment may cause further leaning and may lead to advance concerns, ability or constant mortality (7). Tricuspid regurgitation (TR) is amongst the most frequent symptoms of heart valvular disease (VHD) guidelines [European society of cardiology (ESC) and American Heart Association (AHA)/ACC] (8). Working Groups lying on Cardiovascular Surgery and Valvular Heart Disease of the European Society of Cardiology evaluated the research along with seeks to answer most frequently asked concerns about this illness Lemanu et al. (2013).

In therapeutic way Prehabilitation exercises is a technique of increasing objective movement to get better wellness (16). Although not a single set of evidently define protocol originate in journalism, a basic involuntary system would embrace heat up workout and aerobics equipped two to three time for each week, strengthening exercises two days for each week, and elasticity exercises and functional task working out two to three times for every week (17).

Bodily purposeful concert can be considered by validate apparatus such as, the Timed Up and Go Test, the 6 Minute Walk Test, the Barthel index or the Katz ADL(18). It is determined that 25% ration were increased in patients undergoing for the surgery in Europe by 2020 and 50% were increased in the elder population in the same era. It is also concluded that after the surgery heart may get better but the patient may not (19). Later on, in future era 2039, it is appraised with the intention of 24.3% of the Great Britain residents will be elderly 65 or over. Advancements in equipment, health check treatment and advance post- surgical morbidity and mortality, consequences the quota older adults undergo surgical practice is get higher sooner than the pace of the aging people (20). In Pakistan, the frequency of cardiovascular disorders has risen dramatically in recent years, and the concealed piece of the iceberg is expanding by the day (21).

In patients undergoing heart surgery, the role of Prehabilitation programmed in minimizing unfavorable perioperative events has been studied to a lesser extent. (22)

A study examining the outcome of Prehabilitation on post-surgical problem in patients receiving unnecessary cardiovascular interventional found that the groups that received. (24) Prehabilitation had a lower number of issues and a higher maximal inspiratory pressure. Prehabilitation lowers the frequency of post-surgical problems and enhances maximum inspiratory capacity, as well as reducing the duration of stay and improving functional capabilities, according to the findings. (25) One of the most important methods for helping patients recover from life threatening CVDs is timely surgical intervention in the form of heart surgery.(33) Prehabilitation treatment promotes in the advanced preparation of patients to face the difficulties of the cardiac post-operative period with more confidence, better collaboration, and comprehension of the care and probable outcomes, promotes early recovery, and therefore enhance their quality of life. (26) Approximately 230 million surgical operations are done worldwide each year, with cardiac treatments accounting for a large percentage of this total. More than 600,000 heart operations were done globally in 2016, extracorporeal circulation (10 to 65%), pulmonary dysfunctions (20–95%, including up to 63% pneumothorax, 2–22% pneumonia, 2% diaphragmatic dysfunction, 2 percent acute respiratory distress syndrome, 2 percent acute respiratory distress syndrome, 1–20 % pulmonary thromboembolism) are the most common complications of heart surgery.

RATIONALE OF THE STUDY

The Empirical work and more precise considerations are needed to be done with respect to conclude the impact of prehabilitation specifically regarding heart valvular which may be considered as imperative and clinically consequential for wellbeing professionals, patients, and other stakeholders. This research was aimed to provide the awareness and education of prehabilitation and purposeful accommodation in practical ability, cardiac endurance and quality of recovery was achieved through several weeks of prehabilitation. Patients undergoing heart valve surgery and those caring for them, particularly those with little physical ability were given a prehabilitation programme to improve functional exercise capability prior to surgery.

METHODOLOGY

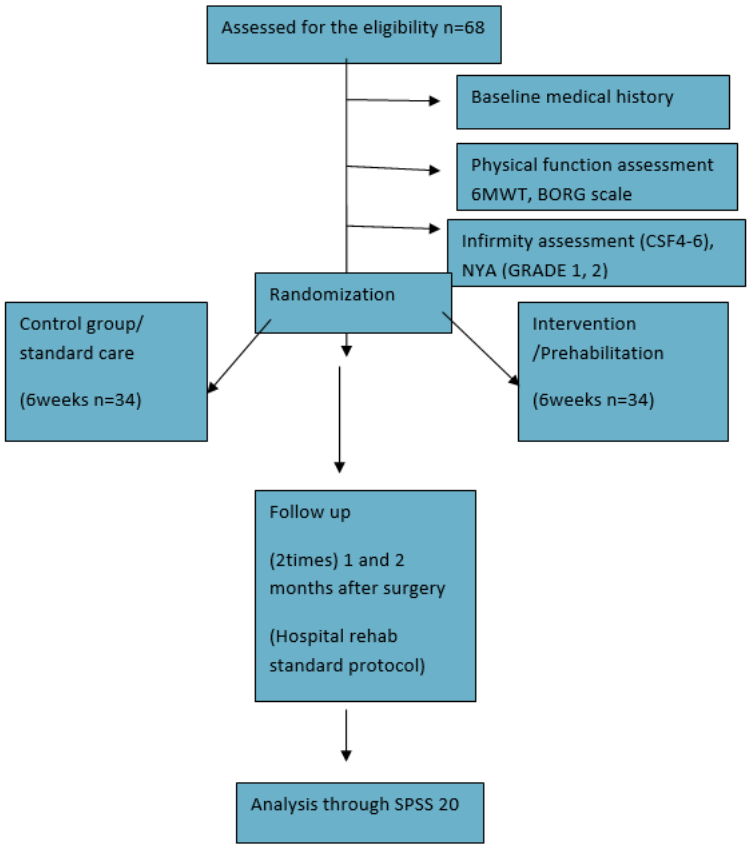
The randomized control trial with single blinding method and non-probability convenient sampling technique was used to conduct this study. 68 control and interventional group patients were included from the twin city (Rawalpindi and Islamabad). The study population was assessed via Borg scale, 6MWT, WHODAS, QoR-15. Patients were undergo a structured 6 weeks of preoperative exercise training to optimize the physical and underlying frailty syndrome before surgery.6MWT was used as an estimation of individual peak oxygen uptake and hence oxygen uptake reserve (VO2R) for exercise prescription, in which exercise prescription and progression were based on the results of the exercise test, individual health status, exercise performance and training response. In Control group with Standard care, provided preoperative physiotherapy and standard care according to existing protocols, breathing exercise, 15 Repetitions thrice a day, Walk (10-15 minutes) twice a day, flexibility training / relaxation exercises, Calf Stretch, Hamstring Stretch, Chest Stretch, Shoulder Rolls, Hold each stretch for 10-15 seconds and repeat each stretch 5 times. Remember to breathe normally during each stretch were performed. However in Interventional group, Prehabilitation, Standard care and Supervised exercises with Warm-up (5 minutes), Breathing exercise and stepping, Interval training on cycle ergometer: between 40% and 60% Vo2max, perceived exertion <13 on Borg scale, 20-30 min/session/day (intermittent of exercise 2-3 mint, followed by 1-2 min of active recovery),Cool down (5 minutes),AROM +Body stretch were performed.

DATA COLLECTION PROCEDURE

The Baseline demographic data was collected on baseline and patient will be asked to perform 6MWT at baseline. All vitals, ECG was measured prior to and after each session. 6 weeks before surgery with early health promotion, infirmity was assessed at baseline, hospital admission and at 1and 3 months after surgery. Baseline demographic data was collected on baseline and patient was asked to perform 6MWT at baseline. All vitals monitoring was measured prior to and after each session. 6 weeks before surgery with early health promotion. Second assessment was measured just before the surgery to evaluate the effect of

pre-operative protocol and Post-operative assessment at 4 weeks and 8 weeks after surgery. Normality was assessed through Shapiro Wilk at SPSS which showed the significance value (P-value <0.05) skewed data so that non parametric tests were applied.

FIGURE 1: CONSORT DIAGRAM



RESULTS

The entire of 68 patients with the mean age of individuals' in control group are 58.09±11.31 and interventional group is 55.05±9.79.The percentage of females in interventional group is 9% and that of male is 91%. The percentage of male in control group is 76% and of female is 24%. The percentage of marital status in interventional group is married 94.1% and unmarried 5.9% and the percentage of marital status in control group is married 88.2% and unmarried 11.8%. The mean and standard deviation of body mass index in interventional group is 22.35±3.03 and in control group is 20.34±2.29, that shows individual in interventional group and control group were normal by their weight (table 1)

Table 1 BMI: BODY MASS INDEX

Variable	Mean ± S.D	
	Control group	interventional group
Age (years)	58.09±11.31	55.05±9.79
Gender	1.23±0.430	1.088±0.287
Marital status	1.11±0.32	1.05±0.23
BMI	20.34±2.29	22.35±3.03

For the variable of 6MWT (feet) Mann Whitney-U test showed that there is no significant difference between control and interventional group at baseline with p-value (0.35), preoperative with p-value (0.78) and postoperative 8 week with p-value (0.14), however there is a significant difference at postoperative 4 week with p-value (0.001). Mann Whitney U-test for Exertion Scale entails that there is a statistical significance at baseline (p=0.00) and postoperative 4 week (p=0.01) and no significance at preoperative (0.540) and postoperative 8 week (p=0.20). For Angina scale there is no significance at all 4 stages baseline (p=0.76), preoperative (p=0.67), postoperative 4 week (p=0.67) and postoperative 8 week (p=1.00) which is highly insignificant. For Dyspnea Scale result showed that there is a significant difference at baseline p-value (0.00) and no significant differences between control and interventional group at preoperative, postoperative 4 week and postoperative 8 week. For the WHODAS 2.0 12-item questionnaires Mann Whitney U-test showed that there is no significant difference at baseline with p-value (0.66), while there is significant result showed at preoperative, postoperative 4 week and postoperative 8 week p-value with value (0.00). For the Quality of Recovery 15 item questionnaire Mann Whitney U-test showed that their no significance

at any stage baseline (p=0.77), preoperative (p=0.36), postoperative 1st follow up (p=0.28) and postoperative 8 week follow up (p=0.10)

Table: 2

	Control group Mean ±S.D	**Interventional group Mean ±S.D**	**F value**	**P =value**
Baseline Dyspnea	2.32 ±0.765	2.88±0.477	12.991	0.001
Preoperative Dyspnea	2.41±0.499	2.35±0.485	0.243	0.624
Post-operative 1st month Dyspnea	2.55±0.704	2.47±0.748	0.251	0.618
Post-operative 2nd month Dyspnea	1.735±0.827	1.41±0.499	3.806	0.055
Baseline Angina	2.85±0.609	2.882±0.477	0.049	0.825
Preoperative Angina	2.67±0.638	2.61±0.652	0.141	0.708
Post-operative 1st month Angina	2.67±0.638	2.7353±0.618	0.149	0.701
Post-operative 2nd month Angina	2.61±0.652	2.617±0.652	0.000	1.000
Baseline Fall risk assessment	2.02±1.167	2.08±1.287	0.039	0.884
Preoperative Fall risk assessment	2.02±1.167	2.08±1.287	0.039	0.884
Post-operative 1st month Fall risk assessment	1.70±0.578	2.17±1.313	3.65	0.060
Post-operative 2nd month Fall risk assessment	2.08±1.164	2.32±1.006	0.795	0.376
Baseline WHODAS	3.35±1.011	3.14±0.85	0.802	0.369
Preoperative WHODAS	2.70±0.905	3.35±0.949	8.267	0.005
Post-operative 1st month WHODAS	0.88±0.477	1.61±0.493	38.989	0.000
Post-operative 2nd month WHODAS	0.14±0.500	1.17±1.287	56.068	0.000
Baseline QoR survey	1.791±0.410	1.764±0.4305	0.83	0.774
Preoperative QoR 15	2,117±0.640	2.029±0.1715	0.602	0.442
Post-operative 1st month QoR15	3.147±0.557	3.294±0.4625	1.401	0.241
Post-operative 2nd month QoR 15	3.323±0.588	3.529±0.6620	1.835	0.184

GROUPS	**Variables**			**P value**	**F value**
Control group	Dyspnea	Baseline	Preoperative	1.000	1051.815
		Preoperative	Postoperative 1st month	0.342	
		Postoperative 1st month	Postoperative 2nd month	0.000	
	Angina	Baseline	Preoperative	1.000	1019.387
		Preoperative	Postoperative 1st month	1.000	
		Postoperative 1st month	Postoperative 2nd month	0.962	
	Fall risk assessment	Baseline	Preoperative	0.000	141.132
		Preoperative	Postoperative 1st month	0.159	
		Postoperative 1st month	Postoperative 2nd month	0.164	
	WHODAS	Baseline	Preoperative	0.018	570.948
		Preoperative	Postoperative 1st month	0.000	
		Postoperative 1st month	Postoperative 2nd month	0.000	
	QOR15	Baseline	Preoperative	0.034	3180.276
		Preoperative	Postoperative 1st month	0.000	
		Postoperative 1st month	Postoperative 2nd month	1.000	
Interventional group	Dyspnea	Baseline	Preoperative	0.000	1144.048
		Preoperative	Postoperative 1st month	0.962	
		Postoperative 1st month	Postoperative 2nd month	0.000	
	Angina	Baseline	Preoperative	0.427	1098.876
		Preoperative	Postoperative 1st month	0.262	
		Postoperative 1st month	Postoperative 2nd month	0.262	
	Fall risk assessment	Baseline	Preoperative	0.000	130.865
		Preoperative	Postoperative 1st month	0.184	
		Postoperative 1st month	Postoperative 2nd month	0.000	
	WHODAS	Baseline	Preoperative	1.000	905.288
		Preoperative	Postoperative 1st month	0.000	
		Postoperative 1st month	Postoperative 2nd month	0.005	
	QoR15	Baseline	Preoperative	0.009	4512.689
		Preoperative	Postoperative 1st month	0.000	
		Postoperative 1st month	Postoperative 2nd month	0.880	

DISCUSSION

The concern of the study before elective heart surgery, there are chances for treatments that may enhance postoperative outcomes, as well as a "educational instant" for behavioral and hazard factor change. In patients awaiting heart surgery, a lack of physical activity is prevalent (67 %). In old patients coming up more than 6 weeks for aortic valve implantation, functional status has been found to deteriorate. Savci (2011) and Sawatzky (2014), observed that the treatment group travelled significantly extra distance than the control group (p 0.05).(48) Current study indicates the significance by covering more distance at postoperative 8 week with the p (0.11) and also at postoperative 4 week(p 0.00) that means prehabilitation had good effects on interventional group. Another previous study evaluates at 4 weeks (mean difference, 51.5 93 m; p = 0.01) and 8 weeks (mean difference, 84.5 83 m; p <0.01), participants in the prehabilitation programme showed better postoperative walking ability. Prerhabilitated patients recovered 81% of the time after 8 weeks, compared to the control group 40% (p< 0.01) MARMELO F et al (2018). (49) During Prehab no complications occurred. Preoperatively FC ($6MWT_{IG}$: 443.0 ± 80.1 m to 493.5 ± 75.5 m, $P = 0.003$; TUG_{IG}: 6.9 ± 2.0 s to 6.1 ± 1.8 s, $P = 0.018$) and QoL (IG: 5.1 ± 0.9 to 5.4 ± 0.9, $P < 0.001$) improved significantly more in IG compared to CG CAROLIN STEINMETZ (2020).(50) Current study entails at Baseline (mean difference 60.6±26.8 ft; p=0.27) and at postoperative 8 week(84.83±25.7ft; p=0.00), For the variable of Number of times stop during 6MWT Mann Whitney-U test showed that there is no significant difference between control and intervention group at base line with p-value (0.34), preoperative with p-value (0.51), postoperative 4 week with p-value (0.36), but there is a significant difference at postoperative 8 week with p-value (0.00). Participants in the prehabilitation programme showed improvement in walking ability. Furthermore there is no significant at any stage of Quality of Recovery but still we can say the improvement from baseline to postoperative follow up. Significant interaction between groups was observed in all categories of quality of life as a result of the preoperative period. Improvements were more evident in the intervention group compared to the control group (intervention group: 0.3–0.4, P 0.001; control group: 0–0.1; P 0.001; P 0.001).(51) In support with, this study improvement entails within the groups as per Quality of recovery baseline 1.77±0.41 with the median (IQ) [2(0)], preoperative 2.07±0.46 [2(0)], postoperative 4 week3.22±0.51 [3(1)] and postoperative 8 week 3.42±0.63 [3.5(1)], which clearly shows improvement through prehabilitation programmed. Prehabilitation programme has revealed to be effective, those vulnerable and frail patients are likely to benefit by improving their preoperative frailty, enhancing their physical and psychological well-being, and reducing their functional decline, and in turn enhancing their quality of recovery after surgery.

CONCLUSION

It is concluded that Prehabilitation has more positive impact at postoperative 8 week than post-operative 1st month. While prehabilitation also enhance the recovery phase and decreasing the risk of disability by improving the health of firm and infirm patients. The effect of prehabilitation increased from preoperative level (prior to surgery) to post-operative 2nd specifically in heart valvular patients. Due to lack of literature, there was a lot of variation. It's challenging to aggregate data since research differ in terms of outcome measures. Prior to beginning on larger-scale investigations, these features should be standardized. The facts are inadequate to offer recommendations on the benefits of prehabilitation in other surgical populations. If prehabilitation is to be explored in different surgical populations, programmes must take into account patient appropriateness, location, intervention delivery, and clinical efficacy. After surgery, it is also advised that the workouts suggested be maintained and followed.

RECOMMENDATIONS

Recommended to do such broader phenomena and multicenter need to be conducted in future to evaluate the factor further in a wide range

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DISCLOSURE STATEMENT

The authors report no potential competing interest

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