Effect of Health Education on Knowledge Regarding Post-operative Care among Patients with Mechanical Valve Replacement: A Quasi-Experimental Study

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ABSTRACT

Introduction: Mechanical valve replacement is a necessary procedure for patients with valvular heart disease. The potential for morbidity and mortality from a valvular prosthesis remains as long as the valve is in place globally. Post-Operatively the patients are more prone to develop severe complications i.e. wound infection, oral anticoagulation related disorders like **Thromboembolic** events, bleeding, infective endocarditis, periprosthetic leak, and anemia and valve failure.
Materials and Methods: One group pretest-posttest (Quasi-Experimental) study was conducted in Lady Reading Hospital, a tertiary care government hospital in Peshawar. Data were collected from

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35 patients through an adopted questionnaire. Data analysis for descriptive statistics and inferential statistics were done through SPSS version 22.

Results: The knowledge of the study patients regarding rest, exercise, personal hygiene and medications after mechanical heart valve replacement was insufficient (< 40%). After the education session regarding the exercise, personal hygiene and medications, the knowledge improve due to 93%. The knowledge enhanced from 60% to 100% after intervention (P-value < 0.001). Similarly, knowledge of patients regarding overdose of anticoagulants increased (P-value < 0.001). Likewise, before the intervention, the knowledge of the patients was 42% and after the intervention, it increased to 64% as evidenced by 54.3% of the patients replied correct answers.

Conclusion: Nursing education plays an important role in the improvement of patient's knowledge regarding complications of mechanical valve replacement. Knowledge of patients regarding post-operative care was satisfactory after the intervention. Efforts may be needed to further improve awareness among patients to enhance post-operative care to prevent complication.

1. INTRODUCTION

Valvular Heart Disease (VHD) affects more than 100 million people worldwide and is associated with significantly high morbidity and mortality [1]. The mortality rate of cardiovascular diseases is very high. Cardiovascular diseases are the leading cause of death, accounts for nearly 610000 deaths per year which are one out of three deaths in the United States (US) [2]. More than 65 million deaths worldwide are caused by cardiovascular diseases [3]. Globally around 30% to 40% of deaths are due to cardiovascular diseases [4,5].

There are many cardiovascular diseases which are responsible for the morbidity and mortality in which one of the major categories of cardiovascular diseases is Valvular Heart Disorders [6]. Heart valve replacement is the most effective and appropriate management for Valvular Heart Disorders [7]. Most common causes of Valvular heart disease (VHD) are Rheumatic heart diseases, myxomatous degeneration, aortic sclerosis, infective endocarditis and congenital anomalies. The mostly mitral and aortic valve is effected which results in either stenosis of the valve or regurgitation or leakage of the valve or mix lesions [1,8].

In the last 50 years, the epidemiology of valvular disorders has drastically changed, with a marked reduction in the incidence and prevalence of rheumatic heart disease and a substantial increase in the prevalence of degenerative valve diseases. Currently, the overall age-adjusted prevalence of mitral or aortic valvular heart disease is estimated to be 2.5% in the general population of the United States, with a prevalence exceeding 10% in subjects over 75 years of age [6].

Surgical treatment of VHD began early in the 20th century, before the availability of cardiopulmonary bypass, with isolated attempts to dilate stenotic valves. Surgical valve replacement (or repair of mitral valves) is currently the standard of care for treatment of valvular heart disease in patients at low and intermediate risk for surgery [9].

The major type of morbidity associated with the presence of prosthetic cardiac valve is valve failure due to per-prosthetic leak or mechanical dysfunction of the mechanical prosthesis, thromboembolism, anticoagulant related hemorrhage and endocarditis. Despite successful surgery and regular hospital visits, long-term survival was compromised by anticoagulation-related complications [10]. Prosthetic valve replacement is usually done when the cardiac valve is unable to perform its function. There are several complications of valve replacement in which one and the most important one is the thrombotic event [11,12].

The patients should have sufficient knowledge regarding the post-operative mechanical valve replacement care to overcome the dangerous complications. Education plays an important role in the improvement of patient's knowledge regarding complications of mechanical valve replacement. There is a dearth of study on knowledge of patients regarding post-operative care among patients with mechanical heart valve replacement. The current study is therefore designed to fill the knowledge gap and its hope that the study will have implications for health professional and policymakers.

2. MATERIALS AND METHODS

This was a Quasi-Experimental (pretest-posttest) study conducted in Lady Reading Hospital (LRH), a major tertiary care hospital in Peshawar, Khyber Pakhtunkhwa Pakistan. The study patients were recruited from September 2018 to December 2018. The study participants were those who undergone Aortic valve replacement (AVR) or mitral valve replacement (MVR) or double valve replacement (DVR) and were selected from Cardiac Surgical Ward and Cardiac Surgery Intensive Care unit of LRH hospital. Post-operative mechanical valve replacement patients who fulfilled the inclusion criteria were included in the study.

2.1 Objective

- To assess the knowledge level of the patient about the homecare after prosthetic valve replacement.
- To assess the effectiveness of health education among patients after prosthetic valve replacement.

2.2 Limitation of the Study

The study is limited to patients who are admitted or coming for follow up care in the single tertiary care LRH Peshawar and Patients willing for the study admitted for prosthetic valve replacement in LRH Medical Teaching Institute. Adult patients (>18years old) only are included.

2.3 Sampling

A consecutive sampling technique was used to select 35 patients who had undergone either AVR or MVR or DVR.

Data collection Tool: Twelve items adopted and validated questionnaire was used for data collection. The questionnaire consists of two sections. Section-1 consists of demographic data including the name of the patient, age, sex, category, education, name of the surgery and day of the postoperative period. Section-II contains 12 questions about different aspects of post-operative care after mechanical heart valve replacement.

2.4 Inclusion and Exclusion Criteria

Inclusion: Patients who are undergone either AVR or MVR or DVR with a mechanical prosthesis (>18years old)and willing for the study are included in this study.

Exclusion: Patient who are admitted with other cardiac problem and critically ill patients who cannot answer the questionnaire wereare not included in this study.

2.5 Data Analysis

Data were analyzed using SPSS version 22. Frequencies and percentages were calculated for categorical variables including age, sex, marital status, education and employment. Chi-square test was applied to see the statistical difference in the knowledge level of the patients before and after the intervention.

3. RESULTS

A total of 35 patients were included in the study from LRH Peshawar, Khyber Pakhtunkhwa. The majority (33%) of the patients were from the age group 29-39 years while 6% of the patients were from the age group for more than 50 years. 74% ofthe study patients were married followed by 11% unmarried and only 1% divorced. More than half (60%) patients were male while 40% were female. Only 5% study patients were primary education and 34% were high secondary level of education. 37% study participants were employed and 14% were students (Table 1).

Fisher's exact test and chi-square test was applied, the data to identify the significant difference in the knowledge of participants before and after the intervention. There was a significant difference found in the knowledge level of participants after the intervention. Significant improvement in the knowledge regarding sleep was observed after the intervention (*P-value < 0.001*). Similarly, knowledge of participants regarding surgical wound care after bath significantly increased to 91% (P-value < 0.001). Knowledge of participants regarding the care of the wound after surgery increased from 11% to 29% with intervention.

There is a significant increase in the knowledge of the participants regarding the question of whether the clients can detect the wound infection. The knowledge enhanced from 60% to 100% after intervention (P-value < 0.001) (Table 2). Similarly, knowledge of participants regarding overdose of anticoagulants increased (P-value < 0.001). Likewise, before the intervention, the

Table 1. Demographic profile of the population, (n=35)

	Frequency	Percent
Age (*years*)		
18-28 years	10	29%
29-39 years	11	33%
40-50 years	11	32%
> than 50 years	2	6%
Marital Status		
Married	26	74%
Unmarried	4	11.40%
Death of wife	4	11.40%
Divorced	1	1%
Gender		
Male	21	60%
Female	14	40%
Education		
Primary	5	14.28%
Middle	9	25.71%
Higher Secondary	12	34.28%
FA/FSC or Higher	9	25.71%
Employment Status		
Employed	13	37.14%
Unemployed	10	28.57%
Retired	7	20%
Student	5	14.28%
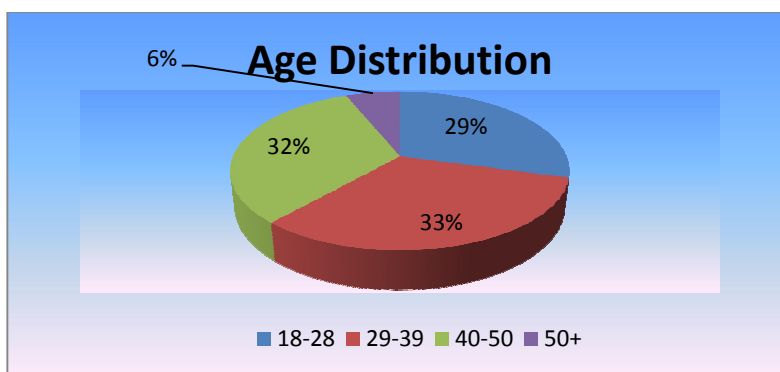
Fig. 1.

Table 2. Knowledge of participants regarding the detection of infection

Variable	Chest pain	Pus or watery discharge from the wound	Palpitation	Don't know
Pre-test	5 (14.3%)	21 (60%)	3 (8.6%)	6(17%)
Post-test	0 (0%)	35 (100%)	0 (0%)	0 (0%)
	P-value < 0.001 < α = 0.05			

knowledge of the participants was 42% and after the intervention, the knowledge increased to 64% as evidenced by 54.3% participants replied correct answer and after interventions, the knowledge level increased up to 20%. There was a significant increase in the knowledge of the study participants regarding the use of Digoxin after the intervention. Before the intervention, the knowledge of the participants was 43% and after the intervention, the knowledge increased to 64%. Also, there was a significant increase in the knowledge regarding checking PT, prophylactic antibiotics, dysfunction of the valve and regarding warning signs and needs immediate medical attention.

Table 3. Knowledge of participants regarding the rest after surgery

Variable	6-8 months	3-6 months	1 month
Pre-Test	9 (25.7%)	25 (71.4%)	1 (2.9%)
Post-Test	5 (14.3%)	28 (80%)	2 (5.7%)
Chi-square test	*P-value = 0.520 > 0.05*		

4. DISCUSSION

Anti-coagulants therapy is the most important post-operative mechanical valve replacement therapy. Anti-coagulant therapy prevents the formation of clots which can reduce severe complication. Our study is the first to provide valuable data on the effect of Health Education regarding knowledge of Post-Operative care among patients with post-operative mechanical valve replacement. This study aimed to verify

Knowledge of the post-operative care rest exercise, personal hygiene and medication with the use of oral anticoagulation in patients with mechanical valve replacement.

The significant increase found in the knowledge regarding sleep after the intervention. Before the intervention, the knowledge was (56%) which increased to 94% after the intervention. The results compare with the study found that 87% of men and 75% of women said that they were able to hear the closing sound of their mechanical valve. Women were more disturbed by the valve sound than men in their sleeping hours [13].In the study knowledge regarding exercise increased up to 91% from 40% after the intervention. Similarly, the knowledge of the participants regarding infection after cardiac valve replacement increased after the intervention. The study showed that the European Society of Cardiology recommends that physical exercise like walking for people with mechanical heart valve replacement should consist of 150 minutes per week, while others recommend three to four hours per week [14].

In this study knowledge of patients regarding surgical wound care after bath significantly improved to 91% (P-value < 0.001). Knowledge of patients regarding the care of the wound after surgery increased from 11% to 29% with intervention. Although numerous improvements in prevention and perioperative care, about deep sternal wound infection DSWI is still a permanent alarm in cardiac surgery patient because of its significant rate and relevant impact on the length of hospital stay, costs, and mortality [15]. Although the incidence of this complication is in part due to the increased number of patients at high-risk for infection because of advanced age and rate of relevant comorbidities in the population due to inadequate knowledge among people undergoing cardiac surgery. Rigorous attention to the details of preoperative, intraoperative, and post-operative management could contribute to keeping DSWIs at a minimal rate. Current results suggest that health education about wound infection can improve patients knowledge before the intervention 20 (55%) replied that they could detect but after the intervention 33 (100%) said that they can detect the wound infection. After the intervention, the knowledge level of the patients regarding the correct answer increased up to 100%. P-value also indicates that the test is significant. P-value < 0.001 < α = 0.05.

The result showed how the patients will identify the overdose of anticoagulant, almost 9% of the patients answered correctly whereas after the intervention 87% of the patients correctly answered. The p-value < 0.001 < α = 0.05 shows that our test was significant. About the score obtained in the instrument by another study, the majority (61.8%) presented regular knowledge, followed by 40 (36.4%) patients who had good knowledge and two (1.8%) who had poor knowledge [16]. The results of another study conducted in the nursing field in which 60% of patients answered correctly almost the entire questionnaire addressing oral anticoagulation knowledge except one question addressing the influence of diet, were less knowledge regarding overdose of oral anticoagulant [17].

The most important feature in treatment success is the periodical and careful follow-up of INR levels and assurance that patients will adhere to the treatment, which is a difficult task for clinical practice without educational teaching intervention [18]. Despite the practical relevance of teaching patients regarding their therapy, the best strategy to educate patients about anticoagulation has yet to be determined our results showed pretest 5 (14.3%) and posttest significantly improved patient knowledge 26 (74.3%) P-value < 0.067 < α = 0.05.

When the participants were questioned about identification of valve dysfunction, only 7(20%) correctly answered the question but after the intervention, their knowledge level increased up to 33 (94.3 %) P-value also shows that there was statistical difference in the knowledge level of the participants before and after the intervention as shown in Table 1. Thrombosis is the main cause of prosthetic heart valve dysfunction. According to various data, it occurs in 0.1 – 5.7% of patients per year. Also, disorders of the prosthetic functioning may occur due to the vegetation growth, the development of ring abscess formation [19,20].

5. CONCLUSION

Based on the findings of the study, post-test knowledge level of patients about Post-operative care with prosthetic valve replacement has been increased. The primary outcome of this health education teaching on knowledge regarding post-operative care in patients with mechanical heart valve replacement project was a health education intervention did make a significant difference in personal hygiene, food and oral anticoagulation therapy knowledge in primary care. Thus health education interventions help in the improvement of the patient's knowledge regarding postoperative care. The cardiology department must arrange sessions for the postoperative cardiac valve replacement patients regarding postoperative care. Further studies are recommended to identify reasons for low knowledge among patients with prosthetic valve replacement.in this study the author developed a pamphlet for awareness regarding post-operative care and knowledge among patients with mechanical heart valve replacement.

CONSENT AND ETHICAL APPROVAL

The study was reviewed and ethical clearance was granted from the Ethics Review Committee of the Khyber Medical University, Peshawar. Also, permission was granted from LRH administration. Informed consents were taken from all the participants before filling the questionnaires.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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APPENDIX

HEALTH EDUCATION PAMPHLET FOR PATIENTS UNDERGONE MECHANICAL VALVE REPLACEMENT

Mechanical valve replacement is a procedure for the patients who are having functional abnormality of a diseased heart valve, moreover stenosis (narrowing of the orifice when the valve is open) or regurgitation (incompetence when the valve is closed) a combination of the two. Here usually we are using the following prosthetics/mechanical valves in patient with dysfunction of their valves.

1. Tilting disc valve-In this type of valves a disc is tilting to open and close the valve.
2. Caged-ball design -A cage attached to the sewing ring that houses a silastic ball.

DIET

- You should include variety of foods and should eat proper balanced diet, like pulses, fresh fruits plenty of liquids
- Avoid fatty foods Red Meat(buffalo, cow ,cheese, butter, unsaturated Vanaspati, if you are having increased body weight
- White garlic and fishes especially Trout, Salman fishes should include in the diet
- If the doctor says to restrict salt in diet, first try to avoid and take a less amount of salty foods such as pickles, lemons, limes and any citrus fruits .Try to take less salt one fourth teaspoon daily.
- Include salad, and cabbages in constant amount daily.
- Try to avoid green leafy vegetables like Spanish, Mustard and all others of dark green leaves Vit k containing vegetables which make thicken the blood.

REST AND EXERCISE

- ➢ Take rest for 3 to 6 months after the surgery. Period of rest will differ for each patient's according to their health condition.
- ➢ Avoid lifting heavy weights for the first 3 months and binding down for anything which is force of gravity and give pressure to your incisional area.

- ➢ Avoid strenuous arm movement such as golf or tennis, swings. When getting out of chair and of bed, use legs rather than pressure on arms. Arm should not bear weight and should be used only for balance nor for weight..
- ➢ Use alternative positions of 3 to 4 month to decrease stress on sternum; avoid side lying and prone position.
- ➢ Sleep at least for 6 to 8hrs inthe night. Take rest for some time in the afternoon after lunch.
- ➢ Exercises that causes fatigue and Shortness of breath should be avoided.
- ➢ Activities which are dangerous should be avoid.
- ➢ Avoid intake of cafeen,opium and smoking
- ➢ Walking is the best exercise after the surgery at least for 20-30 and approximately 150 minutes per week...
- ➢ Daily walk should be in a particular distance and gradually increase the distance, and follow physicians
- ➢ Avoid swimming and climbing stairs for at 4 months.
- ➢ Obey instruction for activity progression in your daily life for light routine works.
- ➢ Daily activities can be done by self. You can return to work within 3 to 6 months after the surgery according to doctor's instructions.
- ➢ Do not drive for at least 6 weeks after surgery (ways side in auto- car)
- ➢ Resume sexual activity when you can climb two flights of stairs without stopping (with physician's recommendations)

PERSONAL HYGIENE AND CARE OF SURGICAL WOUND

Take bath daily with soap and water and wear clean cotton cloth Inspect and cleanse surgical incisions daily with soap and water. Dry the wound with a clean white cloth. Keep the wound always dry. Don't use any medicines without doctor's order. Don't apply powder or oil over the wound that will cause infection of the surgical wound.

Seek medical advice if any watery discharge or pus coming from the surgical wound or presence of itching or reduces over the wound occurs.

Avoid scratching the wound with nail or any other object.

MEDICATIONS

1. Tab.Digoxin is given for increase the ability of hearts muscles to contract and arrange the rhythm. Count the pulse rate for 1 minute taking the tablet.
2. Don't take the tab of the pulse rate is below 60/Mt.
3. Continue the medicine as per doctor's order.
4. Tablets such as Lasix, Aldactone, etc. Are given for removing the unwanted water from all over the body and improve the ability of the heart to pump. If the doctor advised to take tablet daily, take tablet every day as the same time.
5. Seek medical advice if sudden weight gain of peripheral edema or decreased amount of urine occurs
6. Tab.warfarin, Dindivan, Asithrom (CUEMADIN) (Anticoagulants) should take regularly as per the doctors order and special instruction given by charge nurses regarding anticoagulants. This is to prevent blood clotting. This should take life long and don't stop of decrease the dose without doctors' advice.

POINTS TO REMEMBER WHILE TAKING ANTICOAGULANTS

- ❖ Should take the tablet every day in the evening 5 PM at the correct time.
- ❖ The tablet should be taken 1 hr. before food and 1 hr. after food
- ❖ Note down the date, time and amount of the tablet
- ❖ Don't double the dose if one dose is forgotten
- ❖ Prothrombin Time (PT) test should be done monthly and show the report to the doctor.

- ❖ Avoid getting injured. Take care while using sharp objects. Don't use tooth brush with hard bristles.
- ❖ Don't take medicines which contains steroids or aspirin. Tell the doctor about the anticoagulant you are taking if you need to take any other medicines
- ❖ Bring the needed dose of anticoagulant while you travel a long distance

HOW CAN YOU UNDERSTAND THE INCREASED DOSE OF THE ANTICOAGULANT?

• Bleeding from the surgical wound	• Bleeding from the nose while snuffing
• Bleeding from the gum while brushing	• Blood in the sputum
• Presence blood in the urine or stool	• Increased bleeding while menstruation

Mechanical valve are made entirely of synthetic materials. These valves offer the benefits of good long term durability but pose a significant risk of thromboembolism and require long-term anticoagulation. The regular and adequate anticoagulation and regular follow up, usually the patients will have low grade fever, fatigue for the first few weeks. Seek medical advice if it persist for more than 1 month. Thrombo embolic complications will occur, if the anticoagulant is not taking regularly. If the thrombus occurs inside the prosthetic valve, the valve will become stuck.

SIGNS AND SYMPTOMS OCCURS DURING DYSFUNCTION OF THE VALVE

- Appearance of signs and symptoms which was present before the surgery
- (If the replaced valve is filling disc type) the sound that was heard during closure and opening of the valve will become decrease or stop and sign will appear as like before.
- The thrombus occurs in the valve and when dislodge and flow through the circulation. The thrombus will block any vessel of the body and may cause stroke of unconsciousness of blindness. Paraplegia or hemiplegia or pain over the extremities, etc.
- If infection occurs at the site of the prosthetic valve due to some other causes, the symptoms will be prolonged fever, chills and increase fatigue.
- If any one of the above symptoms occur immediate medical attention is necessary
- The most common site of infection in infective endocarditis after prosthetic valve replacement is through dental or urologic infection. So taking prophylactic antibiotic is necessary before dental or urologic procedures.
- Information of anticoagulation therapy should be given to distinct before any procedures.