Original Research Article

Correlation Between Kinesiophobia, Functional Capacity and Quality of Life in Mechanical Heart Valve Replacement Patients

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ABSTRACT

Background: Mechanical heart valve replacement is a lifesaving procedure, but it can lead to challenges in post operative recovery, including reduced physical capacity and diminished quality of life. Kinesiophobia or the fear of movement after cardiac surgery is associated with physical activity and non-adherence to cardiac rehabilitation. It is observed that functional capacity is significantly reduced after cardiac surgery. Long term kinesiophobia leads to avoidance behaviours and hampers the physical levels and leads to deconditioning.

Objectives: This observational, prospective study aimed to investigate the correlation between kinesiophobia, functional capacity and quality of life in mechanical heart valve replacement patients.

Subjects and Methods: A convenient sample of 40 mechanical heart valve replacement patients were included in the study. The Tampa Scale of kinesiophobia-Short Version Heart (TSK-SV Heart), Quality of Life was assessed using WHOQOL-BREF Scale and Six Minute Walk Test were done in the CVTS-OPD. The spearman rho correlation was done to find a correlation between kinesiophobia and Functional capacity, kinesiophobia and Quality of life, Functional capacity and Quality of Life.

Results: It was observed that there was no correlation between Kinesiophobia and Functional Capacity (with r value of 0.271 and p value 0.09). However, the mean of the total TSK-SV Score was 38.40±3.403 which was high and 72.5% of the population reported high kinesiophobia. But at the same time, we found that there is a weak negative correlation between Kinesiophobia and WHOQOL BREF: Environmental domain of (r=-0.365, and p=0.021value) and there is a weak positive correlation between Functional Capacity and WHOQOL BREF: Physical domain of (r=0.399, and p=0.011 value).

Conclusion: The result of this study supports the null hypothesis. There is no correlation between Kinesiophobia and Functional Capacity but patients did report high kinesiophobia and thus it should not be underestimated during cardiac rehabilitation. The possible reasons for high kinesiophobia could be lack of awareness about the safety and level of physical activity, over-protective care givers, lack of attendance to cardiac rehabilitation post discharge, anxiety, and depression. But at the same time, we found that there is a weak negative correlation between Kinesiophobia and WHOQOL BREF: Environmental domain

and there is a weak positive correlation between Functional Capacity and WHOQOL BREF: Physical domain.

Keywords: Mechanical valve replacement, Kinesiophobia, Functional capacity, Quality of life, Cardiac Rehabilitation.

INTRODUCTION

Globally, cardiovascular diseases (CVD) account for 17.9 million annual deaths, making them the leading cause of death. One of the highest rates of cardiovascular disease is found in India. According to projections, there will be 4.47 million cardiovascular disease-related fatalities in India annually by 2020, up from 2.26 million in 1990. [1]

A mechanical or a bioprosthetic heart valve is used during valve replacement surgery to replace one or more of the heart's valves. [2]

"An excessive, debilitating, irrational fear of movement and activity, resulting from a feeling of vulnerability to painful injury or re-injury," is the definition of kinesiophobia. [3]

According to a study by P. Keesen et al. on "Factors related to fear of movements after acute cardiac hospitalization" (2020), kinesiophobia was related to decreased physical activity and non-adherence to cardiac mobilization. [4]

Developed by Balke in 1960 to evaluate the distance walked during a specific period of time, functional capacity evaluation is an objective measurement. [5]

Six Minute Walk Test is easier to give, better to tolerate, and more indicative of activities of daily living than any other walking test, according to a recent study. [6]

The term "quality of life" (QOL) refers to a multifaceted concept that includes perceptions of both the positive and negative aspects of dimensions such as physical, emotional, social, and cognitive functions, as well as the negative aspects of somatic discomfort and other symptoms resulting from a disease or its treatment. [7]

Phase I of cardiac rehabilitation is the inpatient stage. Three to six weeks after discharge, patients typically enter Phase II of the cardiac rehabilitation program. [8]

Exercise training, which is a subset of physical activity with a final goal of improving and maintaining physical fitness, is an important aspect of cardiac rehabilitation. [9]

The sound of the valve not only causes physical discomfort in the patient, but it also has a variety of psychological, physical, and functional impacts that have an indirect impact on the patient's quality of life. Therefore, it is important to be aware of the valve clicking sound in order to reduce fear of movement and enhance people's quality of life as well as daily functional capacity.

NEED FOR STUDY

A barrier to physical activity at any stage of cardiac rehabilitation is kinesiophobia.

Kinesiophobia and its impact on functional capacity and quality of life has been studied in various conditions. But limited literature is available regarding its correlation with functional capacity and quality of life in mechanical heart valve replacement patients.

The need of the study aroused to find out the correlation between kinesiophobia, functional capacity and quality of life in mechanical heart valve replacement patients.

If our study supports the alternative hypothesis then, the fear avoidance strategies and proper exercise program can be implemented for these patients to improve their functional capacity and overall quality of life.

AIM & OBJECTIVES
AIM
- To find the correlation between kinesiophobia, functional capacity and quality of life in mechanical heart valve replacement patients.

OBJECTIVES
- To assess kinesiophobia by Tampa scale (TSK-SV).
- To assess functional capacity by six-minute walk test.
- To assess quality of life by WHO-QOLBREF.
- To correlate kinesiophobia, functional capacity and quality of life in mechanical heart valve replacement patients.

HYPOTHESIS:
Null Hypothesis H (0):
There is no correlation between kinesiophobia, functional capacity and quality of life in mechanical heart valve replacement patients.

Alternate Hypothesis H (1):
There is a correlation between kinesiophobia, functional capacity and quality of life in mechanical heart valve replacement patients.

MATERIALS & METHODS
METHODOLOGY
- **STUDY DESIGN -** Observational, Correlational study.
- **STUDY SETUP -** Cardiovascular and Thoracic surgery Outpatient department at tertiary health care hospital.
- **STUDY POPULATION –** Any Mechanical heart valve replacement patients.
- **SAMPLE SIZE -** 40

Sample size was determined by medical record of cardiovascular and thoracic surgery OPD.

Total number of mechanical valve replacement patients come in cardiovascular and thoracic OPD per month is 6.

Therefore, 6*6(months) =36 patients for 6 months.

Thus, minimum sample size is 36.

10% of patients who are not responding to participate falling into exclusion criteria will be added from the above number of patients. (10/100) *36≈4.

Therefore, 36+4=40 Total Sample Size Is 40.

- **SAMPLING TYPE -** Convenient sampling
- **STUDY DURATION –** After approval from MUHS, 6 months for data collection and 4 months for data analysis.

OUTCOME MEASURES
1. Tampa Scale of Kinesiophobia-Short Version Heart (TSK-SV Heart)
(Miller, Kori, Todd 1991- original scale)
(Maria B et al- TSK-SV)

The scale has 17 items regarding injury or re-injury and fear avoidance behavior during activities.

Scoring and Interpretation: Each item has 4 scores ranging from 1- strongly disagree to 4- strongly agree. While calculating the total score, the score of items 4, 8, 12, 16 are inverted. The total score ranges from 17 to 68.

The score > 37 implies high level of Kinesiophobia while score < 37 implies low level of Kinesiophobia.

Kinesiophobia in individuals who have undergone cardiac surgery has been successfully measured with the TSK-SV Heart. [10]

Psychometric properties: Reliability- 0.77, Construct validity- 0.92, Intra-class coefficient- 0.83, internal consistent- 0.78. [11]

2. Six Minute Walk Test
(ATS Statement: guidelines for six-minute walk test. Am J Respi Crit Care Med 2002)

Six-minute Walk test is a tool to evaluate functional capacity.

According to the American Thoracic Society, the test will be performed using a standardized procedure. [12]

It is a submaximal, reliable test. In adult and older patients shortly after cardiac surgery, it is feasible and well tolerated.

Six Minute Walk test procedure was as follows:

Vincent B et al. The effectiveness of exercise intervention and the factors associated with physical performance in older adults. July 2016
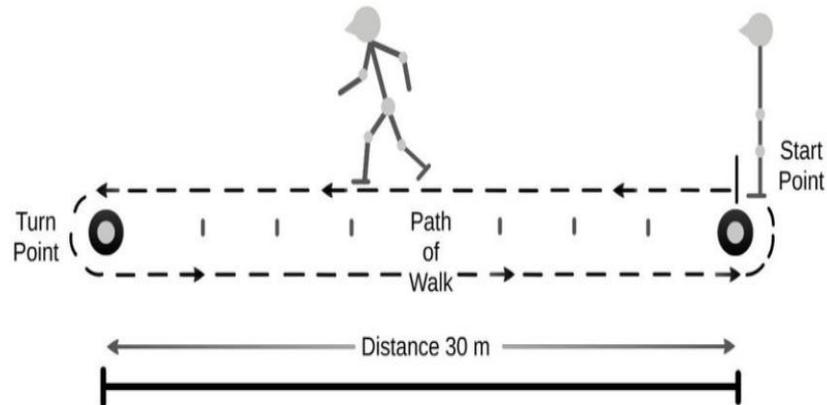
Schematic illustration of the 6-minute Walk Test.

Figure 1: Six Minute Walk Test

The six-minute walk test (6MWT) was conducted inside over a long, flat, straight, enclosed, hard-surfaced hallway that is infrequently traveled.

Figure 2: Chair located near the starting point to rest and measure the vitals.

Instructions given to participants were as follows:

"To complete this test, you must walk as far as you can for six minutes. The hallway will be used for back-and-forth walking. You will be exerting yourself. because it takes a long time to walk for six minutes.

Most likely, you will become exhausted or out of breath. You can go more slowly, pause, and take breaks when you need to.

You can rest by leaning against the wall, but as soon as you can, start moving again.

Around the cones, you will be moving back and forth. Quickly pivot around the cones and move back in the other direction without hesitation.

Now I'm going to show you. Please watch the way I turn without hesitation." The demonstration was given by the examiner walking one lap. 'Are you ready to do that? I am going to use this counter to keep track of the number of laps you complete. At this beginning line, every time you turn around, I'll click it. Remember that the object is to walk as far as possible for six minutes, but don't run or jog. Start now, or whenever you are ready.

The participant was positioned at the starting point. We made sure that we did not walk with the patient. During the walk, words of encouragement were provided at a one-minute interval, such as, you are doing well; keep up the good work.
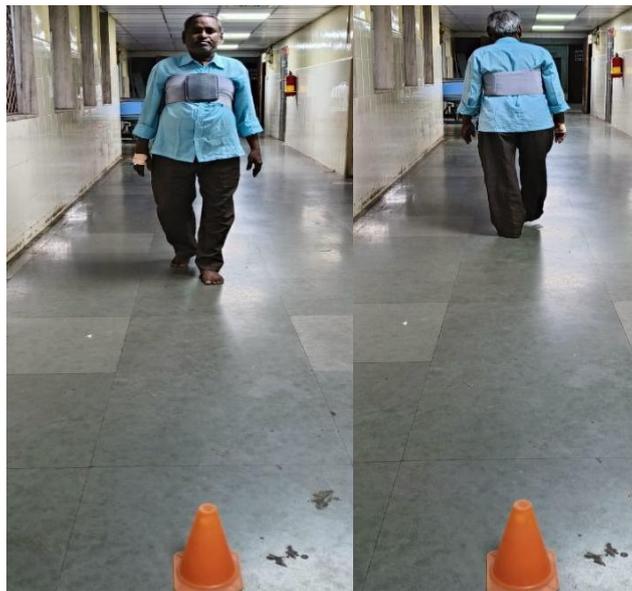

Figure 3: Patient performing six-minute walk test.

Reasons for immediately stopping Six Minute Walk Test included chest pain, intolerable breathlessness, diaphoresis, leg cramps, unwillingness.

Post-test:
If the participant had to stop and rest during the test, then the duration of the rest time was recorded. After completion of the test, participants vitals were measured (HR, RR. BP, SPO2, RPE) immediately, after one minute, three minute and six minutes. Distance walked and the number of laps taken was measured.

Predicted value of distance walked in six minutes will be calculated as follows: [13]

Equation used to calculate predicted value of Six Minute Walk Test –

Indian Male = 561.022 – 2.507 * age (yr.) + 1.505* weight (kg) – 0.055* height(cm)

Indian Female = 30.425 – 0.809 * age (yr.) – 2.074 * weight (kg) + 4.235 * height (cm)

Functional Capacity (Percent Predict): $\frac{\text{Distance walked in 6 minutes x 100}}{\text{Predicted Value of 6MWT}}$

Borg Scale of Perceived Exertion: (reliability: 0.80-0.90, validity 0.72) [13]

The Borg Scale was used to calculate RPE. Rate of perceived exertion is used to

subjectively quantify an individual's perception of the physical demands of an activity. The most widely used RPE tool is the Borg Scale – a psychophysical category scale with rating ranges from 6 (no exertion at all) to 20 (maximal exertion). Individuals on beta blockers experienced a reduced RPE association with heart rate compared to individuals without taking medication, in patients taking these medications, RPE can still be used to predict maximal work rate.

Average RPE associated with physiological adaptation to exercise is between 12 to 16 (somewhat hard) on Borg Scale. After the six-minute walk test and while at rest, RPE was calculated. The participants were instructed regarding the use of the scale and prompted to spontaneously choose a value.

3. WHO-QOL BREF – Quality of Life

The multidimensional nature of QOL in the WHOQOL-BREF is based on four domains, namely: Daily living, psychological bodily image and appearance, social and personal relationships and environmental–financial resources. The scale has 26 items regarding daily physical, psychological, social and environmental domain.

Scoring and Interpretation: Each item has 1to5 scores ranging from 1-Very poor,2-Poor,3- Neither poor nor good,4- Good ,5-Very good. Each individual item of the WHOQOL-BREF is scored from 1 to 5 on a response scale, which is stipulated as a five-point ordinal scale. The scores are then transformed linearly to a 0–100-scale.[14] High internal consistency was indicated by the WHOQOLBREF scale's total Cronbach's alpha coefficient of 0.896. Testretest reliability was statistically significant at the $p<0.01$ level, indicating high scale stability, and each domain showed internal reliability over 0.70 and Intraclass correlation coefficients (ICC) - between 0.491 and 0.769 ($p<0.001$).[15]

STUDY PROCEDURE:

• Permission was taken from the Head of Department of Physiotherapy and Head of the Cardiovascular and Thoracic Surgery Department.

• Approval from DRB, ECARP and MUHS was sought.

• Patients coming to the CVTS OPD were included depending upon their time elapsed after surgery.

• Participants were included in the study after screening for the inclusion and exclusion criteria.

• A written consent was obtained from the participants after explaining the study procedure in detail.

• Case record form was filled which included basic demographics details, anthropometric measures, vital parameters, comorbidities and current medications.

• Tampa Scale of Kinesiophobia for Heart (TSK-SV Heart) was filled.

• Following TSK-SV Heart filling, the vitals were measured (HR, BP, RR, SPO2, RPE) and participant was then made to perform the Six Minute Walk Test on the same day. The participant was under observation throughout the test. Vitals were measured immediately, after 1 minute, after 3 minutes and 6 minutes after completion of the test.

• WHO-QOL BREF is used to assess quality of life was filled.

• Data was collected and analysed.

STATISTICAL ANALYSIS

• SPSS software version 16 was used to analyse the data.

• The data was tested for normality using the Shapiro Wilk Test. The data was found to be normally distributed. Since, the Tampa Scale of Kinesiophobia Heart (TSK-SV Heart) is a four-point Likert scale and WHOQOL BREF for Quality of life is a five-point Likert scale,

• hence Spearman's rho correlation was done.

• For the ease of analysis, data was segregated into:

1. Demographic data
2. Descriptive statistics- Mean, Standard deviation, Confidence Interval and

Standard Error of Tampa Tampa scale of Kinesiophobia, Functional capacity, Rate of Perceived Exertion Scale, WHOQOL BREF for Quality of life.
3. The Spearman's rho correlation test between Kinesiophobia and Functional Capacity, kinesiophobia and WHOQOL BREF and Functional capacity and WHOQOL BREF.
4. The confidence interval was set as 95% and significance level at 0.05. The data was considered significant if $p < 0.05$.

RESULT
1. Total 40 participants were included in this study, out of which 20 (50%) were males and 20(50%) were females as seen in Table no.1a.
2. Mean Age was 44.6 ± 11.517 years as seen in Table no.1b.
3. Mean BMI was 22.37 ± 3.1240 kg/m2 as seen in Table no.1c.
4. Participants had comorbidities as shown in Table no.1d. Participants having Diabetes Mellitus were 5%, Diabetes Mellitus with Hypertension were 2.5%, Hypertension were 25% and 68% had no comorbidities.
5. The TSK-SV Score for Kinesiophobia as seen in Table no.2a and Table no.2b shows that 72.5% participants had High level of Kinesiophobia and 27.5% had Low level of Kinesiophobia. Mean of the total TSK-SV Score was 38.40 ± 3.403.
6. Functional Capacity (percent predicted) as seen in Table no.2c shows mean of Functional Capacity (% predicted) of $73.1273 \pm 13.2694\%$ of patients post Mechanical Valve Replacement.
7. WHOQOL BREF as seen in Table no.2d shows, mean of Physical domain 64.50 ± 11.929, psychological domain 64.93 ± 6.158, social domain 64.83 ± 9.834 and Environmental domain 66.85 ± 7.947.
8. The correlation coefficient of r=0.271 and p=0.09 between the Kinesiophobia and Functional Capacity which shows, no significant Correlation is shown in Table no.3a.
9. The correlation coefficient of r=-0.312 and p=0.05 between the Kinesiophobia and WHOQOL BREF of Physical domain which shows, no significant correlation is shown in Table no.3b1.
10. The correlation coefficient of r=-0.289 and p=0.07 between the Kinesiophobia and WHOQOL BREF of Psychological domain which shows, no significant correlation is shown in Table no.3b2.
11. The correlation coefficient of r=0.139 and p=0.393 between the Kinesiophobia and WHOQOL BREF of social domain which shows, no significant correlation is shown in Table no.3b3.
12. Table no.3b4 shows, a weak negative correlation between Kinesiophobia and WHOQOL BREF: Environmental domain (r=-0.365, and p=0.021).
13. Table no.3c1 which shows, a weak positive correlation between Function Capacity and WHOQOL BREF of physical domain r =0.399 and p =0.011.
14. Table no.3c2 which shows, No correlation between Function Capacity and WHOQOL BREF of psychological domain r = 0.153 and p =0.345.
15. Table no.3c3 which shows, No correlation between Function Capacity and WHOQOL BREF of Social domain r =0.236 and p =0.143.
16. Table no.3c4 which shows, No correlation between Function Capacity and WHOQOL BREF of Environmental domain r =0.077 and p =0.636.

TABLES AND GRAPHS
1. Demographic data

Table no.1a: Gender distribution

Gender	No.	Percentage
Female	20	50.0%
Male	20	50.0%
Total	40	100.0%

Inference: Table no.1a shows the Gender Distribution in this study. Total 40 participants of which 20 (50%) were males and 20 (50%) were females.

Table no.1b: Age Distribution

Age (Years)	
Maximum	73
Minimum	21
Range	52
Mean	44.6
Std. Deviation	11.517
Std. Error of Mean	1.821
Lower 95% CI of mean	40.99
Upper 95% CI of mean	48.36

Inference: Table no.1b shows age distribution in years. There was total 40 participants with minimum age of 21 years and maximum age 73 years having a mean age of 44.6± 11.517 years.

Table no.1c: Body Mass Index Distribution

BMI (kgm2)	
Minimum	16.4
Maximum	28.3
Range	11.9
Mean	22.37
Std. Deviation	3.1240
Std. Error of mean	4940
Lower 95% CI of mean	21.37
Upper 95% CI of mean	23.36

Inference: Table no.1c, shows the BMI distribution in kg/m2. There was total 40 participants with minimum BMI 16.4 kg/m2 and maximum BMI 28.3 kg/m2 having a mean BMI of 22.37± 3.1240 kg/m2.

Table no. 1d: Comorbidities

Comorbidities	No.	Percentage
Hypertension	10	25.0%
Diabetes Mellitus	2	5.0%
Hypertension and Diabetes Mellitus	1	2.5%
No Comorbidity	27	67.5%
Total	40	100.0%

Inference: Table no.1d show frequency and percentage distribution of comorbidities among these patients. In this study, 5 % participants had Diabetes Mellitus, 2.5% participants had Diabetes Mellitus with Hypertension, 25% participants had only Hypertension and 68% participants had no comorbidities.

2. Descriptive Analysis

Table no.2a: TSK-SV Heart Score

TSK-SV Heart Score	
Minimum	34
Maximum	47
Range	13
Mean	38.40
Std. Deviation	3.403
Std. Error of mean	0.538
Lower 95% CI of mean	37.31
Upper 95% CI of mean	39.49

Inference: Table no.2a shows the TSK-SV Heart Score. Mean of the total TSK-SV Score was 38.40 ± 3.403.

Table no.2b: Percentage distribution of TSK-SV interpretation

Interpretation	No.	Percentage
High	29	72.5%
Low	11	27.5%
Total	40	100.0%

Inference: Table no. 2b shows percentage distribution of TSK-SV Heart score of the participants. 72.5% participants showed High level of Kinesiophobia and 27.5% showed Low level of Kinesiophobia.

Table no.2c: Functional Capacity Parameters

	Distance walked (meters)	Predicted Distance (meters)	Functional Capacity Percent Predicted (%)
Minimum	240	412.0	47.70
Maximum	540	643.0	99.50
Range	300	231.0	51.80
Mean	379.50	520.765	73.1273
Std. Deviation	70.807	49.195	13.2694
Std. Error of mean	11.196	7.7784	2.09809

Lower 95% CI of mean	356.85	505.03	68.883
Upper 95% CI of mean	402.15	536.49	77.371

Inference: Table No. 2c shows minimum, maximum, mean and standard deviation of distance walked in six minutes in meters, predicted distance in meters and functional capacity in percentage and shows mean of Functional Capacity (% predicted) of 73.1273 ± 13.2694% of patients post Mechanical Valve Replacement.

Table no. 2d: WHOQOL BREF Domains (All four domains)

	Physical	Psychological	Social	Environmental
Minimum	38	50	44	44
Maximum	81	75	81	75
Range	43	25	37	31
Mean	64.50	64.93	64.83	66.85
Std. Deviation	11.929	6.158	9.834	7.947
Std. Error of mean	374	374	374	374
Lower 95% CI of mean	60.68	62.96	61.68	64.31
Upper 95% CI of mean	68.32	66.89	67.97	69.39

Inference: Table no.2d shows minimum, maximum, mean and standard deviation of Physical, Psychological, Social and Environmental Parameters of WHOQOL BREF score. Table no.2d shows mean of Physical 64.50 ±11.929, mean of Psychological 64.93±6.158, shows mean of Social 64.83 ±9.834 and shows mean of Environmental 66.85 ± 7.947 domains of post Mechanical Valve Replacement.

3. Correlation
3a. Correlation between Kinesiophobia and Functional Capacity:
The data was tested for normality using the Shapiro Wilk Test. The data was found to be normally distributed. Since, the Tampa Scale of Kinesiophobia Heart (TSKSV Heart) is a four-point Likert scale, hence Spearman's rho correlation test was done to find the Correlation between Kinesiophobia and Functional Capacity.

Table no.3a: Correlation between Kinesiophobia and Functional Capacity.

Variables	Spearman's rho	TSK-SV Score	Functional Capacity (% Predicted)
TSK-SV Score	Correlation Coefficient	1	0.271
	p-value	.	0.09

The analysis revealed that there is no significant correlation between Kinesiophobia and Functional Capacity.

Inference: In Table no.3a, revealed that the correlation between Kinesiophobia and Functional Capacity these two variables was not statistically significant with r = 0.271 and p value= 0.09, N = 40 using Spearman rho correlation.

3b. Correlation between Kinesiophobia and WHOQOL BREF:
The Tampa Scale of Kinesiophobia Heart (TSK-SV Heart) is a four-point Likert scale; hence Spearman's rho correlation analysis was conducted to examine the relationship between Kinesiophobia and WHOQOL BREF Domains of quality of life.

Table no 3b1: Correlation between Kinesiophobia and WHOQOL BREF physical domain.

Variables	Spearman's rho	TSK-SV Score	WHOQOL BREF: Physical
TSK-SV Score	Correlation Coefficient	1	-0.312
	p-value	.	0.05

Inference: Table no. 3b1 shows, no correlation between Kinesiophobia and physical domain with r = -0.312, and p value=0.05, N = 40 using Spearman rho correlation.

Table no.3b2: Correlation between Kinesiophobia and WHOQOL BREF of Psychological domain.

Variables	Spearman's rho	TSK-SV Score	WHOQOL BREF: Psychological
TSK-SV Score	Correlation Coefficient	1	-0.289
	p-value	.	0.07

Inference: In Table no.3b2 shows, no correlation between Kinesiophobia and WHOQOL BREF of Psychological domain with r = -0.289, and p value=0.07, N = 40 using Spearman rho correlation.

Table no.3b3: Correlation between Kinesiophobia and social domain.

Variables	Spearman's rho	TSK-SV Score	WHOQOL BREF: Social
TSK-SV Score	Correlation Coefficient	1	0.139
	p-value	.	0.393

Inference: In Table no.3b3 shows, no correlation between Kinesiophobia and WHOQOL BREF of Social domain with r = 0.139, and p value=0.393, N = 40 using Spearman rho correlation.

Table no.3b4: Correlation between Kinesiophobia and Environmental domain.

Variables	Spearman's rho	TSK-SV Score	WHOQOL BREF: Environmental
TSK-SV Score	Correlation Coefficient	1	-0.365*
	p-value	.	0.021

Inference: In Table no.3b4 shows, a weak negative correlation between Kinesiophobia and WHOQOL BREF of Environmental domain with r = -0.365*, and p value=0.021, N = 40 using Spearman rho correlation.

3c. Correlation between Functional Capacity and WHOQOL BREF:

The Functional Capacity and WHOQOL BREF hence Spearman's rho correlation analysis was conducted to examine the relationship between Kinesiophobia and WHOQOL BREF Domains.

Table no.3c1: Correlation between Functional Capacity and WHOQOL BREF of Physical domain.

Variables	Spearman's rho	Functional Capacity (% Predicted)	WHOQOL BREF: Physical
Functional Capacity (% Predicted)	Correlation Coefficient	1	.399*
	p-value	.	0.011

Inference: In Table no.3c1 shows, a weak positive correlation between Functional Capacity and WHOQOL BREF of Physical domain with r = .399*, and p value=0.011, N = 40 using Spearman rho correlation.

Table no.3c2: Correlation between Functional Capacity and psychological domain.

Variables	Spearman's rho	Functional Capacity (% Predicted)	WHOQOL BREF: Psychological
Functional Capacity (% Predicted)	Correlation Coefficient	1	0.153
	p-value	.	0.345

Inference: In Table no.3c2 shows, no correlation between Functional Capacity and WHOQOL BREF of Psychological domain with r = 0.153, and p value=0.345, N = 40 using Spearman rho correlation.

Table no.3c3: Correlation between Functional Capacity and social domain.

Variables	Spearman's rho	Functional Capacity (% Predicted)	WHOQOL BREF: Social
Functional Capacity (% Predicted)	Correlation Coefficient	1	0.236
	p-value	.	0.143

Inference: In Table no. 3c3 shows, no correlation between Functional Capacity and WHOQOL BREF of Social domain with r = 0.236, and p value=0.143, N = 40 using Spearman rho correlation.

Table no.3c4: Correlation between Functional Capacity and Environmental domain.

Variables	Spearman's rho	Functional Capacity (% Predicted)	WHOQOL BREF: Environmental
Functional Capacity (% Predicted)	Correlation Coefficient	1	0.077
	p-value	.	0.636

Inference: In Table no.3c4 shows, no correlation between Functional Capacity and WHOQOL BREF of Environmental domain with r = 0.077, and p value=0.636, N = 40 using Spearman rho correlation.

DISCUSSION

The purpose of this study was to investigate the correlation between Kinesiophobia, Functional Capacity and Quality of Life in Mechanical Heart Valve Replacement patients.

To the best of our knowledge, we can able to determine this is the first study to focus on correlation between Kinesiophobia, Functional capacity and WHOQOL- BREF in Mechanical Heart Valve Replacement patients.

Forty phase II Mechanical Heart Valve Replacement patients, meeting the inclusion criteria such as Both genders, Patients who underwent mechanical valve replacement surgery and are 4 to 6 weeks post discharge (Phase II), Hemodynamically stable patients, Ejection fraction more than 40% and willing to participate were recruited in this study and The Exclusion Criteria such as Patients with coronary artery bypass surgery, Pacemakers, Patients with unhealed suture site, Severe arthritis or restricted joint movements, Assistive aids for walking, Not willing to participate.

The study consisted of 20 (50%) males and 20 (50%) females with a mean age of 44.6± 11.517 years and BMI of 22.37± 3.1240 kg/m2.

Out of this, 5 % participants had Diabetes Mellitus, 2.5% participants had Diabetes Mellitus with Hypertension, 25% participants had only Hypertension and 68% participants had no comorbidities. The Rate of Perceived Exertion on Borg Scale at rest had a mean of 1.65 ± 0.8858.

The finding of the study showed no correlation between Tampa Scale of Kinesiophobia (TSK-SV Heart) and Percent predicted value of Six Minute Walk Test (Functional Capacity) in Mechanical Heart Valve Replacement patients.

Kinesiophobia is a fear of physical movement, is a common and worsening rehabilitation outcomes phenomenon in patients with cardiovascular diseases. Kinesiophobia has been defined as excessive, irrational, and debilitating fear of movement and activity resulting from a feeling of vulnerability to painful injury or reinjury.

According to a study, 86.7% of patients who underwent cardiac surgery experienced kinesiophobia preoperatively. [16]

Kinesiophobia is assessed by the Tampa Scale of Kinesiophobia Heart-Short Version (TSK-SV Heart).

Higher the score, higher is the level of Kinesiophobia.

In our study, 72.5% participants had High level of Kinesiophobia and 27.5% had low level of Kinesiophobia. Mean of the total TSK-SV Score was 38.40 ± 3.403.

Due to a lack of knowledge regarding the safety of physical activity following cardiac surgery, a significant number of patients showed high levels of Kinesiophobia in our study.

The impact of over protective caregivers on cardiac surgery can be supported by a systematic review by Bjørnnes AK, Moons P, Parry et al (2019) which states that caretakers lack the necessary knowledge about care after discharge because they are concerned about the patient's symptoms getting worse. This leads to consistently cautious behavior, which ultimately gives rise to kinesiophobia. [17]

The Kinesiophobia experienced by patients post cardiac surgery is linked to apprehension surrounding movement, overall fitness exercises, and both mental and physical discomfort. As a result, anxiety may contribute to the development of kinesiophobia. Anxiety related to pain, fatigue, and exhaustion can lead to the development of kinesiophobia. [18]

According to studies, participating in cardiac rehabilitation considerably reduced levels of kinesiophobia during the first phase of rehabilitation. [19]

The maximum distance walked in six minutes was calculated in our study. The reference equation provided by Ramanathan et al. (2014 Jan) was used to predict the values.

The percent predicted value of 6MWT was calculated to determine functional capacity. The mean distance walked during the six

minutes was 379.50 ± 70. 807meters.The predicted distance was 520.765 ± 49.195 meters. The Functional Capacity (percent predicted) was 73.1273 ± 13.2694 %. These findings are lower than those found in the Doleciska D et al (2020) study, [20] having mean distance walked 420 ±80 meters and percent predicted 70 ±14%.

Whereas a study conducted by Yue-Chi Chen in 2018, showed that in their study the average distance walked was 277.3 ± 85.7 meters and the percentage predicted was 36.6 ± 10.5% percent at discharge, increasing to 378.1 ± 95.2 meters and the percentage predicted was 50.0 ± 11.7% percent at Phase two follow-up. culture, ethnicity, differences in physical activity, and differences in the reference equation could all be contributing factors to this variation.[21]

Kinesiophobia and Functional Capacity:
In our study, we found no correlation between Kinesiophobia and Functional Capacity in Mechanical Heart Valve Replacement patients. There was no correlation between the Tampa Scale of Kinesiophobia (TSK-SV Heart) score and Percent predicted value of Six Minute Walk Test with a r value of 0.271 and p value 0.09.

The study shows that the two factors, kinesiophobia and functional capacity, are not correlated.

A study by, Keessen P et al. they found that the TSK-NL Heart questionnaire, and showed that `fear of injury' is the main factor in the construct `kinesiophobia'. [22]

M O Joshi et al (2020),[10] reported in their study that there was marked reduction in Kinesiophobia in patients who were using the chest binder. This could probably be the reason for the better functional capacity as during the 6MWT, they felt secure and protected while performing the test. The walking distance may have improved due to a reduction in postoperative pain. The patient is advised to wear the chest binder for six–eight weeks in accordance with hospital protocol. Each participant in M O

Joshi et al (2020) study underwent the six-minute walk test following the recommended procedures, wearing the chest binder throughout the test and Kinesiophobia has been shown to be reduced when people are aware of cardiac rehabilitation and participate in exercise programs. In our study, 72.5% participants had High level of Kinesiophobia and 27.5% had low level of Kinesiophobia. Mean of the total TSK-SV Score was 38.40 ± 3.403. This rate is higher than found in the study by M O Joshi et al (2020).

One hypothesis can be that the patient's pre-cardiac symptoms of dyspnea and chest pain are alleviated after surgery. Thus, they do not have fear of movement and showed better functional capacity. According to preliminary studies, a second reason may be increased awareness of cardiac rehabilitation, which has been shown to reduce kinesiophobia.

Still, despite the study shows no correlation between Kinesiophobia and Functional Capacity, the mean Kinesiophobia of the population is 38.40 ± 3.403 with 72.5% reporting High Kinesiophobia as a barrier should not be underestimated during rehabilitation. Patients have to be screened for Kinesiophobia prior to the start of cardiac rehabilitation.

Kinesiophobia and Quality of Life:
Quality of Life was assessed by using WHOQOL BREF scale. It has five Likert scale and has four components: physical, psychological, social and environmental. Out of these four components, we found correlation between Kinesiophobia and WHOQOL BREF: Environmental domain. Whereas, the other three domains were found not correlated.

It showed a weak negative correlation between Tampa Scale of Kinesiophobia (TSK-SV Heart) and WHOQOL BREF: Environmental domain of (r=-0.365, and p=0.021) value after four weeks of Mechanical Heart Valve Replacement surgery. The mean of WHOQOL BREF domains: physical -64.50±11.929. mean of

psychological domain 6.158 ±374, mean of social domain 9.834±374, mean of environmental domain 7.947±374.

A study by Palinkas L A et al, reported that in their study after an acute cardiac event, fear of injury is common and understandable. However, excessive fear of injury results in ineffective coping strategies, such as avoidance of physical activity, which might lead to further disability and possible secondary cardiac events. [23]

Bäck M et al (2013) and Şahin HB et al (2021), studied that the impact on kinesiophobia (fear of movement) by clinical variables for patients with coronary artery disease showed as the level of kinesiophobia increased, health related quality of life (HRQOL) decreased among the coronary artery diseases patients, and they found that kinesiophobia was a significant predictor for health-related quality of life (HRQOL). Kinesiophobia is an indicator of physical performance, according to their analysis. They focused on the relationship between fear of movement and the physical activity level in patients with cardiac diseases. Similarly, in their results, they reported low levels of health-related quality of life (HRQOL) in coronary artery disease with high levels of kinesiophobia. [24,25]

The findings of Aicher D et al, who also considered that mechanical aortic valve replacement has a greater long-term effect on quality of life than aortic valve formation and biological valve replacement. [26]

Therefore, after four weeks following cardiac surgery, our study found a weak correlation between the Tampa Scale of Kinesiophobia and the Environmental domain of WHOQOL BREF and found no correlation between the other WHOQOL-BREF domains.

Functional Capacity and Quality of Life:
Our other correlation between Functional Capacity and WHOQOL BREF domains of quality of life shows a weak positive correlation between Functional Capacity and WHOQOL BREF: Physical domain of r==.399*, and p=0.011 value after four weeks of Mechanical Heart Valve Replacement surgery and no correlation between other WHOQOL BREF domains with Functional Capacity.

The feasibility and safety of administering the six-minute walk test shortly after uncomplicated heart surgery were described in a study by Fiorina C. et al. [27]

A study by, Welke *et al.* reported in their study an improvement in physical health in 73.3% of patients, while only 41.6% had an improvement in their mental health six months after cardiac surgery. [28]

In our study, we took WHOQOL BREF scale for assessment of quality of life. It has four components: physical, psychological, social and environmental. Our study found the correlation between functional capacity and quality of life which showed weak positive correlation between functional capacity with Physical domain of WHOQOL BREF with r=.399* and p value =0.011 after four weeks of mechanical heart valve replacement surgery.

A study by, Penckofer *et al.* was found that 25% of women undergoing cardiac surgery continued to express severe psychological distress three months after surgery.[29] In our study, we found that the psychological domain does not correlate with functional capacity four weeks after surgery.

Commonly the phase II cardiac rehabilitation emphasizes on the safety of the physical activity program which is designed to improve the functional capacity and limit the physiological and psychological effects of cardiac illness, reduce risk of sudden death and reinfarction, control cardiac symptoms, stabilize and reverse atherosclerotic processes of patients. [30]

Prior to the program in phase two of cardiac rehabilitation, the patients must pass an exercise test. This test has the purpose of establishing a baseline of exercise ability that can be used as guidance for an exact exercise prescription. Patients must successfully complete an exercise test

before beginning phase two of cardiac rehabilitation. The purpose of this test is to create the baseline of exercise ability that are used as guidelines for an appropriate exercise prescription.

Therefore, if a patient's functional capacity improves after cardiac rehabilitation post-surgery, it will definitely enhance their quality of life.

CONCLUSION

The result of this study supports the null hypothesis. There is no correlation between Kinesiophobia and Functional Capacity in mechanical valve replacement patients (with r value of 0.271 and p value 0.09).

But at the same time, we found that there is a weak negative correlation between Kinesiophobia and WHOQOL BREF: Environmental domain of (r=-0.365, and p=0.021value) and there is a weak positive correlation between Functional Capacity and WHOQOL BREF: Physical domain of (r=0.399, and p=0.011 value).

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