ORIGINAL RESEARCH ARTICLE

Relationship Between Functional Capacity and Health Related Quality of Life Among Cardiac Patients

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ABSTRACT

Background: Cardiac diseases make the patients prone for decline in their functional capacity and a diminished quality of life. The aim of the study is to assess relationship between functional capacity and Health Related Quality of Life (HRQOL) among cardiac patients.

Methodology: This correlational research was carried out by examining cardiac patients who were receiving treatment at the selected hospital of Punjab, India. 6 Minute Walk Test (6MWT) and Quality of Life SF-36 were used to assess functional capacity and HRQOL among subjects.

Results: Of the 196 cardiac patients, 80.1% patients were not able to cover more than 250 m of walking distance during 6MWT, depicting to have a low Functional capacity. Results also revealed that all (n=196) cardiac patients had poor quality of life. Furthermore, a significant mild positive correlation (.223) between the functional capacity and HRQOL was found among these cardiac patients.

Conclusion: Functional capacity and quality of life are directly related to each other. Poor the functional capacity poor is the quality of life of cardiac patients. Thus, the results point towards the need for early involvement of patients in cardiac rehabilitation in order to improve health and prevent future complications.

Key words: 6 Minute Walk Test, Cardiovascular Disease, Coronary artery disease, Functional capacity, Health Related Quality of Life

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INTRODUCTION

Coronary artery disease (CAD) is causing disability and premature deaths around the world.[1] It has increased 9 times in India in the past twenty years. According to WHO, the highest estimated heart patients in the year 2025 will be Indians.[2] According to a report on Medical Certification of Cause of Death, out of the total medically certified deaths i.e. 39,621, diseases of the circulatory system accounted for 36.2% in Punjab State.[3] Currently, Punjab has the highest prevalence rate of cardiac diseases (17.08%) against the nation's average of 8.66%.[4] Previous researches had highlighted the negative impact of cardiac diseases on patients' lives, It has emphasized the necessity for further exploration into patient outcomes keeping in mind both subjective and objective evaluation. This includes an in-depth assessment of an individual's functional capacity and the health-related quality of life.[5] So far, few studies have been conducted to assess the subjective aspects of cardiac diseases. Moreover, the studies conducted with such aim included a very small sample or done on a specific population, thus cannot be generalized.[5] There are very few existing studies that formally evaluated the relationship between functional capacity and health-related quality of life. Though, functional capacity and health-related quality of life are frequently mentioned and sometimes used as equivalent terms but it is important to distinguish them. Functional capacity has been described as "the ability to perform activities of daily living that require sustained, submaximal aerobic metabolism" and health-related quality of life can be characterized as a self-reported evaluations of one's health status that cannot be interpreted by anyone else.[6]

To ameliorate quality of life, there is a need to understand the connection between both the aspects of health i.e., the function capacity and the health-related quality of life.

METHODOLOGY

The present study used a quantitative research approach with a correlational research design. The sample comprised of 196 cardiac patients receiving treatment at selected hospitals of district Jalandhar, Punjab. The present study used a quantitative research approach with a descriptive research design. The study's sample size was determined using the formula

$$N = \frac{z_{(1-\alpha/2)^2 P(1-P)}}{d^2}$$

where $z_{(1-\alpha/2)^2}$ is the standard normal variate at a 5% type I error level (P<0.05), which equals 1.96. The expected proportion in the population was based on previous studies, with p=10% or 0.10 and d=5% or 0.05. A previous study found poor functional capacity in 10% of cardiac patients, resulting in a sample size of 138.[7] However, a larger sample size was selected to prevent the loss of participants. Between September 2022 and December 2022, 196 cardiac patients undergoing treatment at designated hospitals in Punjab, India, were enrolled using purposive sampling methods. The patients who had undergone cardiac events- myocardial infarction, coronary artery disease, stable angina, heart failure and had undergone interventions like-Coronary Artery Bypass Grafting, Percutaneous Coronary Interventions, Valve Replacement, Pacemaker, Implanted Cardioverter Defibrillator and were in Class-I and II as per New York Heart Association Functional Classification of Heart Failure were included in the study, whereas those who had unstable angina pectoris, acute endo-myocarditis, recent phlebothrombosis, and arrhythmias were excluded. Ethical clearance was obtained from Institution Ethics Committee (EC/NEW/INST/2020/531/CU/09). The permission was also taken from Hospital Administrators and Consultant physicians. Written informed consent was taken from the subjects. Confidentiality of the information was maintained. Baseline data was collected on the first follow-up visit of patient to the concerned physician between the 3rd-10th day after discharge.

Functional capacity was measured by distance covered during 6MWT and this test has proven to be a simplest, safest, valid as well as a reliable test (Test-retest reliability=0.97).[8] This test was conducted in a 20m corridor of the selected hospitals by the researcher following the guidelines of the American Thoracic Society.[9] Oxygen Saturation (SPO_2) was recorded using finger-tip pulse oximeter before and after doing 6MWT. A 6MWT was performed and recorded on all the patients and the patient's perceived exertion was assessed with the BORG scale (where <6=No exertion at all and 20=Maximal exertion).[10] If required, patients were given rest (whenever needed) during the walk. The distance covered over a time of 6 minutes was recorded using a stopwatch and was used as an outcome to compare changes in functional capacity. The reference values used in 6MWT were proposed by the American Thoracic Society guidelines.[9]

The Health-Related Quality of Life was evaluated using the Quality-of-Life SF-36 questionnaire including 36 questions related to limitations during any physical and social activity, bodily symptoms, psychological problems, and overall perception of health.[11] The reliability of the tool was calculated using Cronbach's alpha and was found to be highly reliable (α=0.82). Patients were given the questionnaire and were helped in understanding the tool and instructions. Thus, they filled the questionnaire by themselves and later was scored by the researcher. Each domain consists of a 0-100 scale on the assumption that each question carries equal weightage. The lower the score the poor is the quality of life. A higher score indicates good quality of life.[12]

Statistics: IBM SPSS (version 21) was utilized for data analysis. Demographic data (such as age, gender, marital status, etc.) as well as functional capacity and health-related quality of life (HRQOL) were presented as frequency and percentages. Pearson's correlation coefficient was used to determine the relationship between the Functional Capacity and HRQOL scores. Independent 't' test and One-way ANOVA were utilized to assess associations. Post-hoc tests were utilized to determine pairwise comparisons of means contributing to the overall significant difference observed while computing 'F' statistics. The level of significance for all tests was set at $p<0.05$.

RESULTS

All patients completed 6MWT and Quality of life SF-36. No clinical complications were recorded during and after the test.

In this study, 196 cardiac patients were studied and the results revealed that majority of the cardiac patients i.e., 157 (80.1%) covered <250m distance during 6MWT and 19.9 percent of patients covered 250m-400m distance, while there were no patients who were able to cover >400m distance during 6MWT (Table 1). The mean functional capacity or the average 6-minute walk distance of 196 patients was (227.37m± 25.71), ranging from 210m-320m which depicted a low functional capacity among cardiac patients.

Table 1: Distribution of Functional capacity among cardiac patients (N=196)

Functional capacity (6 Minute walk distance)	Cases (%)
<250m	157 (80.1)
250m-400m	39 (19.9)
> 400m	0 (0)

Table 2: Distribution of Health-Related Quality of Life among cardiac patients (N=196)

Health Related Quality of Life (HRQOL)	Possible Range	Cases (%)
Poor	0-1200	196 (100)
Average	1201-2400	00
Good	2401-3600	00

Table 3: Relationship between Functional capacity and Health Related Quality of Life among cardiac patients

Variables	Mean ± SD
Functional capacity (n=196)	227.37 ± 25.71
Health Related Quality of Life (n=196)	32.52 ± 31.88

'r' value 0.223; p value 0.002

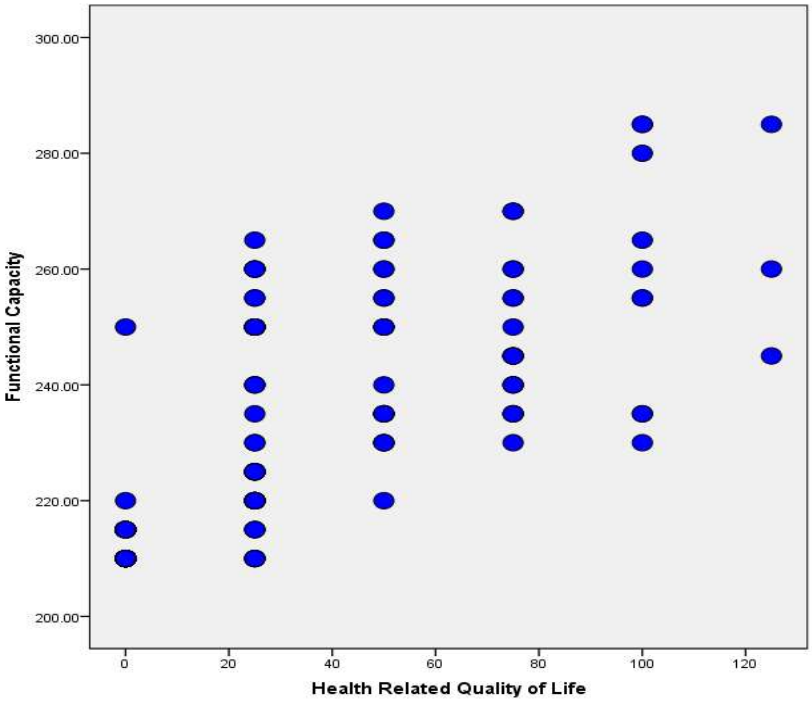

Figure 1: Relationship between Functional Capacity and Health Related Quality of Life

It can be seen from the Table 2 that 100% of the cardiac patients had poor Health Related Quality of Life (HRQOL). It was also found that the Mean HRQOL scores of 196 cardiac patients were (32.52± 31.88) ranging from 0-75. The relationship between Functional capacity and HRQOL was computed using Pearson's correlation coefficient and was found as r=0.223 (*P*= 0.002) (Table 3). The null hypothesis was rejected as a statistically significant mild positive relationship between Functional capacity and HRQOL was observed. (Figure 1).

Table 4: Association of selected demographic variables with compliance and selected health outcomes among cardiac patients (N=196)

Variables	Patients (%)	Functional capacity	P value	Health Related Quality of Life	P value
Age (in years)					
41-50	49 (25)	228.36 ± 14.76	0.941#	40.81 ± 34.11	**<0.001#**
51-60	78 (39.8)	226.73 ± 14.98		21.79 ± 23.61	
> 60	69 (35.2)	227.39 ± 38.56		38.76 ± 35.23	
Gender					
Male	110 (56.1)	231.81 ± 30.76	**0.006***	34.09 ± 30.80	0.438*
Female	86 (43.9)	221.68 ± 15.67		30.52 ± 33.29	
Marital status					
Married	137 (69.9)	225.36 ± 15.52	**<0.001#**	33.75 ± 31.00	**0.008#**
Single	39 (19.9)	240.76 ± 47.31		38.46 ± 37.97	
Widowed/ Divorced	20 (10.2)	215.00 ± 5.12		12.50 ± 12.82	
Educational status					
Up to Middle	20 (10.2)	242.50 ± 7.69	**<0.001#**	12.50 ± 12.82	**<0.001#**
Up to Secondary	89 (45.4)	233.53 ± 33.56		27.80 ± 30.25	
Graduation	67 (34.2)	216.86 ± 13.61		32.08 ± 32.21	
Above Graduation	20 (10.2)	220.00 ± 0.00		75.00 ± 0.00	
Employment status					
Not-working	156 (79.6)	221.89 ± 15.41	**<0.001**	28.04 ± 31.92	**<0.001***
Part-time working	40 (20.4)	248.75 ± 42.11		50.00 ± 25.31	
Occupation					
Not-working/ Homemaker	156 (79.6)	221.89 ± 15.41	**<0.001***	28.04 ± 31.92	**<0.001***
Business/ Commercial	40 (20.4)	248.75 ± 42.11		50.00 ± 25.31	
Dietary pattern					
Vegetarian	58 (29.6)	216.89 ± 15.24	**<0.001***	11.63 ± 27.39	**<0.001***
Non-Vegetarian	138 (70.4)	231.77 ± 27.90		41.30 ± 29.54	
Specific habits					
Alcohol					
Yes	78 (39.8)	219.67 ± 11.71	**0.001***	34.61 ± 33.52	0.457*
No	118 (60.2)	232.45 ± 30.76		31.14 ± 30.82	
Smoking					
Yes	50 (25.5)	217.00 ± 4.04	**0.001***	45.00 ± 37.11	**0.001***
No	146 (74.5)	230.92 ± 28.88		28.25 ± 28.80	
Tobacco					
Yes	127 (64.8)	231.33 ± 29.79	**0.003***	36.61 ± 30.50	**0.014***
No	69 (35.2)	220.07 ± 12.99		25.00 ± 33.21	
Duration of heart disease (in years)					
1	49 (25)	225.30 ± 15.65	**<0.001#**	34.18 ± 34.11	**0.049#**
2	59 (30.1)	212.45 ± 3.86		25.00 ± 29.36	
3	39 (19.9)	221.53 ± 11.53		32.05 ± 32.92	
4	20 (10.2)	220.00 ± 0.00		50.00 ± 25.64	
5	29 (14.8)	274.13 ± 33.86		33.62 ± 32.23	
Primary aetiology					
Coronary	70 (35.7)	222.85 ± 13.68	**<0.001#**	32.14 ± 32.17	**<0.001#**
Hypertension	59 (30.1)	235.42 ± 40.01		45.33 ± 33.94	
Cardiomyopathy	28 (14.3)	237.14 ± 19.02		8.03 ± 11.88	
Mitral Regurgitation	19 (9.7)	217.63 ± 2.56		25.00 ± 0.00	
Diabetes Mellitus	20 (10.2)	215.00 ± 5.12		37.50 ± 38.47	
Cardiac history/ Diagnosis					
Myocardial Infarction	50 (25.5)	220.00 ± 15.64	**0.001#**	15.00 ± 20.20	**<0.001#**
Stroke/ TIA	29 (14.8)	239.65 ± 14.51		33.62 ± 32.23	
CABG	78 (39.8)	230.51 ± 35.43		40.70 ± 35.38	
Stable Angina	19 (9.7)	212.36 ± 2.56		11.84 ± 12.82	
PCI	20 (10.2)	230.00 ± 10.25		62.50 ± 12.82	
Therapeutic intervention done					
Revascularization	40 (20.4)	212.50 ± 4.38	**<0.001#**	31.25 ± 32.88	0.919#
PCI	88 (44.9)	240.17 ± 31.94		33.52 ± 26.77	
CABG	68 (34.7)	219.55 ± 13.40		31.98 ± 37.36	
Number of vessels blocked					
1	49 (25)	219.08 ± 15.93	**<0.001#**	4.59 ± 9.78	**<0.001#**
2	60 (30.6)	243.33 ± 36.55		33.33 ± 31.44	
3	87 (44.4)	221.03 ± 13.55		47.70 ± 29.93	
Co-morbidities					
Yes	68 (34.7)	227.05 ± 17.53	0.901*	21.69 ± 28.62	**<0.001***
No	128 (65.3)	227.53 ± 29.20		38.28 ± 32.13	

*t test applied; #ANOVA test applied

The results show that most (39.8%) of the patients were in the age group of 51-60 years with a male preponderance of 56.1% (110 out of 196), majority [137 (69.9%)] of the cardiac patients were married. Other patients' characteristics are shown in Table 4.

The association of functional capacity and HRQOL with the selected demographic variables was calculated using One-way ANOVA and Student's 't' test (Table 4) which reveals a statistically significant association of all the selected demographic variables with the functional capacity of cardiac patients except with the age and co-morbidities. Whereas, all the selected demographic variables had a significant association with HRQOL except for gender, alcohol consumption, and therapeutic intervention done.

Discussion

In the present study, the majority of the patients 78 (39.8%) were in the age group of 51-60 years of age with a male preponderance of 56.1% (110 out of 196) and the majority [137 (69.9%)] of the cardiac patients were married. These results were supported by the study conducted by Wu JR et al,[13] Forman DE et al,[14] Wang G et al,[15] Suman-Horduna I[16] and Firouzabadi MG et al,[17] that majority of subjects were in age group 50 years and above and were males.

In the present study, the 6MWT was used to assess the functional ability of cardiac patients and the results showed that 157 (80.1%) of the cardiac patients covered <250 m of walking distance during 6MWT which was lower than that of a previous correlational study where a majority of respondents covered the distance of 300m during 6MWT. One possible explanation for this finding could be the difference in patients' Body Mass Index, gender, diet, comorbidities, etc.[18] Whereas, research conducted by Straiton N et al[19] revealed similar results to that of the present study that patients had significantly reduced functional capacity after cardiac events.

In this study, all the cardiac patients i.e., 196 (100%) had poor quality of life and these results are similar to the results of a prospective study conducted by Wu JR et al[13] and Straiton N et al.[19] Despite cardiac disorders significantly impacting QOL, other factors play an important role as well, including age, marital status, education, job, diet, cause of heart disease, treatment done, comorbidities, depression, anxiety, social withdrawal, NYHA classification etc. Moreover, a prospective and an observational study revealed the strong impact of age, gender, residence, marital status, monthly income and clinical factors like comorbidities and number of hospitalizations on HRQOL and functional status of the patient.[15,20]

An observational study conducted by Wu JR[13] and a cross-sectional study conducted by Jellestad L et al.[21] and Wang G[15] concluded that the functional capacity is associated with the quality of life of patients who had undergone cardiac interventions. This is same as the results of present study. The present study elucidates a statistically significant mild positive correlation (.223) between functional capacity and HRQOL which is consistent with the results of the previous studies showing a mild to moderate positive correlation between functional capacity and QOL and also revealed that there are several key elements corresponding to a reduced health-related quality of life among older cardiac patients. The most common is functional capacity (as per New York Heart Association functional class) is highly associated with QOL.[6,14]

The results of a study conducted by Rahmani S[18] are contrary to the results of the present study which reveals a significant negative correlation between functional capacity and the QOL among heart failure patients. These results may be due to the choice of tool, as they used MLHFQ which mainly measures the physical ability of heart failure patients with questions like limitation in walking or climbing staircase. Whereas, in the present study the Quality-of-Life SF-36 questionnaire was used which covers all the main domains of health including limitations in physical activities, social activities because of physical or emotional problems, psychological distress, and well-being and general health perceptions.

Limitations

Although a correlational design was appropriate for this research study, but it has its own inherent limitations as cause-and-effect relationship between functional capacity and health-related quality of life cannot be inferred. Furthermore, in addition to the assessment of the relationship between functional capacity and health-related quality of life among cardiac patients, future studies could investigate relationship of other mediating and moderating variables which were not included in the present study but can impact the main variables of these patients studied under present research. Additionally, the study subjects were enrolled from the selected hospitals of one district only, which might affect the generalizability of findings of the study.

Conclusion

Quality of life and functional capacity of cardiac patients are substantially reduced. Timely enrolment in cardiac rehabilitation programs can improve the functional capacity and can help in gain in health-related quality of life of these patients.

Recommendations

Though, there are many factors influencing the quality of life and functional capacity of cardiac patients, it is also suggested to identify the different factors affecting both functional capacity and quality of life. A

qualitative enquiry can provide in-depth information on the impact of cardiac disease on different aspects of lives of patients including the functional limitations. Furthermore, impact of enrolment and completion of cardiac rehabilitation program on functional capacity and quality of life can be assessed.

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REFERENCES

1. Laher AE, Mumpi BE, Beringer C, Enyuma C, Moolla M, Motara F. Clinical Profile of Acute Coronary Syndrome Presentation to the Ladysmith Provincial Hospital: High Prevalence Among the Minority Indian Population. 2021;
2. Cardiovascular diseases (CVDs) [Internet]. Available from: https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)
3. In 2020, Punjab Saw More Deaths Due To Cardiovascular Diseases Than Covid _ Chandigarh News - Times of India.
4. Coronary Artery Disease - Coronary Heart Disease | American Heart Association [Internet]. [cited 2022 Apr 6]. Available from: https://www.heart.org/en/health-topics/consumer-healthcare/what-is-cardiovascular-disease/coronary-artery-disease
5. Prabhu N V., Maiya AG, Prabhu NS. Impact of Cardiac Rehabilitation on Functional Capacity and Physical Activity after Coronary Revascularization: A Scientific Review. Vol. 2020, Cardiology Research and Practice. 2020.
6. Alcaide-Aldeano A, Garay A, Alcoberro L, Jiménez-Marrero S, Yun S, Tajes M, et al. Iron deficiency: Impact on functional capacity and quality of life in heart failure with preserved ejection fraction. J Clin Med. 2020;9(4).
7. Buendía F, Almenar L, Martínez-Dolz L, Sánchez-Lázaro I, Navarro J, Agero J, et al. Relationship between functional capacity and quality of life in heart transplant patients. Transplant Proc [Internet]. 2011;43(6):2251–2. Available from: http://dx.doi.org/10.1016/j.transproceed.2011.05.003
8. Kammin EJ. Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID- 19 . The COVID-19 resource centre is hosted on Elsevier Connect , the company ' s public news and information . 2020;(January):2020–3.
9. Issues S, Test MW, Equipment R, Preparation P. American Thoracic Society ATS Statement : Guidelines for the Six-Minute Walk Test. 2002;166:111–7.
10. Williams N. The Borg Rating of Perceived Exertion (RPE) scale. Occup Med (Chic Ill). 2017 Jul 1;67(5):404–5.
11. 36-Item Short Form Survey (SF-36) - Physiopedia [Internet]. [cited 2022 Jul 20]. Available from: https://www.physio-pedia.com/36-Item_Short_Form_Survey_(SF-36)
12. SF-36 - Wikipedia [Internet]. [cited 2022 Jul 20]. Available from: https://en.wikipedia.org/wiki/SF-36
13. Wu JR, Lennie TA, Frazier SK, Moser DK. Health-related quality of life, functional status, and cardiac event-free survival in patients with heart failure. J Cardiovasc Nurs. 2016;31(3): 236–44.
14. Forman DE, Fleg JL, Kitzman DW, Brawner CA, Swank AM, McKelvie RS, et al. 6-Min Walk Test Provides Prognostic Utility Comparable To Cardiopulmonary Exercise Testing in Ambulatory Outpatients With Systolic Heart Failure. J Am Coll Cardiol [Internet]. 2012;60(25):2653–61. Available from: http://dx.doi.org/10.1016/j.jacc.2012.08.1010
15. Wang G, Yang Q. Factors associated with health-related quality of life in Chinese patients with heart failure: a cross-sectional study. Collegian [Internet]. 2020;27(5):512–20. Available from: https://doi.org/10.1016/j.colegn.2020.04.003
16. Suman-Horduna I, Roy D, Frasure-Smith N, Talajic M, Lespérance F, Blondeau L, et al. Quality of life and functional capacity in patients with atrial fibrillation and congestive heart failure. J Am Coll Cardiol [Internet]. 2013;61(4):455–60. Available from: http://dx.doi.org/10.1016/j.jacc.2012.10.031
17. Firouzabadi MG, Sherafat A, Vafaeenasab M. Effect of physical activity on the life quality of coronary artery bypass graft patients. J Med Life. 2014;7(2):260–3.
18. Rahmani S, Erwinanto, Andean R. Correlation between Six-Minutes' Walk Test and Quality of Life in Heart Failure Patients. Althea Med J. 2015 Dec;2(4).
19. Straiton N, Jin K, Bhindi R, Gallagher R. Functional capacity and health-related quality of life outcomes post transcatheter aortic valve replacement: A systematic review and meta-analysis. Age Ageing. 2018;47(3):478–82.
20. Deichl A, Edelmann F. Improvement of exercise and functional capacity and quality of life in patients with heart failure by iron therapy. Front Cardiovasc Med. 2023;10(May).
21. Jellestad L, Meier VG, Bierbauer W, Bermudez T, Auschra B, Günther MP, et al. Differential associations of emotional and physical domains of the MacNew Heart with changes in 6-min walking test. Qual Life Res [Internet]. 2023;32(2):615–24. DOI: 10.1007/s11136-022-03247-3