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Research article ***Physiotherapy***

Correlation between psychological co-morbidities and functional capacity in hospitalized coronary artery bypass graft surgery (CABG) patients.

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ABSTRACT

Background: Coronary Artery Bypass Graft surgery(CABG) is used to treat blockage or narrowing of one or more coronary arteries, hence it restore blood supply to the heart muscle. It can effectively relieve patient previous symptoms such as discomfort from chest pain (angina), fatigue ,breathlessness and heart attack and increases life expectancy. It is usually a stressful events for patients. After cardiac surgery. If there is alterations in psychological comorbidities are common during recovery. Functional capacity is ability to perform daily tasks or exercise.This well documented value gives information to the doctors, medical staff, physiotherapist and caregivers to give early intervention for emotional disorders after surgery in hospitalized patients
Aim: to find the Correlation Between Psychological Co-Morbidities And Functional Capacity. In Hospitalized Coronary Artery Bypass Graft Surgery Patients.
Study design: cross-sectional, observational & correlation study.
Method: A total of 40 hospitalized CABG patients from tertiary healthcare centre of a metropolitan city. The assessment tool used in this study was Depression, Anxiety and Stress Scale (DASS-21), 6 Minute walk test(6MWT), and Borg scale. The patients taken who fulfilled inclusion criteria and were willing to participate. After obtaining written consent, the DAS Scale was administered to patient and made to performing 6 minute walk test in cardio-vascular & thoracic surgery(CVTS) wards. For each participants required time was 30-40 mins.
Results: Pearson correlation was used to find correlation between Psychological Comorbidities and Functional Capacity. r value for Psychological Comorbidities (DASS Scale score) and percent predicted value of 6MWT (Functional Capacity) is -.399 which shows weak negative correlation and is statistically significant with p value of 0.011. This implicates that if slightly high DASS Scale score for measuring psychological comorbidities was slightly reduced functional capacity.
Conclusion: The result of this study showed weak negative correlation between Psychological comorbidities and Functional capacity. It may be due to post operative fatigue, incisional pain, unable to fall a sleep, loud noises in wards, coughing etc. So this study gives us an understanding to improve quality of life of patients.

Keywords: CABG; Functional capacity; 6MWT; Depression Anxiety and Stress (DAS)Scale.

INTRODUCTION

According to World Health Organization(WHO)"Health is define as, it is state of complete -mental ,physical and social well being and not merely the absence of disease". Mental health is one of the positive dimension in WHO's definition of health. Mental health is defined as a " state of well being in which every individual realizes his or her own potential,

can cope with the normal stresses of life and also can work productively and fruitfully and is able to make a contribution to her or his community "[41]. Mental health is co-related with stress and stressor.

Stress –"It is physical, mental or emotional factor that develop mental tension and bodily tension on persons body". Stress can be encounter from multiple sources, including work, money, health, and relationship worries and media overloaded etc.

Stressor - "Stressor is a chemical or biological agent, environmental condition, external stimulus or event that causes stress to the person".There are two categories of stressors- physiological/physical includes pain, injury, chronic illness, surgery; and psychological stressors are overthinking, negative thoughts, community based problems etc[42]. Physical stressors produce mechanical stresses on skin, bones ,ligaments, tendons, muscles and nerves that develop tissue deformation and tissue failure. It also produce pain and impair work performance. Chemical stressors produce biomechanical responses associated with metabolism and tissue repair[43]..Common disorders of this illness are anxiety and depression[41] .Anxiety manifests as a feeling of unease or apprehension, breathlessness , inability to relax , persistent headache excessive negative thoughts, sweating , butterflies in stomach and persistent sleep disturbance. Depression is characterized by depressed mood and loss of interest or pleasure and is accompanied by significant functional impairment[14] .

Epidemiological studies have shown a high prevalence of coronary artery disease (CAD)[3] due to increased stress level and stressors among the Indian population . Commonly it occurs due to smoking , hypertension , diabetes mellitus , sedentary lifestyle, and obesity etc.[33].Coronary arteries have obstruction is typically due to arteriosclerosis and atherosclerosis [32]. If coronary arteries have 50-90% obstruction then Coronary Artery Bypass Graft (CABG) surgery indicated. In this operation there are 2 main approaches of graft which has been used in procedure-internal mammary artery(IMA) and great saphenous vein graft. Internal mammary artery graft is attached to the anterior descending branch of coronary artery. Great saphenous vein is removed from a leg and attached to aorta. Preferrance of the graft depends on the surgeon's choice and condition of disease. After procedure patient is in Intensive Care Unit (ICU) and also on mechanical ventilation, sedation so that promotes muscle weakness and results in reduction in mobility[34,35] .

The CABG commonly associated with higher prevalence of anxiety and depression i.e. 25-40%. Anxiety and depression status has been assessed by using screening tool-Depression ,Anxiety & Stress scale (DASS). It is in public domain. DASS-21 is shorter version of DASS-42. The scale having 21-items and takes 5 to10 minutes to complete. Internal consistency for each of the subscales are typically high - Cronbach's α of 0.96 to 0.97 for DASS-Depression,0.84 to 0.92 for DASS-Anxiety and 0.90 to 0.95 for DASS-Stress [23].This scale is a dimensional rather than categorical concept of psychological disorder[44]. There is also availability of DASS 21 Hindi version .DASS showed hindi adaptation which showed comparable reliability and validity score. Cronbach alpha for entire scale 0.83, factor loading ranged from 0.20-0.88 of Hindi version which was found comparable with original scale [45].It is popular and simple, highly reliable for detecting states of anxiety and depression for use in medical practice[24].Compared to other inventories , which give good measurement of severity of an psychological co-morbidities has been found to be valid for screening purposes in CABG patients[44].

According to American Thoracic Society, functional capacity can be assessed by using 6 Minute Walk Test(MWT) [36]. It is safe ,simple, cost effective, reliable and well tolerated , applicable in early phase of surgery[36] . The reliability of 6MWT demonstrated with interclass correlation= 0.97 and validity of the test P <0.001 [39]. The assessment of functional capacity reflects the ability to perform activities of daily living[17]. It includes measure of rate of perceived exertion .To measure the amount of activity performed, the energy utilization and oxygen intake capacity[19] .It is feasible & well tolerated after 7 th day of post operative by CABG patients[36].Hence, we were performed 6MWT on early phase of postoperative days i.e. from day 7 .During the patient transferred to the ward and before the hospital discharge.

In ICU ,patients is on ventilated ,sedative ,having leads on chest,not heamodynamically stable ,fatigue , more breathlessness and having chest pain ,so that patients not selected immediately after the surgery.During hospitalization,due to psychological comorbidities can cause, reduction of functional capacity, length of hospital stay ,delayed wound healing, higher infection rate,poor physical and emotional health,reduced pain threshold, more adverse cardiac events like myocardial infarction and early death..Due to surgical procedure, sutures are present over chest and lower leg so that feeling of pain and irritability to the patients.It affects the mind, making the person less active and confined to one place or a particular room . Reduction of overall activity, exercise tolerance , the effects of therapy ,participation and exposure to environment which affects their quality of life. It also reduces the lack of hope and spirit to fight against the disease, and affecting their prognosis.

Hence this comorbidity is secondary to the diagnosis and will recover with the surgery. Frequently, such conditions are either ignored or not asked/reported, hence they cause significant distress and may lead to adverse outcomes. Further, it may fail to respond to standard medical treatment due to nature of their mental health problems and may experience a greater loss of function than necessary. Many studies have done to assess functional capacity in CABG patient from the hospital discharge up to 4th weeks .There are very few studies has been conducted on early phase after surgery. So the purpose of this study is to find out any correlation between psychological co-morbidities (anxiety, depression, stress) and functional capacity in hospitalized CABG patients.

Objectives

1. To find out psychological co-morbidities by using Depression, Anxiety & Stress Scale (DASS) in hospitalized CABG patients.
2. To find out functional capacity by using 6 Minute Walk Test in hospitalized CABG patients.
3. To find out the correlation between psychological co-morbidities and functional capacity by using DAS scale and 6MWT in hospitalized CABG patients .

Hypothesis

Null Hypothesis: There is no correlation between psychological co-morbidities and functional capacity in hospitalized CABG patients .

Alternate Hypothesis: There is a correlation between psychological co-morbidities and functional capacity in hospitalized CABG patients.

Study design

Research Design: Cross- sectional, correlational & observational study.

Sample Size: 40

Formula: [46] $n=4pq/l^2$

Where, n=required sample size, p- prevalence rate of CABG in Indian population-11%[48], q=(100-p)=100-11=89,l= Dropout Rate/ error =10%

$n=4x11x89/10^2=3916/10x10=39$

calculated sample size is 39 So, Round up sample size is 40.

Study Population: Post operative CABG patients were selected after consideration of inclusion & exclusion criteria (early phase)

Type of sampling: Convenient Sampling;

Duration of study: 6 months

Source of Sampling: Cardio Vascular & Thoracic Surgery wards

Place of study: Tertiary Health Care Hospital in a Metropolitan city.

Selection criteria

Inclusion Criteria

1. Patients who underwent first elective uncomplicated CABG procedure.,able to ambulate, willing to participate,age-40-60 years
2. Early post operative days of CABG in hospitalized patients.

Exclusion criteria

1. Any major Psychological illness ,neurological and respiratory conditions,Surgical reintervention, Auditory –visual impairements, musculoskeletal problems,Any major systemic failure,Haemodynamically unstable
2. No current treatment with drugs affecting psychological Co-morbidities
3. Unwilling to co-operate
4. Contraindications for the 6 MWT (According to American Thoracic Society Guidelines)&Patients needing walking aids for ambulation
5. No current treatment with drugs affecting psychological Co-morbidities

Material required

1. Sphygmomanometer,Stethoscope ,Pulse oximeter ,Stopwatch, A source of oxygen(if needed) ,2 Cones ,Borg Scale
2. A chair that can be easily moved along the walking course.
3. Stationary : pen ,paper ,measuring tape, scale, Case record form,Mobile phone (to click the photograph of patients or to make record of view).

Equipment





Methodology

Approval for the study was obtained from the Protocol committee and the Institutional Ethical Committee and from Maharashtra University of Health Sciences(MUHS).Informed Consent document (ICD) was taken from each participants before starting and they were selected according to inclusion and exclusion criteria .

Assessment of psychological co-morbidities[23]

Demographic data and anthropometric data was gathered from chart review and interview basis. The facilitated the Depression, Anxiety and Stress scale (DASS) to the post CABG patients after ensuring their ability to read and understand the questionnaire. DASS-21 is a 21 item self-report questionnaire design to measure the severity of a range of symptoms of depression , anxiety & stress. The scale has scores from 0 (did not apply to me at all) to 3(applied to me very much). Each of the three DASS-21 scales contains 7 items, divided into subscales with similar content[23,24].The questionnaire then individually analysed and scored accordingly. Total interview and answering time was around 15 -20 minutes. Those patients , after filling the scale with cutoff for Depression>10, Anxiety>8 , Stress>15 points were employed as an indicator of possible depressive or anxious pathology respectively and further patient was eligible to do 6 minute walk test.

Assessment of functional capacity

6MWT test was to be done from day 7. Test was conducted using a standardized procedure according to American Thoracic Society. The test was symptom limited[37]. Before starting the test initially check indications & contraindications of patients

Procedure

The 6MWT was performed in indoors, a long, flat, straight, enclosed corridor with a hard surface that was seldom

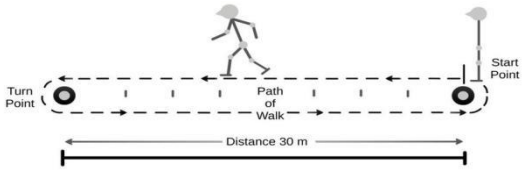
travelled. A 100-ft hallway, therefore, required. The turn around points was marked with a cone.

The patient was sit at rest in a chair, located near the starting position, for at least 10 minutes before the test starts. Resting vital signs were recorded before walk: blood pressure, heart rate, and oxygen saturation. The patient was stand and rate their baseline RPE using the Borg scale. Set the lap counter to zero and the timer to 6 minutes. Assemble all necessary equipment (lap counter, timer, clipboard, borg scale, worksheet) and move to the starting point. The patients of this test are walk as far as possible for 6 minutes and also walk back and forth in this hallway.

6MWT



Taken consent from patient



Patient was performing 6MWT as follow-



Fig.1



Fig.2



Fig.3

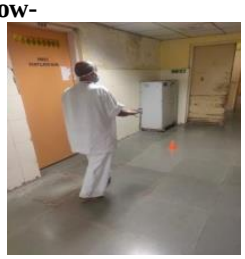


Fig.4

Post test

Record the post walk Rate RPE and distance walked was measured and recorded to the nearest foot. If patient had to stop and rest, the duration of the rest time was recorded. Recorded patients blood pressure, heart rate and pulse rate and SPO_2. Rate of perceived exertion was calculated using Borg scale. Then after data was collected. Result and conclusion was drawn.

Borg scale of rate of perceived exertion (RPE)[37]: (Reff- ATS Guidelines)(Borg ,GA,1982)

RPE scale is widely used for prescribing exercise intensity and assessing physiological variables (HR or volume of O_2 intake). The RPE associated with a given HR is lower in individuals on beta-blocker medications as compared to non-medicated individuals, but RPE can still be used to predict maximal work rate in patients on these drugs. The Linear Borg Rate of Perceived Exertion , which is the first rating scale and based on 15 point scale with numerical rating between 6 & 20.During at rest and after 6MWT were evaluated and ranging from 6(least effort) to 20(most effort). The patients were instructed regarding the use of the scale and prompted for the spontaneous choice of a value.

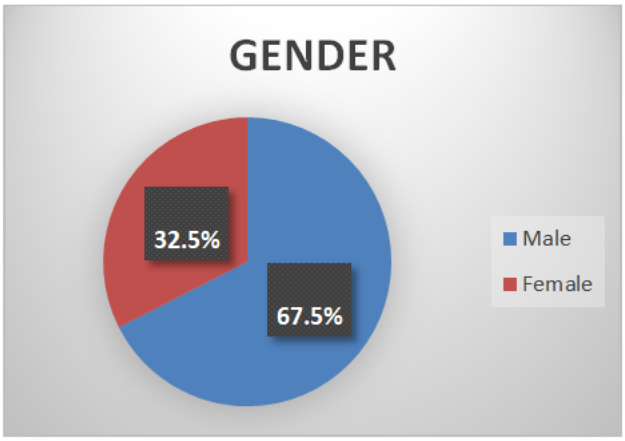
Data analysis

Data was analysed using SPSS Software Version 16.The data was checked for normality using the Shapiro-wilk Test as it is sensitive for smaller sample size(n<60).

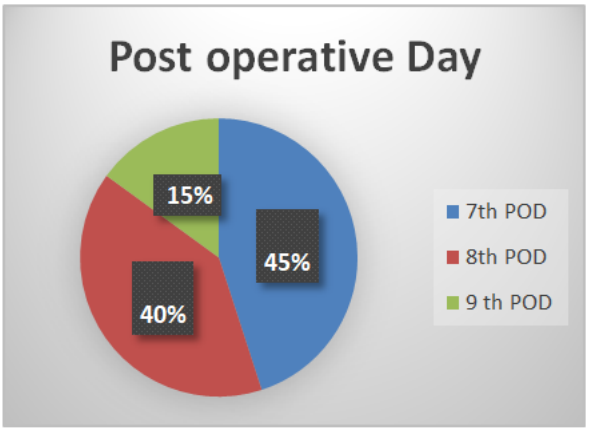
For the ease of analysis, data was segregated into

1. Demographic data
2. Descriptive statistics- Mean, Standard Deviation, Confidence Interval and Standard error of DASS Scale (Depression, Anxiety, Stress scale), Functional capacity, RPE on Borg Scale.
3. The Pearson's correlation test between Psychological comorbidities and Functional Capacity.
4. The confidence interval was set as 95% and significance level was set as 0.05.The data was considered as significant if $p<0.05$.

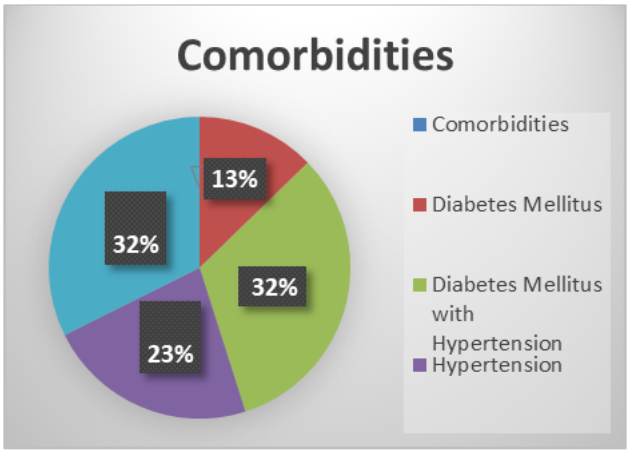
Demographic Data



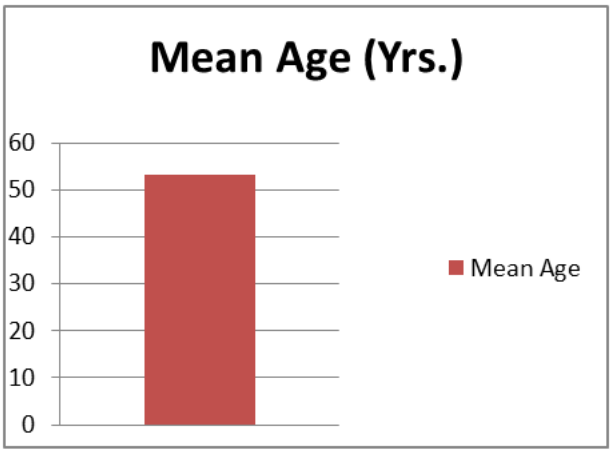
a. Gender Distribution



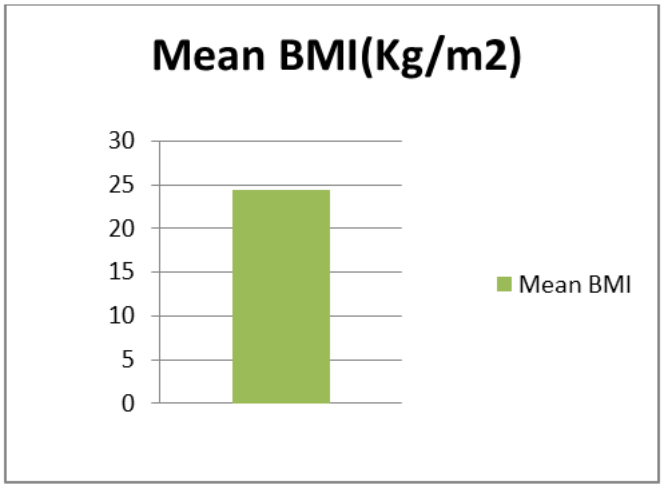
b. CABG Patients Post-operative day(POD)



C. Comorbidities

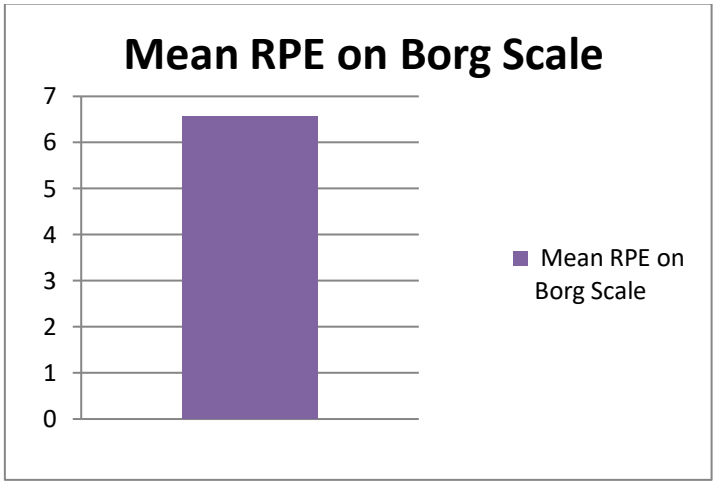


d. Age Distribution (mean of 53.3+_6.257 years)

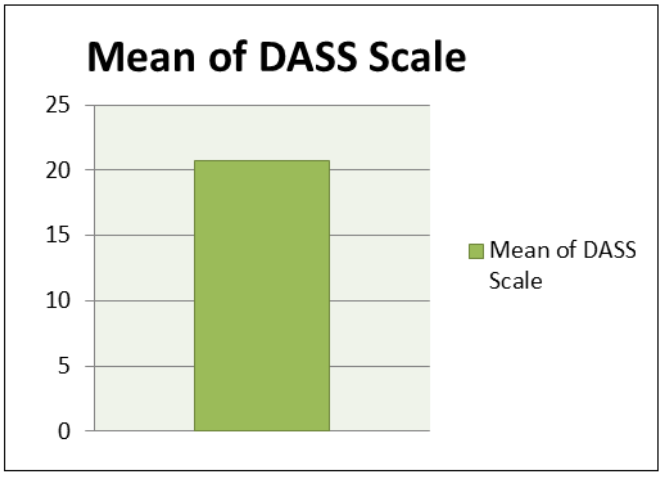


e. Body Mass Index(BMI) distribution

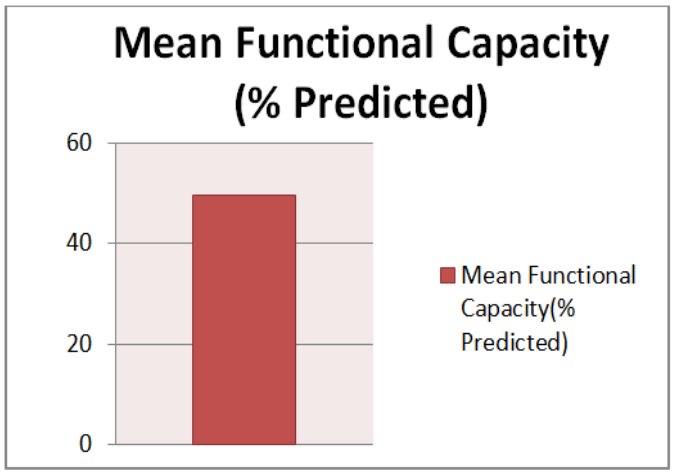
Descriptive Analysis



a. RPE on rest using Borg Scale (mean of 6.57+_0.67)



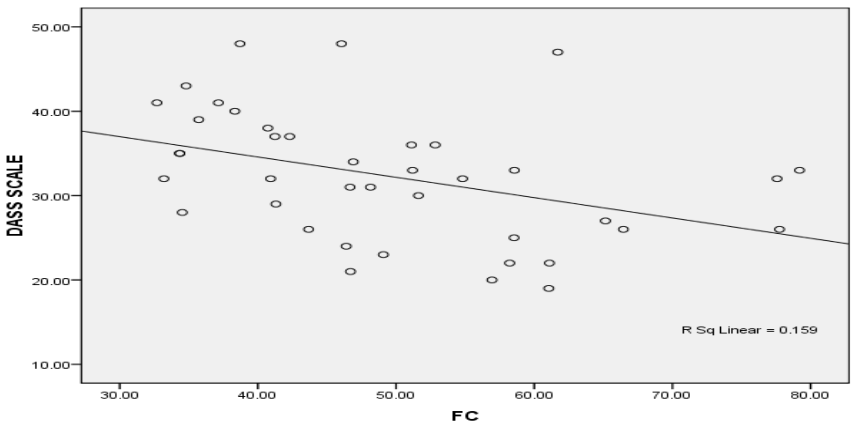
b. DASS Scale score(mean20.72)



c. Functional Capacity (% predicted)of 49.69+-12.41%)

Correlations: a.Correlation between psychological comorbidities and Functional capacity

	Shapiro-Wilk Test		
	Statistic	**Df**	**Sig.**
DASS	.974	40	.482
FC	.932	40	.018



	r value	p value
DASS Functional Capacity	-0.399 (weak negative Correlation {-0.3to -0.5})*	0.011
Significant ?(alpha=0.05) (2-tailed)	Yes*	
No. of samples	40	

Inferrence: In above table statistically significant Weak negative correlation (DAS Scale: r= -.399; p=0.011,N=40) between DASS Scale score(Psychological Comorbidities) and Functional capacity (r=1,p=00,n=40) using Pearson correlation

DISCUSSIONS

The purpose of the study was to investigate the psychological comorbidities and Functional Capacity of patients hospitalized post Coronary Artery Bypass Grafting (CABG) and to find the relationship between the two. To the best of our knowledge this is the study to focus specifically on correlation between psychological comorbidities and functional Capacity in hospitalized CABG patients in India.
Hospitalized post CABG 40 subjects where, meeting the inclusion criteria and willing to participate were recruited in this study. The study consisted of 27(67.50%) males and 13(32.50%) females with a mean age of 53.23±6.257 years and BMI of 24.36±2.102 kg/m^2. Out of the 40 participants, 45% were assessed on the 7^{th} post operative day,40% on 8^{th} postoperative day and 15% on 9^{th} post operative day. Timing of test was influenced by patient's disabillity and dependency level.32.50% of subjects had no comorbidities, 32.50% had Diabetes mellitus with hypertension, 22.50% had only hypertension and 12.50% had only Diabetes mellitus. The Rate of perceived exertion on Borg scale at rest had a mean of 6.575±0.6751.

Psychological Comorbidities

Depression Anxiety and Stress Scale (DASS 21 scale) is used in this study. Many of the symptoms that DASS Scale considers as stress, anxiety and depression are characteristic of cardiac patients .

Functional Capacity

In this study, by using 6MWT the maximum distance walked in 6 minutes was calculated. Predicted values using reference equation given by Ramanathan et al. were used[61]. Functional capacity was found by calculating percent predicted value of 6 MWT. The test was well tolerated by all the participants and no cardiopulmonary complications were reported. Mean distance walked during 6 minutes was 258.9±62.14 meters, the predicted distance was 522.1±19.64 meters. The Functional capacity (percent predicted) was49.69±12.41%. This values are slightly lower than Fiorina et al.(2007) study, having mean distance walked 304±89 meters having percent predicted 58±15%[61]. Whereas study done by Yuch-Chi Chen in 2018 shows mean distance walked 277.3±85.7 meters having percent predicted 36.6±10.5% which are slightly lower than our values[60]. The possible reason for this variation could be the difference in race, culture, ethnicity, physical activity and different reference equation [61]

The primary findings of this study showed weak negative correlation(r=-.399,p=0.011) between Psychological comorbidities using DASS scale score and Percent predicted value of 6 Minute walk test(Functional capacity). This implicates that if patients having Slightly high DASS Scale score for measuring psychological comorbidities will have slightly reduced functional capacity. It may be due to post operative fatigue, incisional pain, unable to fall a sleep, loud noises in wards, coughing etc. Hence, functional capacity may deteriorate both physical and psychological function during recovery and hampering the Quality of Life[61]. If presence of psychological co- morbidities will do double the burden or worsen the cardiovascular health outcomes during rehabilitation. However, Functional capacity and psychological comorbidities are independently associated with Quality of life(QOL).
Therefore, psychological comorbidities should be considered as one of the important component of cardiac rehabilitation to improve the functional capacity of these patients.
We found that there is weak negative correlation between psychological comorbidities and functional capacity in Hospitalized Coronary Artery Bypass Grafting patients as well as it is a way to improve pathways to recovery .Thus, the null hypothesis is rejected.
Correlation of components of Psychological Comorbidities (DASS Scale) and Functional capacity (percent predicted value of 6MWT) as seen in Graph shows that- r value for Psychological Comorbidities (DASS Scale score) and Functional Capacity is -.399 which shows weak negative correlation and is statistically significant with p value of 0.011.

CONCLUSION

The result of this study showed weak negative correlation between Psychological comorbidities and Percent Predicted value of 6MWT (Functional capacity). This implicates that patients having Slightly high DASS Scale score for measuring psychological comorbidities will have reduced functional capacity. Functional capacity was reduced post CABG ,this could be due to prolonged bed rest, incisional pain, respiratory limitations due to sternotomy, perceived exertion affecting the psychological factors which in turns affects the Functional capacity. Hence, we found that there is a correlation between psychological comorbidities and functional capacity in hospitalized Coronary Artery Bypass Grafting patients. Therefore Alternate hypothesis can be accepted for this study.

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