Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(6), 1029-1040 | ISSN:2251-6727

Effects of Different Intensities of Continuous Aerobic Exercises on Fatigue Levels, Mental Well- Being & Mindfulness in Cardiac Rehab Phase 2

Mehwish Iftikhar[1], Mehwish Waseem[2], Muhammad Iqbal[3], Pakeeza Batool[4], Muheebur Rehman*[5] Nadeem Ahmad[6]

[1]Faculty of Rehabilitation & Allied health Sciences, Riphah International University Islamabad, Pakistan

[2]Faculty of Rehabilitation & Allied health Sciences, Riphah International University Islamabad, Pakistan

[3]Faculty of Rehabilitation & Allied health Sciences, Riphah International University Islamabad, Pakistan

[4]Department of Cardiac Rehabilitation Armed Force Institute of Cardiology Rawalpindi, Pakistan

[5]Department of Allied Health & Biological Science, Abasyn University Peshawar, Pakistan

[6]Faculty of Rehabilitation & Allied health Sciences, Riphah International University Malakand Campus, Pakistan

Corresponding Author: Dr. Muheebur Rehman*

(Received: 16 October 2024 Revised: 20 November 2024 Accepted: 24 December 2024)

KEYWORDS

Coronary Artery Bypass Grafting, Mindfulness Attention Awareness Scale, Multidimensional Assessment Of Fatigue, Myocardial Infarction, Warwick Edinburgh Mental Well- being Scale.

ABSTRACT:

Depression is seen among many of post CABG patients causing them fatigue and thus affects their mental wellbeing and minfullness. In cardiac Rehab Phase2, monitoring the effects of different intensities of continuous aerobic exercises on fatigue level mental wellbeing and minfullness in depressed patients must be considered. To determine the effects of different intensities of Continuous Aerobic Exercises on Fatigue levels, Mental Well- Being & Mindfulness in Cardiac Rehab Phase 2. It was an Randomized control trail (RCT) conducted at Rawalpindi Institute Of Cardiology from September 2020 to December 2020 .Total 106 post CABG patients with diagnosed depression (mild/moderate) were enrolled of age between 35-60 years. The participants were randomly allocated into two groups. The group A underwent Treadmill walking with mild intensity and group B underwent Treadmill walking with moderate intensity for 6 weeks. Assessments were done at pre and post level of intervention .The functional capacity was measured by 6MWT before any intervention .The outcome measures and study tools were Multidimensional assessment of fatigue (MAF), Fatigue Severity Scale (FSS), Warwick Edinburgh mental Well- being scale (WEMWBS), Mindfulness attention awareness scale (MAAS). The age of Group A was (57.60 ±2.23) years and of Group B was (49.15±3.67) years. The values of PHQ-9 scale were significant with p value < 0.05. The values of MAF score, WEMWBS score, MAAS score and FSS score were non- significant with p value > 0.05. In the case of vitals, the values of RR and HR were significant with p vale < 0.05. In the case of lipid profile only the values of triglycerides were significant with p value < 0.05. The values of Borg scale were non –significant with p value > 0.05. The values of ejection fraction were also significant with p vale < 0.05. The effects of different intensities of continuous aerobic exercises on fatigue, mental well-being and mindfulness were found effective in both groups.

Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(6), 1029-1040 | ISSN:2251-6727

INTRODUCTION

Myocardial infarction also called as heart attack which results when flow of blood reduced to the chamber of heart thus cause detriment of heart. The most standard sign and symptoms are chest shooting pain and pain radiating to left shoulder, arm or jaw. Mainly it happens in the middle and on the leftward part of chest. This unpleasant feeling may felt like burning sensations in chest. Further sign and symptoms constitute dyspnea, nauseating feeling, fainting and cold sweat out. Mostly atypical symptoms are found in women as compared to men. The myocardial infarction might cause irregular heartbeat, heart failure, cardiac arrest or cardiogenic shock in some cases. Mostly the disease of coronary artery is the main reason of MI seen in majority of world's population. There is a complete blockage of coronary artery (blood supply to heart) due to of thrombus of cholesterol plaque formed in coronary artery and it is the mechanism of an MI in most of the case. Blood supply either reduced or completely finished to the chamber of heart leads to the muscle damage .There are other risk factors too which include high blood pressure both systolic and diastolic BP, obesity, diabetes, smoking, inadequate exercise, raised level of cholesterol in blood and excessive alcohol intake (2) The myocardial infarction is due to CAD which is the main reason of death in advanced and advanced areas of the world. With the introduction of coronary care units and earlier reperfusion therapy , the mortality rates has been decreased in hospital leads to better effects in survived persons having MI. There are certain ailments of MI which involve early pericarditis and post MI syndrome in addition to thrombus in ventricle. With the main awareness of complexities that is included in the post infarction time and the associated remedial syndromes will guide and help a physician to evaluate and treat that problem in particular (3) World Health Organization had play a vital part in the formation of main and foremost criterias for the prognosis of coronary heart disease and myocardial infarction. The independent level of diagnosis and prognosis of MI is most vital and had main consequence on biological and mental health of person and also to the whole family members (4)

Literature review: A study was conducted by Hendrik Moths et all with the aim to determine the effect of aerobic exercises on mindfulness in men. It was Randomized control trial type of study. In the study he worked on dispositional mindfulness and included men population only. He assessed dispositional mindfulness, mental and physical health before and after intervention by the help of self-report questionnaires and concluded that regular aerobic exercises increase dispositional mindfulness and also mentioned that changes in dispositional mindfulness are related to changes in mental health (81) Another study was conducted with the aim to determine effect of moderate intensity aerobic exercise on depression in CHF population. The study done by Walid Kamal et all .They included 46 patients with CHF who suffered from depression then they were randomly classified in two group. At last they concluded that the study group who underwent moderate-intensity aerobic exercise had a greater decrease in the depression status of CHF patients when compared to the control group (1) One more study was done by McCann I. L with the aim to determine effect of aerobics on depression. They included 43 women in their study with diagnosed depression. They assigned aerobic exercise treatment like any strenuous exercise the participants' aerobic capacity was assessed before and after 10 week of intervention. They concluded that participants enrolled in strenuous aerobic exercise program showed improvement and were considered effective for reducing depression (82) a study was conducted by Jennifer Moses, Andrew Steptoe et all with the aim to determine mental well- being on general population by the help of exercise. It was randomized control trail type of study. They compared the effects of two aerobic training programs of different intensities on mood and mental well-being. Total 109 sedentary adults were included in study. At the end of study they concluded that psychological benefits were seen with the moderate exercise condition but not in the high exercise. (83) Another study was conducted by Sylvia R., Cramer and colleagues with the aim to determine the effect of moderate aerobic exercise training and its effect on mental well-being in women. They included 35 mild obese sedentary women. The intervention was moderate intensity exercise training each group. At the end there was an improvement in submaximal cardiorespiratory fitness. Exercise training also had a significant effect on frequency. The Mood States scores were not significantly related to exercise training. Overall they concluded that there was improvement seen in general psychological well- being with exercise training (84) one more study done by Gaeini. AA to determine effects of continuous aerobic exercises and interval training in bypass patients, they conducted study on 30 post CABG male patients. They concluded that both training programs were equally effective on RPP in patients after CABG surgery by enhancing efficiency of myocardium and its metabolic demands, but Aerobic interval training program is more effective (85) A study was conducted by Trine T.Moholdt and his colleagues. The aim of their study to compare two different exercise trainings after bypass surgery.

Research Gap:

In accessible literature, limited studies were found on effects of continuous aerobic exercises of mild and

Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(6), 1029-1040 | ISSN:2251-6727

moderate intensities in CABG patients.

Significance of Study:

In different studies the Continuous Aerobic exercises show beneficial effects on fatigue level, mental well-being and mindfulness in different diseases however, there is limited accessible literature on effects of different intensity aerobic exercises on fatigue level, mental being-being and mindfulness in cardiac rehab phase 2. In cardiac Rehabilitation, the main emphasis of therapist is to improve physical functioning of patient without consideration of well-being and mindfulness of patient. The objective of current study is to determine the effects of mild and moderate intensities of Continuous Aerobic Exercises on Fatigue levels, Mental Well- Being & Mindfulness in Cardiac Rehab Phase 2.

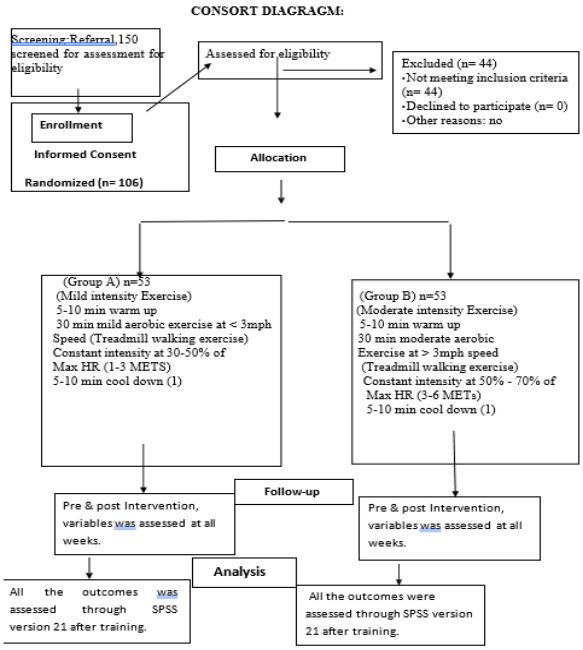

Figure 2: CONSORT Diagram

Activities to Achieve 2008 Exercise Guideline Recommendations

Moderate-Intensity Aerobic Activities >150 min/week	Vigorous-Intensity Aerobic Activities >75 min/week
Brisk walking (>3 miles/h)	Uphill walking or race walking
Bicycling (<10 miles/h)	Bicycling (>10 miles/h)
Water aerobics	Running or jogging
Tennis (doubles)	Tennis (singles)
Ballroom dancing	Aerobic dancing
General gardening	Heavy gardening (digging/hoeing)

From the Centers for Disease Control and Prevention guidelines (12).

Figure 3: Activity Intensities

Moderate-intensity Physical Activity (Approximately 3-6 METs)	Vigorous-intensity Physical Activity (Approximately >6 METs)
Requires a moderate amount of effort and noticeably accelerates the heart rate.	Requires a large amount of effort and causes rapid breathing and a substantial increase in heart rate.
Examples of moderate-intensity exercise include:	Examples of vigorous-intensity exercise include:
• Brisk walking	• Running
• Dancing	• Walking / climbing briskly up a hill
• Gardening	• Fast cycling
• Housework and domestic chores	• Aerobics
• Traditional hunting and gathering	• Fast swimming
• Active involvement in games and sports with children / walking domestic animals	• Competitive sports and games (e.g. Traditional Games, Football, Volleyball, Hockey, Basketball)
• General building tasks (e.g. roofing, thatching, painting)	• Heavy shovelling or digging ditches
• Carrying / moving moderate loads (<20kg)	• Carrying / moving heavy loads (>20kg)

Figure 4: Different Activities

MATERIALS AND METHODS

DATA COLLECTION PROCEDURE:

After Taking consent from all the Participants, their physical function was assessed through 6-minute walk test at the baseline either they can take part in aerobic exercise or no not then they were assessed pre intervention (Before cardiac rehab phase 2) and post intervention (after aerobic exercises) by using the tools mentioned below. At baseline PHQ-9 Scale was used for screening of patients for inclusion and at post intervention level it was reassessed to check whether there was improvement in PHQ-9 score or not. Fatigue was assessed by Multidimensional assessment of fatigue (MAF) and Fatigue Severity Scale (FSS). Mental well-being was assessed by The Warwick Edinburgh mental Well- being scale (WEMWBS), Mindfulness was assessed by Mindfulness attention awareness scale (MAAS). Patients Ejection fraction was assessed pre (Day1) and post intervention (on the basis of Echocardiography and Lipid Profile through Blood Serum was also Assessed at Baseline and After 6 weeks of Interventions. Level of dyspnea and vitals (include Heart rate, blood pressure, respiratory rate, oxygen saturation) were assessed at pre- and post-intervention thrice a week for all 6 weeks. And then all the Data was assessed on SPSS 21 Version.

INTERVENTION: Continuous Aerobic exercises was performed with mild (Constant intensity at 30-50% of max HR) and moderate (Constant intensity at 50% - 70% of max HR) intensities.

Experimental Group A

Continuous Aerobic Mild Intensity Exercise

Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(6), 1029-1040 | ISSN:2251-6727

5-10 min warm up

30 min moderate aerobic exercise (Treadmill walking exercise)

Treadmill speed < 3 mph

Constant intensity at 30-50% of max HR (1-3 METS)

5-10 min cools down

Experimental Group B

Continuous Aerobic Moderate Intensity Exercise

5-10 min warm up

30 min mild aerobic exercise (Treadmill walking exercise)

Treadmill speed > 3mph (4mph)

Constant intensity at 50-70 % of max HR (3-6 METS)

5-10 min cools down

STATISTICAL ANALYSIS: The statistical analysis of both groups. Group A and Group B were carried out by using SPSS version 21 in order to determine significance of intervention used in both groups. Normality of data was checked by applying Shapiro-Wilk test. After determining the Normality of data, the Non-parametric test was analyzed by SPSS version 21 as the obtained p-value was < 0.05 in majority of the variables used in current study. Mann-Whitney test was also used for in between group analysis.

RESULTS

Total 106 patients participated in current study. There were two groups included Group A (mild intensity) and Group B (moderate intensity).Total 53 patients of both gender were included in each group (Table 1).The mean age of Group A was 57.6 ±2.23 and Group B was 49.1 ±3.67 (Table 1). There were 33 males and 20 females in Group A while 36 males and 17 females were in group B (Table 2). In Group A, the Mean height was 168.61 ±7.27 cm and in Group B the Mean height was 167.9 ±4.67 (Table 1). The Mean weight in Group A was 66.81 ±6.61kg and in Group B it was 66.73 ±5.98 kg (Table 1). The participants had different occupations. In both Groups majority participants were housewives and shopkeepers. The housewives with 34% in Group A and 28.3% in Group B, In the same way shopkeepers with 22.6% in Group A and 32.1% in Group B (Table 3)After intervention of 6 weeks no significant difference observed between groups in MAF scores with p value 0.696(Table 4). No significant difference seen between groups in FSS scores with p value 0.489(Table 4). Likewise, no significant difference seen between groups in WEMWBS scores with p value 0.829(Table 4), Similarly, MAAS scores were observed non-significant in both groups with p value 0.087(Table 4) There was significant difference observed between groups in PHQ-9 scores with p value 0.006(Table 4). The 6MWT scores were observed significant with p value 0.000 (Table 7). The scores of EF in both groups were significant with p value 0.000(Table 6). In the case of lipid profile, the scores of cholesterol, HDL and LDL were found non-significant in both groups with p value 0.691, 0.547 and 0.147 (Table 6) respectively. Only the result of triglycerides was found significant in both groups with p value .020(Table 6). In the case of vitals, the scores of RR and HR were seen significant in both groups with p value 0.000 and 0.006(Table 5). The results of BP were non- significant in both group with systolic p value 0.560 and diastolic p value 0.670(Table 5). The spo2 scores were also observed non-significant in both groups with p value 1.00(Table 5). No significant difference

Table 1 Demographic data of Post CABG patients of Group A and Group B in terms of Age, Height and Weight.

Variable Name	Group A (n=53) Mean ± SD	Group B (n=53) Mean ± SD
Age (Years)	57.60 ±2.23	49.15 ±3.67
Height	168.61±7.27	167.90±4.67

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(6), 1029-1040 | ISSN:2251-6727

Weight	66.81±6.61	66.73±5.98

Table 2 Demographic data of Post CABG patients of Group A and Group B in terms of Gender.

Variable Name Gender	Group A (n=53) Frequency (%)	Group B (n=53) Frequency (%)
Male	33 (62.3%)	36 (67.9%)
Female	20 (37 %)	17 (32.1)

Table 3 Demographic data of Post CABG patients of Group A and Group B in terms of Occupation.

Variable Name Occupation	Group A %age	Group B %age
Business	7.5%	17%
Farmer	1.9%	0
Housewife	34%	28.3%
Jobless	13.2%	9.4%
Retired	11.3%	1.9%
Shop	22.6%	32.1%
Teacher	5.7%	5.7%
Police	0	1.9%
Driver	0	3.8%

Table 4 Man-Whitney U test for PHQ-9 Scale, MAF Scale, WEMWBS Scale, MAAS Scale and FSS Scale for Group A and Group B at Baseline and after week 6.

Variable Name	Group A (n=53) Median (IQ)	Group B (n=53) Median (IQ)	Man Whitney U Test (P Value)

Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(6), 1029-1040 | ISSN:2251-6727

PHQ9 Score	**Baseline**	2(0)	3(0)	0.000
	Week 6	1(0)	1(1)	0.006
MAF Score	**Baseline**	99(26.5)	95(23)	0.467
	Week 6	30(7)	32(5)	0.696
WEMWBS Score	**Baseline**	40(21)	36(24)	0.849
	Week 6	65(10)	66(23)	0.829
MAAS Score	**Baseline**	81(18)	90(3)	0.001
	Week 6	90(3)	90(1)	0.087
FSS Score	**Baseline**	59(5)	55(3)	0.000
	Week 6	16(6)	17(3)	0.489

Table 5 Man-Whitney U test for Heart Rate, Respiratory Rate, Systolic BP, Diastolic BP and Spo2 for Group A and Group B at Baseline and after week 6.

Variable Name		**Group A (n=53) Median (IQ)**	**Group B (n=53) Median (IQ)**	**Man Whitney U Test (P Value)**
HR	**Baseline**	76(9)	80(14)	0.000
	Week 6	78(6)	88(14)	0.006
RR	**Baseline**	18(5)	20(4)	0.181
	Week 6	18(4)	21(2)	0.000
Systolic BP	**Baseline**	120(0)	120(0)	0.987
	Week 6	120(0)	120(0)	0.560
Diastolic BP	**Baseline**	80(0)	80(0)	0.046
	Week 6	80(0)	80(0)	0.670
	Baseline	98(0)	98(0)	0.004

Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(6), 1029-1040 | ISSN:2251-6727

SPO2	**Week 6**	98(0)	98(0)	1.00

Table 6 Man-Whitney U test for Cholesterol, HDL, LDL, Triglycerides and EF for Group A and Group B at Baseline and after week 6

Variable Name		**Group A (n=53) Median (IQ)**	**Group B (n=53) Median (IQ)**	**Man Whitney U Test (P Value)**
Cholesterol	**Baseline**	186(87)	189(77)	0.887
	Week 6	184(86)	180(69)	0.691
HDL	**Baseline**	50(34)	47(18)	0.204
	Week 6	184(86)	50(20)	0.547
LDL	**Baseline**	120(58)	135(62)	0.016
	Week 6	128(58)	131(64)	0.147
Triglycerides	**Baseline**	140(67)	198(189)	0.018
	Week 6	140(80)	190(176)	0.020
EF	**Baseline**	45(5)	50(15)	0.000
	Week 6	45(5)	50(15)	0.000

Table 7 Man-Whitney U test for Borg Scale and 6MWT for Group A and Group B at Baseline and after week 6.

Variable Name		**Group A (n=53) Median (IQ)**	**Group B (n=53) Median (IQ)**	**Man Whitney U Test (P Value)**
Borg Scale	**Baseline**	13(2)	15(0)	0.000
	Week 6	11(0)	11(0)	0.062
6MWT	**Baseline**	200(50)	200(0)	0.148
	Week 6	200(60)	280(60)	0.000

Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(6), 1029-1040 | ISSN:2251-6727

DISCUSION

Cardiac rehabilitation was designed to return patients to prior level of functioning after any cardiac event like myocardial infarction (MI).It is an important tool to assure quality to patients live and thus give meaningful survival.(90) Cardiac Rehab Phase II consist of 6-8 weeks. It involves exercises with help of equipment's like recumbent bike, upper and lower body ergometer, treadmill etc.(31) The main goals of this phase is to improve cardiac risk factor modification, patient education and support the patient. Intensity will increase over a varying period of time depending on diagnosis and exercise program. (32)Exercise intolerance is one of the reasons of fatigue and dyspnea in chronic heart failure patients due to significant skeletal muscle atrophy and metabolic abnormalities. (91) Exercise intolerance is one of the reasons of reduced quality of life in elderly heart failure patients. It is due to reduced cardiac output and reduced vo2 difference seen in older heart failure subjects. A-Vo2 reverse is independent predictor of peak Vo2 and its reduction reduced aerobic capacity suggested reduced both cardiac output and ejection fraction.(92) There is low peak Vo2 difference seen in heart failure patients due to following reasons like impaired peripheral vascular function (endothelial dysfunction, abnormal vasodilation, reduced muscle blood flow, muscle oxygen diffusional conductance) and/or musculoskeletal function (skeletal muscle atrophy, reduced mitochondrial and capillary density.(92) With proper exercise training in cardiac rehabilitation we can improve cardiorespiratory fitness thus improve peripheral vascular and skeletal muscle function result in increased A-V02 difference and peak Vo2.(93) Physical activity is helpful in the management of fatigue in a way that regular exercise training have beneficial effects on patients with fatigue due to cardiac pathologies.(65) Cardiac rehabilitation play a vital role in lessening the fatigue so it should be identified at early stages and treated to reduce its severity.(66) The cardiac rehabilitation for an extended period show long term improvement in fatigue level hence little effect on functional capacity of person.(67) A study was done by Bunny Pozehl and et al in 2008 with the aim to determine the effects of exercise training on fatigue and shortness of breath in persons having failure of heart and they also wanted to determine physiological benefits of exercise training for heart failure patients .A 24 weeks exercise training was done on subjects of heart failure and they concluded that exercise group showed significant decrease in fatigue. The results of the study showed beneficial effects of exercise on fatigue and dyspnea level. Both fatigue and dyspnea were seen reduced in the exercise subjects. (94) A study was conducted in 2008 by Susan barnason and et al on relationship between fatigue and early postoperative recovery outcomes over time in elderly patients undergoing coronary artery bypass graft surgery. The fatigued subjects had significant impaired psychosocial functioning and they concluded that persistent fatigue reduces early recovery after CABG surgery. Hence this literature showed that fatigue level of patients must be considered post operatively (post CABG) and fatigue must be addressed early for active recovery of patients(95) In the current study, post CABG patients were given intervention for 6 weeks duration to address their fatigue levels. I recorded changes in MAF and FSS scores. No significant difference seen in MAF and FSS scores in both groups with p value ($p > 0.05$). Both mild and moderate intensity exercises showed improvement in exercise capacity of post CABG patients thus reduced fatigue. Current study subjects also showed significant difference in 6MWT with p value 0.000 due to improved exercise capacity in cardiac rehabilitation, phase2.

Many of the patients face mild or moderate depression post operatively after bypass surgery (post CABG). Depression leads to fatigue and persistent fatigue cause hurdle in active recovery. It is important to address post CABG depression. An RCT was conducted in 2009 by Bruce L.Rollman et al. with the aim to determine effects of telephonic care which was a collaborative care for the treatment of depression in persons having bypass surgery. Collaborative care was provided on telephone for 8 months by nurses, psychiatrist and primary care physicians and they concluded that their intervention improved mental health related quality of life, physical functioning and mood symptoms. (96) Determine mental well-being of persons. A study was conducted by Patrick Mueller and et.al in 2020 with the purpose to determine the effects of home confinement on mental health during the pandemic COVID-19. Psychological effects were studied. It was a multicenter study; they used WEMWBS scale to address mental health or mental well-being of persons and concluded increased psychosocial strain triggered by home confinement that may lead to high risk mental disorders. (97) In the current study, I used WEMWBS scale to consider mental well-being of post CABG patients after intervention of 6 weeks and concluded that no significant difference seen between groups in WEMWBS scores with p value 0.829. This non significance is due to changed population. Trait mindfulness is linked with mental well-being. Intentional attention and awareness is key component of trait mindfulness and is measured by Mindful attention and awareness scale (MAAS).(98) A lot of studies conducted in the past used MAAS scale to determine mental attention and awareness in individuals. A study was conducted by Tanya S. Watford and her colleagues in 2019 with-it the aim to determine the benefits of using mindful attention awareness (MAAS) scale on certain

Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(6), 1029-1040 | ISSN:2251-6727

population. The study investigated relationship between MAAS and cardiovascular reactivity to two lab stressors and concluded higher scoring on MAAS scale.(98) There was no enough literature found on the use of MAAS scale in post CABG patients. In the current study the MAAS scores were observed non-significant in both groups with p value 0.087. This non significance is also due to changed population. A study was conducted in 2018 by Vitale and et.al with the purpose to determine value of 6MWT in persons having valve surgery. The main aim of their study was to evaluate the prognostic relevance of 6-min walk test (6MWT) in patients admitted to an in-hospital cardiovascular rehabilitation program after open-heart valve surgery. Walking capacity They concluded significant difference in 6MWT in PCI group with p value (<0.001) but not in CABG group using correlational analysis between 6MWT and peak Vo2 with no significant effects of cardiac rehabilitation in PCI group. Cardiac rehabilitation was found significant in CABG group (p value) 0.0072. Hence cardiac Rehabilitation was found advantageous for both groups in terms of exercise capacity, cardiorespiratory function and autonomic nervous system modulation but CABG patients showed most improvement .(100) In the current the 6MWT scores were observed significant with p value 0.000. The same results obtained due to similar duration and conducted in cardiac rehabilitation setup. Another study was conducted in 2019 by Birna, R Nebel and et all with the aim to determine cardiovascular rehabilitation in persons having reduced ejection fraction in persons having heart failure. It was an RCT and inducted patients of heart failure with EF= ≤40% with follow up of ≥ 6 months. There was no association seen between exercise based cardiac rehabilitation with improved EF. No effect on mortality rate also seen hence cardiac rehabilitation improved exercise capacity and quality of life.(101) . In current study the scores of EF in both groups were significant with p value 0.000 that is may be due to involvement of different intensities of continuous aerobic exercises. In the case of lipid profile, a study was done by Nathaniel and his colleague's in2016 with the aim to determine effects of moderate intensity exercise for 90 min and its efficacy on triglycerides in older adults". The main aim of their study was to determine the effect of moderate intensity exercise training on level of triglycerides in older subjects. A study was conducted by V.Stoickov with his colleagues in 2019. Their aim was to determine impact of exercise training on arterial blood pressure, QT dispersion, cholesterol and physical exercise capacity in patients after coronary artery bypass graft surgery. The intervention included gymnastic exercises, ergometry and walking. They concluded that exercise training reduced BP, HR, cholesterol along with improved physical exercise capacity which had beneficial effects in prognosis of post CABG patients(104) In current study in case of vitals the scores of blood pressure were non- significant along with RR and HR were seen significant in both groups with p value 0.000 and 0.006 due to normal physiological response, in moderate intensity continuous aerobic exercise training the RR and HR were found increased due to increased speed and intensity of treadmill i-e >3mph speed and 50-70% of max HR intensity with (3-6 METs) activity. The results of BP were non-significant in both group with systolic p value 0.560 and diastolic p value 0.670 that is may be due to one intervention that was treadmill walking. The spo2 scores were also observed non- significant in both groups with p value 1.00. A study was done in 2004 by J. David Branch and his colleagues.

CONCLUSION

The study concluded that there is no statistical difference found between both groups (Group A and Group B) for Fatigue, Mental Well-Being and Mindfulness however, depression PHQ-9 Scale was found to be improved after intervention at week 6 between both groups.

Recommendations:

Continuous aerobic exercises of different intensities must be considered for other populations too like for valvular heart surgery patients and the time duration can be extended for more benefit

REFERENCES

1. Abdelbasset, W. K., & Alqahtani, B. A. (2019). A randomized controlled trial on the impact of moderate-intensity continuous aerobic exercise on the depression status of middle-aged patients with congestive heart failure. *Medicine*, *98*(17), e15344.

2. Castelli, W. P. (1984). Epidemiology of coronary heart disease: the Framingham study. *The American journal of medicine*, *76*(2), 4-12.

3. Mullasari, A. S., Balaji, P., & Khando, T. (2011). Managing complications in acute myocardial infarction. *J Assoc Physicians India*, *59*(12), 43-8.

4. World Health Organization. (2002). *The world health report 2002: reducing risks, promoting healthy life*. World Health Organization.

5. Frangogiannis, N. G. (2011). Pathophysiology of myocardial infarction. *Comprehensive Physiology*, *5*(4), 1841-1875.

6. Nordin Fredrikson, G., Hedblad, B., Berglund, G.,

& Nilsson, J. (2003). Plasma oxidized LDL: a predictor for acute myocardial infarction?. *Journal of internal medicine*, *253*(4), 425-429.

7. Dutta, P., Courties, G., Wei, Y., Leuschner, F., Gorbatov, R., Robbins, C. S., ... & Nahrendorf, M. (2012). Myocardial infarction accelerates atherosclerosis. *Nature*, *487*(7407), 325-329.

8. Burke, A. P., & Virmani, R. (2007). Pathophysiology of acute myocardial infarction. *Medical Clinics of North America*, *91*(4), 553-572.

9. Yam, N., Au, T. W. K., & Cheng, L. C. (2013). Post-infarction ventricular septal defect: surgical outcomes in the last decade. *Asian Cardiovascular and Thoracic Annals*, *21*(5), 539-545.

10. Allender, S., Scarborough, P., Peto, V., Rayner, M., Leal, J., Luengo-Fernandez, R., & Gray, A. (2008). European cardiovascular disease statistics. *European Heart Network*, *3*, 11-35.

11. Madesis, A., Tsakiridis, K., Zarogoulidis, P., Katsikogiannis, N., Machairiotis, N., Kougioumtzi, I., ... & Zarogoulidis, K. (2014). Review of mitral valve insufficiency: repair or replacement. *Journal of thoracic disease*, *6*(Suppl 1), S39.

12. Munyombwe, T., Lovelace, R., Green, M., Norman, P., Walpole, S., Hall, M., ... & Gale, C. P. (2020). Association of prevalence of active transport to work and incidence of myocardial infarction: A nationwide ecological study. *European Journal of Preventive Cardiology*, *27*(8), 822-829.

13. de Cardiología, S. A. (2012). Consenso de prevención cardiovascular. *Rev Argent Cardiol*, *80*(Supl 2), 1-127.

14. Yusuf, S., Sleight, P., Held, P., & McMahon, S. (1990). Routine medical management of acute myocardial infarction. Lessons from overviews of recent randomized controlled trials. *Circulation*, *82*(3 Suppl), II117-34.

15. Khatib, R., Patel, N., & Hall, A. S. (2020). The my experience of taking medicines (MYMEDS) questionnaire for assessing medicines adherence barriers in post-myocardial infarction patients: development and utility. *BMC cardiovascular disorders*, *20*(1), 1-11.

16. Jing, Z. C., Zhu, H. D., Yan, X. W., Chai, W. Z., & Zhang, S. (2020). Recommendations from the Peking Union Medical College Hospital for the management of acute myocardial infarction during the COVID-19 outbreak.

17. Herzog, C. A., Ma, J. Z., & Collins, A. J. (2002). Comparative survival of dialysis patients in the United States after coronary angioplasty, coronary artery stenting, and coronary artery bypass surgery and impact of diabetes. *Circulation*, *106*(17), 2207-2211.

18. Herzog, C. A., Ma, J. Z., & Collins, A. J. (2002). Comparative survival of dialysis patients in the United States after coronary angioplasty, coronary artery stenting, and coronary artery bypass surgery and impact of diabetes. *Circulation*, *106*(17), 2207-2211.

19. Tailor, S., & Borude, S. (2019). Knowledge, attitude and self-reported practices regarding cardiac rehabilitation among post CABG patients. *Age (in years)*, *45*(50), 19.

20. World Health Organization. (1993). *Rehabilitation after cardiovascular diseases, with special emphasis on developing countries: report of a WHO expert committee [meeting held in Geneva from 21 to 18 October 1991]*. World Health Organization.

21. Mampuya, W. M. (2012). Cardiac rehabilitation past, present and future: an overview. *Cardiovascular diagnosis and therapy*, *2*(1), 38.

22. Antypas, K., & Wangberg, S. C. (2014). Combining users' needs with health behavior models in designing an internet-and mobile-based intervention for physical activity in cardiac rehabilitation. *JMIR research protocols*, *3*(1), e2725.

23. Oldridge, N. B., Guyatt, G. H., Fischer, M. E., & Rimm, A. A. (1988). Cardiac rehabilitation after myocardial infarction: combined experience of randomized clinical trials. *Jama*, *260*(7), 945-950.

24. Balady, G. J. (2007). American Heart Association Exercise, Cardiac Rehabilitation, and Prevention Committee, the Council on Clinical Cardiology; American Heart Association Council on Cardiovascular Nursing; American Heart Association Council on Epidemiology and Prevention; American Heart Association Council on Nutrition, Physical Activity, and Metabolism; American Association of Cardiovascular and Pulmonary Rehabilitation. Core components of cardiac rehabilitation/secondary prevention

programs: 2007 update: a scientific .... *Circulation*, *115*, 2675-2682.

25. Sethi, P. S., Nance, J., Johnson, D., Wilke, J., Wilson, K., Hall, R., ... & Morrison, D. A. (2003). A comprehensive cardiac rehabilitation program in post-CABG patients: a rationale and critical pathway. *Critical Pathways in Cardiology*, *2*(1), 20-33.

26. Main, E., & Denehy, L. (Eds.). (2016). *Cardiorespiratory physiotherapy: adults and paediatrics: formerly Physiotherapy for Respiratory and Cardiac problems*. Elsevier Health Sciences.

27. St-Pierre, M. (2018). *Impact d'un programme de réadaptation sur la condition physique de patients coronariens* (Doctoral dissertation, Université du Québec à Chicoutimi).

28. Ades, P. A., Keteyian, S. J., Balady, G. J., Houston-Miller, N., Kitzman, D. W., Mancini, D. M., & Rich, M. W. (2013). Cardiac rehabilitation exercise and self-care for chronic heart failure. *JACC: Heart failure*, *1*(6), 540-547.

29. Clark, R. A., Conway, A., Poulsen, V., Keech, W., Tirimacco, R., & Tideman, P. (2015). Alternative models of cardiac rehabilitation: a systematic review. *European journal of preventive cardiology*, *22*(1), 35-74.

30. Brørs, G., Pettersen, T. R., Hansen, T. B., Fridlund, B., Hølvold, L. B., Lund, H., & Norekvål, T. M. (2019). Modes of e-Health delivery in secondary prevention programmes for patients with coronary artery disease: a systematic review. *BMC health services research*, *19*, 1-24.

31. Depression, C. (2003). Effects of treating depression and low perceived social support on clinical events after myocardial infarction. *JAMA*, *289*, 3106-3116.

32. Achttien, R. J., Staal, J. B., van der Voort, S., Kemps, H. M. C., Koers, H., Jongert, M. W. A., ... & Practice Recommendations Development Group. (2013). Exercise-based cardiac rehabilitation in patients with coronary heart disease: a practice guideline. *Netherlands heart journal*, *21*, 429-438.

33. American College of Sports Medicine. (2013). *ACSM's guidelines for exercise testing and prescription*. Lippincott williams & wilkins.

34. Arthur, H. M., Smith, K. M., Kodis, J., & McKelvie, R. (2002). A controlled trial of hospital versus home-based exercise in cardiac patients. *Medicine & Science in Sports & Exercise*, *34*(10), 1544-1550.

35. Sharma, R., & McLeod, A. A. (2001). Cardiac rehabilitation after coronary artery bypass graft surgery: its effect on ischaemia, functional capacity, and a multivariate index of prognosis. *Coronary health care*, *5*(4), 189-193.

36. Blair, S. N., & Morris, J. N. (2009). Healthy hearts—and the universal benefits of being physically active: physical activity and health. *Annals of epidemiology*, *19*(4), 253-256.

37. Brown, M. D. (2003). Exercise and coronary vascular remodelling in the healthy heart. *Experimental physiology*, *88*(5), 645-658.

38. Gielen, S., Schuler, G., & Hambrecht, R. (2001). Exercise training in coronary artery disease and coronary vasomotion. *Circulation*, *103*(1), e1-e6.

39. Bruning, R. S., & Sturek, M. (2015). Benefits of exercise training on coronary blood flow in coronary artery disease patients. *Progress in cardiovascular diseases*, *57*(5), 443-453.

40. Goldberg, A. P., Geltman, E. M., Gavin, III, J. R., Carney, R. M., Hagberg, J. M., Delmez, J. A., ... & Harter, H. R. (1986). Exercise training reduces coronary risk and effectively rehabilitates hemodialysis patients. *Nephron*, *42*(4), 311-316.

41. Rehman, M., Ahmad, U., Waseem, M., Ali, B., & Tariq, M. I. (2023). Effects of exercise training in patients with lung cancer during chemotherapy treatment. *The Malaysian Journal of Medical Sciences: MJMS*, *30*(2), 141.

42. Kiran, T., Waseem, M., Batool, P., Iftikhar, M., Suleman, R., Fatima, S. M., ... & Rehman, M. (2024). To Evaluate The Effect Of Prehabilitation Programme On The Quality Of Recovery In Pre-Infirmity And Infirm (Frail) Patients Undergoing Heart Valve Surgery.

43. Noora, U., Waseemb, M., Yaqoobc, N., Ahmadd, U., Rehmane, M., & Khand, D. A. (2024). Translation and cross-cultural adaptation of the Leicester Cough Questionnaire into Urdu: A descriptive study.

44. Waseem, M., Tariq, M. I., & Yaqoob, N. (2019). Effect of lower cycle ergometer on functional capacity of patients with dilated cardiomyopathy. *Rawal Medical Journal*, *44*(3),

465-476.

45. BUTT, M. W., YASMEEN, R., KHALIQUE, A., KHALID, S., ANWAR, K., & ARSHAD, H. Cardiac Diseases among Children and its Impact on Family: a Cross Sectional Survey.

46. Mehwish, W., Naveed, Y., Muhammad, T., Muhammad, R., & Imran, A. (2018). Effects of lower limb cycle training on echocardiographic parameters of left ventricle in dilated cardiomyopathy patients.