

EFFECTS OF CARDIOPULMONARY CONDITIONING ON BODY MASS INDEX, PHYSICAL ACTIVITY AND GENERAL PSYCHOLOGICAL HEALTH OF YOUNG ADULTS

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Contribution

MMAA conceived the idea and designed the study. Data collection was done by SQ and HT while FAS did final review. All authors contributed equally to the submitted manuscript.

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ABSTRACT

Objective: To determine the effects of cardiopulmonary conditioning on body mass index (BMI), physical activity (PA), and general psychological health of healthy young adults and their interrelationship.

Methodology: A quasi-interventional study was conducted in Pakistan Railway Hospital, Rawalpindi from February to July 2017. A total of 97 healthy young adults who sustained moderate physical exertion were selected through non-probability convenient sampling to perform cardiopulmonary conditioning exercises for 12 weeks at moderate intensity. Individuals with any systemic disease were excluded. The pre and post levels of PA, general psychological health and BMI were assessed through International Physical Activity Questionnaire (IPAQ), General Health Questionnaire (GHQ-12) and BMI formula respectively and performed statistical analysis on SPSS 20 software.

Results: We recruited 97 participants; mean age was 23.40 ± 2.29 years. Majority, around 74% of the participants were females. The descriptive analysis showed that 73.2 % participants were minimally active before the intervention that improved to 0.0 % after the intervention. No participant was HEPA active before intervention that significantly improved to 38.1 %. In the pre-intervention, 87.6 % participants were overweight and 12.4 % participants were obese where as in post-intervention, 85.6 % participants had normal weight and 14.4 % participants were overweight. The Wilcoxon Signed Rank Test revealed significant improvement in all outcome measures ($p = 0.001$). The Spearman's Correlations of PA and general psychological health and PA and BMI was demonstrated as -0.262 ($p = 0.01$) and -0.081 ($p = 0.431$) respectively.

Conclusion: Cardiopulmonary conditioning is an effective approach for improving BMI, general psychological health and physical activity. With higher levels of PA general psychological health improves unlike BMI that does not have any significant relation with PA.

Key Words: Mental illness, Obesity, Physical Inactivity.

INTRODUCTION

The environment in which we sit or move has been evolving quickly and is transforming into sedentary life style and these modifications that include adjustments in transportation, communication, working environment and modern household inventions have essentially been associated with lessened levels of physical activity.¹ We are investing expanding measures of time in situations that not just limit our physical activity levels but lengthen sitting in our ergonomics.² So, Sedentary behaviors have emerged as a new focus for research on physical activity and health.³ Physical inactivity is evaluated similar to the main source for roughly 21–25% of cancer load, 27% of diabetes and around 30% of ischemic heart disease.⁴ Physical inactivity is well regarded as curable risk factor for mental illness as well as many other disease conditions such as modifiable risk factor for depression and other non-communicable diseases e.g. ischemic heart diseases, diabetes, cerebrovascular accidents and high risk obesity.⁵

The energy imbalance causes obesity as the amount of calorie intake is much more than the amount of calorie burnt. The number of calories burnt each day depends upon many factors such as age, body size and genetics. But the most easily identified factor is the amount of physical activity per day. Staying active with regular aerobic exercise can help person to stay healthy with a normal body mass index.^{6,8} The most important step to being healthy is to be physically active.^{6,7} Though systematic research on the topic did not begin for a long time. Early researches concluded that people in active line of work had small rates of cardiac disease than people in inactive line of work. The present test is to create projects and researches to advance physical exercise for all in our undeniably sedentary environment.^{7,8}

Cardiopulmonary conditioning exercises have a significant impact on general psychological health as many cross-sectional reviews have dependably related high level of successive physical exercise with better mental prosperity and good general psychological health.⁹

The youth of today is the leader of tomorrow, if they will not engage themselves in cardiopulmonary conditioning exercises, they will not be able to run the nation efficiently.¹⁰ By obtaining results on these we can provide recommendation to the young adults to improve their health, lifestyle and find themselves in a much better condition of living and side by side this study supplements the literature available across the world regarding physical inactivity and sedentary behaviors in young adults. The aim of the study was to find the effects of cardiopulmonary endurance training on body mass index (BMI), physical activity and general psychological health in young adults.

METHODOLOGY

A quasi-interventional study was conducted in Riphah IIMCT Pakistan Railway Hospital, Rawalpindi in 2017. Participants were assessed for eligibility with an inclusion criteria i.e. normal healthy individual aged between 18 to 30 years qualifying pre-intervention test to sustain moderate physical exertion on BORG scale and individuals with any systemic illness were excluded. The study was approved by the Riphah Ethical Committee. A written consent was obtained from all the study participants.

Anonymity and confidentiality of study participant's response and clinical data was maintained.

The pre-intervention levels of PA, general psychological health and BMI were assessed through International Physical Activity Questionnaire (IPAQ), General Health Questionnaire (GHQ-12) and BMI formula respectively.

The International Physical Activity Questionnaire (IPAQ) is a long, self-administered questionnaire has satisfactory validity to assess level of physical activity in a normal healthy young adult. The final scores are categorized into three levels of physical activity. Inactive is described as no reported activity or activity not enough to meet minimally active or HEPA active level. Minimally active physical activity level is described as physical activity of at least 20 minutes per day for 3 or more days or moderate intensity activity or walking of at least 30 minutes per day for 5 or more days or any combination of walking, moderate intensity or vigorous intensity activity of at least 600 MET-min per week for 5 days or more. HEPA active is described as vigorous activity of at least 1500 MET- minute per week for at least 3 days or any combination of vigorous, moderate or walking with at least 3000 MET- minute per week for 7 or more days.^{11,12}

General Health Questionnaire (GHQ-12) is a helpful questionnaire to rule out the general psychological health of an individual. A 4-point Likert-type scale is used scoring from 0 to 3. Total score range from 0 to 36 where 0-13 indicate no distress or normal general psychological health, 14-20 indicate mild distress, 21 to 30 indicate moderate distress and >30 indicate severe distress. Worse health was indicated by higher scores.^{13,14}

The subjects were intervened with Cardiopulmonary Conditioning according to the guidelines of American Heart Association i.e., 30 minutes of treadmill training and stationary cycling daily for 5 days a week at moderate intensity.¹⁵ After the 12 weeks of intervention the questionnaire was refilled by the participants and then the data was analyzed to report the effects of intervention applied. All statistical analysis was performed through SPSS 20 software. The descriptive statistics were analyzed and demonstrated through frequency tables, bar graphs and pie charts. The normality of data was analyzed by Shapiro-wilk normality test. The Wilcoxon signed rank test was utilized to analyze the inferential statistics of the study. The relationship between physical activity, body mass index and general psychological health was analyzed through spearman's rank-order correlation.

RESULTS

Total 123 participants were assessed out of which, 18 participants could not meet the inclusion criteria, 5 declined to participate and 3 discontinued the follow up. The present study recruited 97 participants with age range 18 to 30 of either gender. The mean age in years was 23.40 ± 2.29 . Majority, around 74% of the participants were females.

The descriptive analysis showed that 73.2 % participants were minimally active before the intervention that improved to 0.0 % after the intervention. 0.0 % participants were HEPA active before intervention that significantly improved to 38.1 % after the twelve-week intervention. In the pre-intervention, 87.6 % participants were overweight and 12.4 % participants were obese where as in

post-intervention, 85.6 % participants had normal weight and 14.4 % participants were overweight. Only 18.6 % participants had no distress before intervention that improved to 78.4 % after the intervention. In the pre-intervention, 17.5 % participants had severe distress that improved to 0.0 % after the intervention was given.

Comparison of pre and post intervention scores was analyzed through Wilcoxon sign rank test that showed significant improvement in all the outcome measures (Table 2).

The results of Spearman Rank-Order Correlation of physical activity level measured through IPAQ and general psychological health measured through GHQ-12 was demonstrated as -0.262 ($p = 0.01$). The results showed that there was significant negative correlation. The correlation for physical activity level measured through IPAQ and body mass index was found to be -0.081 ($p = 0.431$). These results showed insignificant negative correlation (Table 3).

Table 1: Pre and Post Intervention Levels of the Variables

	Variables	Pre Intervention	12 weeks post Intervention
IPAQ	Minimally Active	71 (73.2%)	0 (0.0%)
	Moderately Active	26 (26.8%)	60 (61.9%)
	Hepa Active	0 (0.0%)	37 (38.1%)
BMI	Normal	0 (0.0%)	83 (85.6%)
	Over Weight	85 (87.6%)	14 (14.4%)
	Obese	12 (12.4%)	0 (0.0%)
GHQ - 12	Minimal Distress	18 (18.6%)	76 (78.4%)
	mild Distress	28 (28.9%)	18 (18.6%)
	Moderate Distress	34 (35.1%)	3 (3.1%)
	Severe Distress	17 (17.5%)	0 (0.0%)

GHQ-12= general health questionnaire, IPAQ= international physical activity questionnaire, BMI= body mass index

Table 2: Pre and Post Intervention Levels of the Variables

	Pre-Intervention Median(IQ)	Post-Intervention Median(IQ)	Z-score	P-value
GHQ -12	3 (1)	1 (0)	-7.80	<0.001***
IPAQ	1 (1)	2 (1)	-9.39	<0.001***
BMI	3 (0)	2 (0)	-9.74	<0.001***

IQ = Inter Quartile, GHQ-12= general health questionnaire, IPAQ= international physical activity questionnaire, BMI= body mass index, ***= 0.000

Table 3: Summary of Results of Spearman's Rank-Order Correlation

Variables	International Physical Activity Questionnaire	
	Spearman's Correlation	P-value
General Health Questionnaire	-0.262	0.01
Body Mass Index	-0.081	0.431

DISCUSSION

This study was carried to find out the effect of cardiopulmonary conditioning exercise on the body mass index, general psychological health and physical activity of young adults from 18 years to 30 years old and the interrelation of physical activity with general psychological health and BMI. After following twelve weeks of cardiopulmonary conditioning, the level of physical activity increased in young adults. The overall general psychological health of the participants improved significantly. It was interpreted that general psychological health got better with

higher levels of physical activity. The body mass index was significantly improved from cardiopulmonary conditioning exercises. It was also interpreted that the body mass index was not associated with levels of physical activity.

Willis LH, Bateman LA et al. conducted a randomized controlled trial to find out effects of aerobic exercise training along with resistance exercise training on weight and fat mass in adults who were overweight or obese.¹⁶ The study supports the results of our study that cardiopulmonary conditioning exercise training is optimal mode of exercise for reducing body mass.

Patrick Callaghan conducted an RCT on women living with depression. The experimental group showed significantly lower levels of depression, better general psychological health following moderate intensity exercise. In the current study, the same tool was used for assessing general psychological health through GHQ-12.¹⁷ The study also supports the current study that cardiopulmonary conditioning exercise training at a specific intensity using RPE scale is effective in improving general psychological health.

The study was conducted in short duration of time so the short-term efficacy of the intervention was investigated only. It is recommended to conduct the study in a wide area scale with large sample size and long time duration to rule out long-term effects of cardiopulmonary conditioning exercises.

CONCLUSION

Conditioning exercise training has a positive effect on general psychological health of healthy young adults as it increases the physical activity levels and is very effective in improving body mass index. Unlike physical activity levels which does not have any association with the body mass index. But as the individual incorporates in higher levels of physical activity, his general psychological health improves.

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