DOI:https://doi.org/10.54393/pbmj.v5i5.415

PAKISTAN BIOMEDICAL JOURNAL

https://www.pakistanbmj.com/journal/index.php/pbmj/index

Volume 5, Issue 5 (May 2022)

Original Article

Assessment of Resting Heart Rate and Body Composition Among Exercise Performers

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ARTICLE INFO

Key Words:
Exercise, Body Composition, Resting Heart Rate

How to Cite:
Nawaz, F. . ., Khan, A. ., Zafar Iqbal, M. ., Bhatti , S. ., Jamil, M., Selamoglu, Z. ., Khan, S. ., Aslam, S. ., & Ali Soomro, J. . (2022). Assessment of Resting Heart Rate and Body Composition among Exercise Performers: Resting Heart Rate and Body Composition. Pakistan BioMedical Journal, 5(5). https://doi.org/10.54393/pbmj.v5i5.415

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Received Date: 3rd May, 2022
Acceptance Date: 24th May, 2022
Published Date: 31st May, 2022

ABSTRACT

Obesity is a global health issue and millions of people around the globe have obesity. **Objective:** To examine the effect of aerobic exercise on resting heart rate and various parameters of body composition. **Methods:** It was a randomized controlled trial. The participants of the study included forty (40) volunteer inter collegiate females of Punjab Pakistan. They were randomly categorized into two groups *i.e.* control group (CG) and experimental group (EG). It was conducted by following the prescribed exercise protocols of eight (08) weeks. A written informed consent was taken from each subject before participation in the study. After completion of the exercise protocols, the pre and post test data were processed through statistical package for social sciences (SPSS, version,25) **Results:** The RHR of the 40 participants in pretest was (76.37± 5.63) and in posttest was (73.55± 5.51). The HRR of the 40 participants in pretest was (116.70± 4.46) and in posttest was (110.77± 10.00). In respect of resting heart score of EGs in pretest and posttest the data indicate that the score of pretest of RHR (76.35± 3.85) and post of RHR (71.55± 3.45) were significantly different. In respect of resting heart score of control group in pretest and posttest the data indicate that the score of pretest of RHR (76.40± 7.09) and post of RHR (75.55± 6.48) were not significantly different. In the same way, significantly the pretest measurement of HRR (117.30± 5.74), of control group was not different from the posttest measurement of HRR (119.51± 4.65) t_{19}= -1.714, $p \leq 0.05$. However, the researcher concluded that before the treatment the EG and CG were balanced in body composition, RHR and HRR. Hence the researcher found that there is significant difference between EG and CG in body composition, RHR and HRR after the treatment.**Conclusion:** Based on analysis, the researcher concluded that aerobic exercise has significant impact on resting heart rate and various parameters of body composition among female exercise performers.

INTRODUCTION

Globally obesity is recognized as chronic health problem, facing majority of the people. Many factors are responsible for this global health problem but high energy intake is one among these leading factors [1-3]. Different health complications are associated with obesity. Cardiac syndromes that are the main cause of delayed heart rate recovery (HRR). Physical activities significantly influence heart rate such as heart rate decrease within a minute after the completion of physical work [4]. Heart recovery rate is a vital predictor of cardiovascular problems. It is closely linked with unexpected cardiac arrest in adults [5]. To avoid cardiac problems, exercise with different volumes and intensities such as walking, running, jogging and cycling etc., are suggested [6-8]. Normal or routine walk is a simple way of managing body weight and maintaining various physiological activities of the body [9,10]. Body mass index

DOI:https://doi.org/10.54393/pbmj.v5i5.415

(BMI) is widely accepted for categorizing the people with obesity [11]. Walking incorporates all of the body's major muscular groups and may be superior than running. Adults have also been proven to benefit from walking in small sessions throughout the day rather than a single large continuous walk [12,13]. Cardiovascular stability is closely linked to how the heart beat frequency decrease after physical exertion [14]. Resting heart rate (RHR) helps to know about causes of mortality among the masses [15]. By measuring RHR, one can predict about the cardiovascular risks of a subject. During exercise more energy is required for HRR [16]. Exercise promotes the structural and functional abilities of the body. Similarly, it is well explained that aerobic exercises have a substantial influence upon heart recovery and body composition [17]. Exercise of moderate volume and intensity also has a major role in preventing heart disease, osteoporosis, diabetes, obesity, blood pressure, weakness, and depression, as well as the prevention and rehabilitation of cardiac vascular illnesses and body composition, according to research [18]. The primary goal of this study is to see how moderate intensity aerobic exercise affects the cardiac recovery rate and body composition of college female students.

METHODS

A randomized controlled trial was conducted. Comprised of forty (40) volunteer inter collegiate females of Punjab Pakistan. The participants of the study were randomly categorized into two groups i.e., control group (CG) and experimental group (EG). The trial was conducted by following the prescribed exercise protocols of eight (08) weeks developed by Speakman (2003). For the purpose of randomization of the subjects into groups the researcher took RHR and body composition data of subjects and arranged these RHR score into ascending order. The heart beat was calculated through Radial artery. After the process of collecting data of resting heart rate the data of 40 subjects than prepared on the basis of rank order. All the subjects who lay in odd number in rank order list were assigned to EG and all the subjects in even number in rank order list was assigned to CG. During the pretest there were total 47 subjects but 7 subjects were dropout in the light of inclusion criteria. The researcher measured 9 different components (Fat free mass, Fat mass, Fat percentage, Sum of skin fold measurements, Mid-calf circumference, Mid-thigh circumference, Mid-arm circumference, Waist Hip Ratio, Weight, Heart recovery rate) of the body to determine. After the completion of eight-week exercise protocol, the data of RHR and body composition, the data of pretest and posttest was recorded and analyzed using paired sample t test to see the difference between the RHR and body composition score of girls in pretest and posttest and independent sample t test was applied to measure the difference between the CG and EG in pretest and posttest with special reference to RHR and body composition of the girls at college level. The researcher also used ANOVA analysis of variance to measure the difference in RHR and body composition in demographic variables.

RESULTS

Figure 1 shows that total subjects having age 15-17 years in the sample were 25 (62.5%), 17-19 years were 11(27.5%) and subjects having age group 20 years and above were 4(10%).

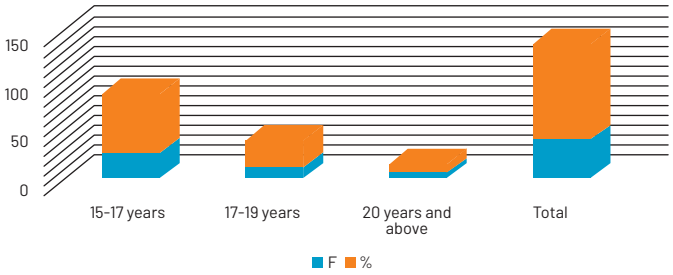

Table 3.1: Age-wise frequencies and percentages

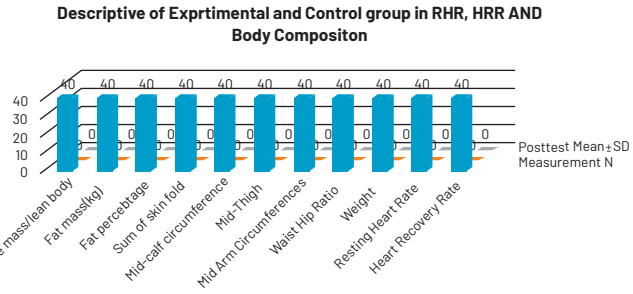

Figure 2: Descriptives of Experimental and Control group in RHR, HRR and Body Composition

Figure 2 showing the descriptives of EG and CG in RHR and body composition in pretest and posttest. The measurement of fat free mass/lean body mass (Kg) was (49.43± 1.27 Kg) in pretest and (49.13± 1.28 Kg) in posttest. In the same way the measurement of fat mass (kg) was (23.46± 1.26 Kg) in pretest and (22.05± 1.74 Kg) in posttest. Similarly, the measurement of fat percentage of 40 participants in pretest was (27.47± 3.55 Kg) and posttest was (25.96± 3.87 Kg). The Sum of skin fold measurements (mm) of the participant in pretest was (70.45± 5.63mm) and in posttest was (65.34± 7.41mm). The Mid-calf circumference (cm) of the participant in pretest was (28.58± 1.88cm) and in posttest was (27.02± 2.20cm). The Mid-thigh circumferences (cm) of the participant in pretest was (50.97± 1.93cm) and in posttest was (48.86± 2.69cm). The Mid Arm Circumferences (cm) of the participant in pretest was (29.03± 2.18cm) and in posttest was (27.93± 2.34cm). The Waist Hip Ratio of the participant in pretest

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was (0.68± 0.05cm) and in posttest was (0.67± 0.05cm). The Weight of the participant in pretest was (63.42± 3.75 Kg) and in posttest was (61.30± 4.38 Kg). The RHR of the 40 participants in pretest was (76.37± 5.63) and in posttest was (73.55± 5.51). The HRR of the 40 participants in pretest was (116.70± 4.46) and in posttest was (110.77± 10.00).

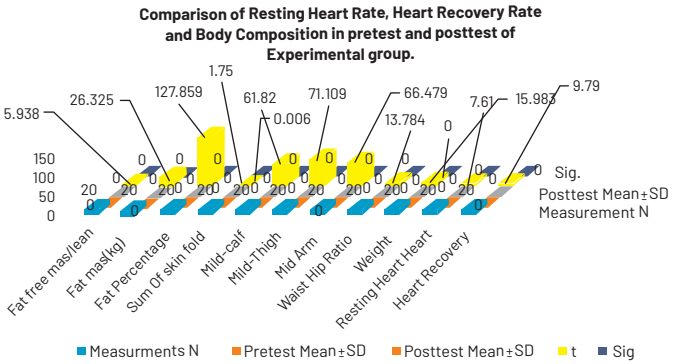

Table 3.4: Comparison of Resting Heart Rate, Heart Recovery Rate and Body Composition in pretest and posttest of Control group.

Figure 3 showing the treatment group difference between the measurement before and after the treatment in 9 components of body composition and RHR. The data shows that significantly the pretest measurement of fat free mass/lean body mass (kg) (49.23± 1.35 Kg), of EG was different from the posttest measurement of Fat free mass/lean body mass (Kg) (48.64± 1.20 Kg) t19= 5.983, p≤ 0.05. Similarly, significantly the pretest measurement of fat mass (kg) (23.57± 1.00), of EG was different from the posttest measurement of fat mass (Kg) (20.76± 0.732Kg) t19= 26.325, p≤ 0.05. In the same way significantly the pretest measurement of fat percentage (27.43± 3.58), of EG was different from the posttest measurement of fat percentage (24.43± 3.58) t19= 127.859, p≤ 0.05. In the same stance significantly the pretest measurement of sum of skin fold measurements (mm) (70.59± 3.77mm), of EG was different from the posttest measurement of sum of skin fold measurements (mm) (60.59± 5.77mm) t19= 1.750, p≤ 0.05. In the same way, significantly the pretest measurement of Mid-calf circumference (cm) (28.86± 1.89cm), of EG was different from the posttest measurement of Mid-calf circumference (cm) (25.86± 1.89cm) t19= 61.820, p≤ 0.05. In the same way, significantly the pretest measurement of Mid-Thigh Circumferences (cm) (51.01± 1.94cm), of experimental group was different from the posttest measurement of Mid-Thigh Circumferences (cm) (47.01± 1.94cm) t19= 71.109, p≤ 0.05. In the same way, significantly the pretest measurement of Mid Arm Circumferences (cm) (29.09± 2.23cm), of experimental group was different from the posttest measurement of Mid Arm Circumferences (cm) (27.09± 2.23cm) t19= 66.479, p≤ 0.05. Similarly, the data indicates that significantly the pretest measurement of Waist Hip Ratio (0.68± 0.057), of experimental group was different from the posttest measurement of Waist Hip Ratio (0.66± 0.057) t19= 13.784, p≤ 0.05. In the same way, significantly the pretest measurement of weight (63.45±3.32 Kg), of experimental group was different from the posttest measurement of weight (59.05±3.28 Kg) t19= 15.983, p≤ 0.05. In respect of resting heart score of EGs in pretest and posttest the data indicate that the score of pretest of RHR (76.35± 3.85) and post of RHR (71.55± 3.45) were significantly different (Figure 3).

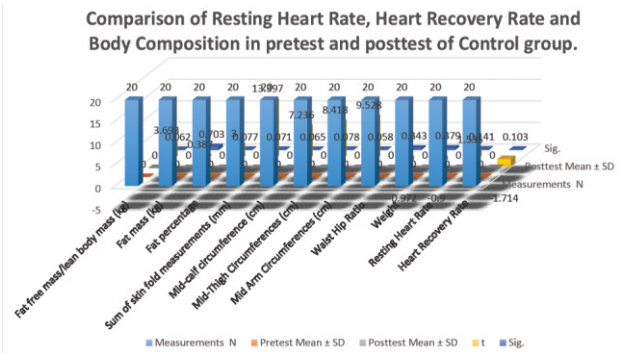

Table 3.5: Comparison of Experimental group and control group in pretest measurements of body composition, Resting Heart Rate and Heart Recovery Rate.

Figure 4 showing the CG difference between the measurement before and after the treatment in 9 components of body composition and RHR. The data shows that significantly the pretest measurement of Fat free mass/lean body mass (kg) (49.78± 1.33Kg), of control group was not different from the posttest measurement of Fat free mass/lean body mass (kg) (49.63± 1.18Kg) t19= 3.693, p≤ 0.05. Similarly, significantly the pretest measurement of Fat mass (kg) (23.35± 1.49Kg), of CG was not different from the posttest measurement of Fat mass (kg) (23.34± 1.4Kg) t19= 0.387, p≤ 0.05. In the same way significantly the pretest measurement of Fat percentage (27.51± 3.61), of control group was not different from the posttest measurement of Fat percentage (27.50± 3.61Kg) t19= 3.000, p≤ 0.05. In the same stance significantly the pretest measurement of Sum of skin fold measurements (mm) (70.33± 5.64mm), of control group was not different from the posttest measurement of Sum of skin fold measurements (mm) (70.10± 5.63mm) t19= 13.397, p≤ 0.05. In the same way, significantly the pretest measurement of Mid-calf circumference (cm) (28.42± 1.86), of control group was not different from the posttest measurement of Mid-calf circumference (cm) (28.18± 1.89cm) t19= 7.236, p≤ 0.05. In the same way, significantly the pretest measurement of Mid-Thigh Circumferences (cm) (50.99± 1.95cm), of control

DOI:https://doi.org/10.54393/pbmj.v5i5.415

group was not different from the posttest measurement of Mid-Thigh Circumferences (cm) (50.71± 1.97cm) t19= 8.418, p≤ 0.05. In the same way, significantly the pretest measurement of Mid Arm Circumferences (cm) (29.06± 2.22cm), of control group was not different from the posttest measurement of Mid Arm Circumferences (cm) (28.77± 2.20cm) t19= 9.528, p≤ 0.05. Similarly, the data indicates that significantly the pretest measurement of Waist Hip Ratio (0.68± 0.05), of control group was not different from the posttest measurement of Waist Hip Ratio (0.68± 0.058) t19= -0.972, p≤ 0.05. In the same way, significantly the pretest measurement of weight (63.40± 4.23Kg), of control group was not different from the posttest measurement of weight (63.55± 4.24Kg) t19= -0.900, p≤ 0.05. In respect of resting heart score of control group in pretest and posttest the data indicate that the score of pretest of RHR (76.40± 7.09) and post of RHR (75.55± 6.48) were not significantly different. In the same way, significantly the pretest measurement of HRR (117.30± 5.74), of control group was not different from the posttest measurement of HRR (119.51± 4.65) t19= -1.714, p≤ 0.05.

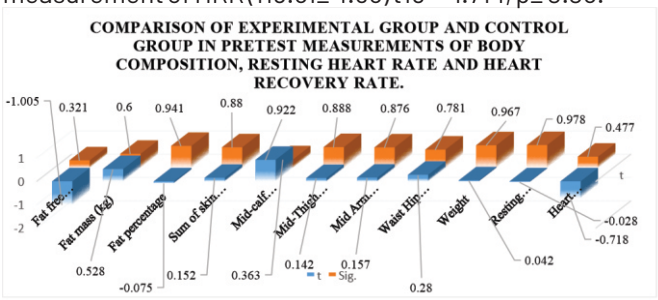

Table 3.6: Comparison of Experimental group and control group in posttest measurements of body composition, Resting Heart Rate and Heart Recovery Rate

Figure 5 showing the comparison of EG and CG after the randomization and before the treatment in nine selected determinants of body composition and RHR. The data indicates that there is no significant difference between the EG and CG in Fat free mass/lean body mass (kg) (t=-1.005, a=0.321 > 0.05), Fat mass (Kg) (t=0.528, a=0.600 > 0.05), Fat percentage (t= -0.075, a=0.941 >0 .05), Sum of skin fold measurements (mm) (t=.152, a=0.880 > 0.05), Mid-calf circumference (cm) (t=0.922, a=0.363 > 0.05), Mid-Thigh Circumferences (cm) (t=.142, a=0.888 > 0.05), Mid Arm Circumferences (cm) (t=0.157, a=0.876 >0 .05), Waist Hip Ratio (t=0.280, a=0.781 > 0.05), Weight, RHR (t= -0.028, a=0.978 >0.05) and HRR (t= -0.718, a=0.477 > 0.05) . However, the researcher concluded that before the treatment the EG and CG were balanced in body composition, RHR and HRR

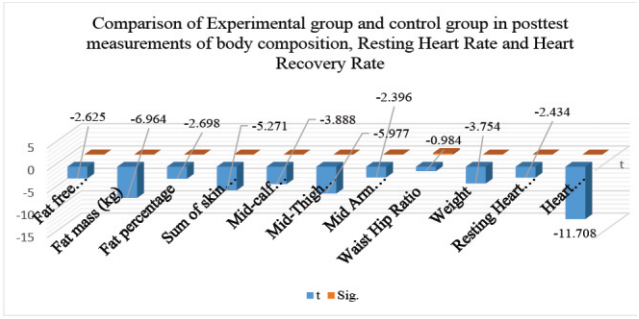

Figure 6: Comparison of Experimental group and control group in posttest measurements of body composition, Resting Heart Rate and Heart Recovery Rate

Figure 6 showing the comparison of EG and CG after treatment (8 Weeks Treatment Programme; Speakman, 2003), in nine selected determinants of body composition and RHR. The data indicates that there is significant difference between the EG (48.64± 1.20, n= 20) and CG (49.63± 1.18, n= 20) in Fat free mass/lean body mass (kg) (t38= -2.625, p≤ 0.05.). The data also indicates that there is significant difference between the EG (20.76± 0.732, n= 20) and CG (23.34± 1.4, n= 20) in Fat mass (kg) (t38= -6.964, p≤ 0.05). The data also indicates that there is significant difference between the EG (24.43± 3.58, n= 20) and CG (27.50± 3.61, n= 20) in Fat percentage (t38= -2.698, p≤ 0.05). The data also indicates that there is significant difference between the EG (60.59± 5.77, n= 20) and CG (70.10± 5.63, n= 20) in Sum of skin fold measurements (mm) (t38= -5.271, p≤ 0.05). The data also indicates that there is significant difference between the EG (25.86± 1.89, n= 20) and CG (28.18± 1.89, n= 20) in Mid-calf circumference (cm) (t38= -3.888, p≤ 0.05). The data also indicates that there is significant difference between the EG (47.01± 1.94, n= 20) and CG (50.71± 1.97, n= 20) in Mid-Thigh Circumferences (cm) (t38= -5.977, p≤ 0.05). The data also indicates that there is significant difference between the EG (27.09± 2.23, n= 20) and CG (28.77±2.20, n= 20) in Mid Arm Circumferences (cm) (t38= -2.396, p≤ 0.05). The data also indicates that there is significant difference between the EG (.66± 0.057, n= 20) and CG (0.68± 0.058±2.20, n= 20) in Waist Hip Ratio (t38=-0.984, p≤ 0.05). Similarly, the table shows that there is significant difference between the EG 59.05± 3.28, n= 20) and CG (63.55± 4.24, n= 20) in Weight (t38=-3.754, p≤ 0.05). The researcher also found that the second main variable resting heart rate was also significantly different in EG (71.55± 3.45, n= 20) and CG (75.55± 6.48, n= 20) after the treatment t38=-2.434, p≤ 0.05. The researcher also found that the third main variable HRR was also significantly different in EG (102.03± 4.74, n= 20)

DOI:https://doi.org/10.54393/pbmj.v5i5.415

and CG (119.51± 6.3.66, n= 20) after the treatment t38=-11.708, p≤ 0.05. Hence the researcher concluded that EG produce better in results in nine selected body composition determinants, RHR and HRR than control group after the exercise protocol Speaksman 2003. Hence the researcher found that there is significant difference between EG and CG in body composition, RHR and HRR after the treatment

DISCUSSION

After the data analysis, the researcher found that there is significant effect of Moderate Intensity Aerobic Exercise upon the body composition, RHR and HRR. The results of the present study are supported by the study of Brandou et al., (2003), Regular exercise, such as walking, running, jogging, and cycling, is recommended as an effective strategy to treat obesity in children. Cycling, according [20,21,22] to Hamila et al., (2018), is a replacement activity for managing obesity [6]. Walking, according to the authors Wang et al., (2008), is also beneficial for elderly persons in terms of weight management [23]. Because it reflects the ability to do daily tasks, the ability to walk is the easiest approach to assess physical function and a critical component for quality of life. Enright et al., (1998) discovered that measuring the distance travelled during a normal walk on a horizontal surface is a simple and cost-effective way to evaluate individual physical function [24] Smart et al (2015) found that females who engaged in moderate intensity exercise for three months, such as cycling and jogging, had improved HRR, autonomic system, and breast cancer risk [25].

CONCLUSION

Based on the findings, the researcher concluded that moderate intensity aerobic exercises have a substantial impact on weight, fat free mass/lean body mass, fat mass, fat percentage, and fat mass. Sum skin fold measurements, Mid-calf circumference, Mid-Thigh Circumferences, Mid Arm Circumferences, Waist Hip Ratio, Resting Heart Rate and Heart Recovery Rate of the girls at college level. Hence the researcher concluded that Moderate Intensity Aerobic Exercises put positive effect upon body composition, resting heart rate and heart recovery rate of College girls.

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