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# Influence of Aerobic Training on Physical Fitness and Health Status of Older People of Bahawalpur City

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## Abstract

*This study investigates the properties of endurance physical activity on the fitness and healthiness of older. The sample was the trial (n = 32) and the direct group (n = 35). The variables were health status through a questionnaire, physical fitness with flexibility, balance, handgrip strength, leg strength, endurance, body mass index (BMI), and cardiovascular reading of older. The experimental group did aerobic training for 12 weeks and the control group in regular walking. Repeated measures of ANOVA and multiple regression were employed for numerical testing. The result depicts experimental group was significantly higher after twelve weeks of training in right and left leg balance (P > 0.02; P > 0.00), handgrip strength (P > 0.01), six-minute walk (P > 0.01), 10 m brisk walking (P > 0.003). It is concluded that the 12-week intervention had a positive effect on the fitness of older people in maintaining health.*

**Keywords:** Aerobic Training, Older People, Physical Fitness, Health Status, Physical Exercise

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## Title

# Influence of Aerobic Training on Physical Fitness and Health Status of Older People of Bahawalpur City

## Abstract

*This study investigates the properties of endurance physical activity on the fitness and healthiness of older. The sample was the trial (n = 32) and the direct group (n = 35). The variables were health status through a questionnaire, physical fitness with flexibility, balance, handgrip strength, leg strength, endurance, body mass index (BMI), and cardiovascular reading of older. The experimental group did aerobic training for 12 weeks and the control group in regular walking. Repeated measures of ANOVA and multiple regression were employed for numerical testing. The result depicts experimental group was significantly higher after twelve weeks of training in right and left leg balance (P > 0.02; P > 0.00), handgrip strength (P > 0.01), six-minute walk (P > 0.01), 10 m brisk walking (P > 0.003). It is concluded that the 12-week intervention had a positive effect on the fitness of older people in maintaining health.*

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## Keywords:

Aerobic Training, Older People, Physical Fitness, Health Status, Physical Exercise

## Contents



## Introduction

Regularity in physical activities plays a critical role in maintaining the health and fitness of older people (Falck et al, 2019). The term physical activity is frequently used in different ways such as sports, occupational, household, and different activities (Rivera et al., 2019), and advantageous for physiological and psychological health (Molina et al., 2018; Bouaziz et al., 2018). These physical movements enhance fitness and further assist in completing daily routine tasks of domestic and family life without fatigue (Wagner et al., 1992). These activities are beneficial as sports participations increase muscle mass, neuromuscular coordination, and efficiency of the metabolic system (Sözen & Akyildiz, 2018) Rivera et al., 2019). Regular physical activities reduce the risks of diseases among older as (Nelson et al., 2007), as it was

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reported that 6 weeks of aerobic training increased oxygen consumption (Cardalda et al., 2019). Physical fitness is the capacity to engage in typical daily tasks such as walking, speed, strength, and agility (Gallè et al., 2016). Various types of aerobics and high-intensity physical activities are associated with physical fitness and health like walking, yoga jogging, running, and recreational, sprinting, gym training, swimming, and cycling. However, aerobic activities are more suitable for older people to enhance their health (Shahana et al., 2010).

Aerobic exercises involve a large group of muscles for a long duration which improves endurance capacity and reduces body fats (Piercy et al., 2018). These exercises are also important for the improvement of the cardiovascular health of men and women (Lo et al., 2020; Saillant et al., 2021). There is a piece of evidence that regular physical activity is safe for one's health and improves balance (McPhee et al., 2016; Papalia et al. (2020) discovered that physical exercise can effectively enhance the dynamic and static balance of those 65 years older which reduces falling injuries. Regularity in exercise boosts physiological, cognition, and mobility functions (Falck et al, 2019). Therefore, balance and postural activities are recommended in training programs for older individuals.

Several studies suggest that regular physical exercise has instant health advantages for both men and women through improving body composition and musculoskeletal development. As a result, research is required to investigate the importance of physical wellness via frequent physical exercise and aerobic training. Therefore, a study is required to fill the research gap by measuring health status, physical fitness, heart rate, and blood pressure. Consequently, the purpose of the present study is to survey how regular exercise and aerobic training affect older individuals' levels of physical fitness. The objective of this investigation is to explore how the regularity of exercise improves the fitness and health of older people of District Bahawalpur.

## Materials and Methods

This is an experimental research design with pre-post data collection. A convenient sampling technique was applied for data collection on the older adults of district Bahawalpur. Data were obtained from (n = 67) older adults aged 50 years to 80 years, (n = 30) and n = 35). The experimental group engaged in aerobic training for twelve weeks and daily routine activities for the control group. This training program consists of twelve weeks and five days per week. The participant had no history of smoking, or heart disease in medical history, like walking with support (with or without a walking aid) as guided by (Sasaki et al., 2010). Presence of metabolic disorders that are not being properly controlled, such as heart disease, arrhythmias, and diabetes (Galbreath et al., 2018), and chronic musculoskeletal disorder and muscle injury (Bertolla et al., 2007). Data was collected at the premises of Dring Stadium Bahawalpur with the permission of Tehsil, District, and Divisional Sports officers. A consent letter was obtained from each participant to ensure their willingness. The procedure of the research was briefed before the commencement of data. It was also ensured by the participants their information would be secure and not used for any other purpose. Further, it was also ensured that this procedure of data collection would not harm the participants and if anyone wanted to quit this study could easily be allowed.

## Instruments and Procedure

The first stage of this study was the pre-data measurements which started from the current health condition and physical fitness. A questionnaire was used for the collection of data about the health status of old people which was adopted from the website of the National Council on Strength and Fitness (NCSF). The questionnaire consists of five sections first section is about general information, the second section contains current Medical Information, the third section medical history, the fourth section health-related behaviors, and the fifth section health-related attitudes.

**Table 1**

**Physical Fitness Variables and Associated Test Instruments for Older Adults**

| Variable | Test\Instruments | Units |
|---|---|---|
| Stature (height) | Stadiometer | Centimeter |
| Body mass (weight) | Electrical Weighing machine | Kilogram |
| Flexibility | Sit and Reach Test (Step Box, Ruler) | Centimeter |
| Balance | Standing on one foot on a balancing | Seconds |
| Hand Grip Strength | Hand Grip Dynamometer | Kg |

| | | |
|---|---|---|
| Agility and functional strength | The Timed Up and Go test | Seconds |
| Aerobic Power | Six-minute walk test | Kilometers |
| Cardiovascular Capacity | Harvard test Sit to Stand (STS) | Beats |
| Upper and lower limb strength | Sit-to-stand (STS) test | Seconds |
| Walking speed | 10 m Brisk Walking Test | Seconds |
| BMI | Body Mass Index | Weight (kg) / Height $(m)^2$ |

Body height was calculated from the exterior of the stadiometer to the peak of the head while upright and relaxed position the participants. Body weight was measured according to standard procedures by using an electronic weight machine (Galbreath et al., 2018). The participant's blood pressure was measured by using a digital sphygmomanometer through auscultation of the brachial artery, following standard clinical procedures. The measurements were taken while the participant was in a supine position after resting for 5 minutes, the resting heart rate was also measured using the same procedure (Galbreath et al., 2018). Flexibility was tested by using sit-to-reach trials with a wooden box (Hosiso & Rekoninne, 2013; Ramos et al., 2019). To perform this test, one must sit on the floor without shoes and extend their legs straight ahead. The box should be placed in front of the feet, and the soles of the feet should be pressed flat against the box. The balance of the participants was assessed by standing on one leg one be one-time duration was noted (Chomiak et al., 2015). The handgrip strength of both the right and left hand was measured in kilograms (Saillant et al., 2021). The handgrip dynamometer used is evaluated pre- and post-intervention via a handgrip dynamometer (Saillant et al., 2021). To evaluate grip strength, a portable dynamometer is used to measure the force of the participant's hand grip. The participant is instructed to strongly squeeze the dynamometer, typically three times with each hand. The final score is calculated by averaging the measurements obtained from both hands. A specialized test was to measure agility while sitting at a chair and according to caution stand-up and go caution was followed by each participant (Van Eijkeren et al., 2008; Sasaki et al., 2010). One-minute walk test was used to measure aerobic capacity in meters (DiPiro et al., 2015; Harmsen et al., 2016; Hsu et al., 2017). Ten-meter brisk walking duration was for testing speed walking speed (Bohannon, 1997).

**Figure 1**

*Procedure of data collection one-leg balance, sit-reach flexibility, and sit-stand strength.*

The sit-to-stand (STS) Test was used to measure leg strength (Merellano-Navarro et al., 2017). BMI was estimated by using this formula body mass divided by stature $(meter)^2$ (Hosiso & Rekoninne, 2013). A single-leg stand was used for testing the balance duration (Chomiak et al., 2015). One foot contacts the ground other is placed at the knee, hands at the hips, keep this position as long as possible, and the time of this duration will be recorded.

**Figure 2**

*handgrip strength, sit-stand and go, and 6-minute walk testing.*Schedule of Training

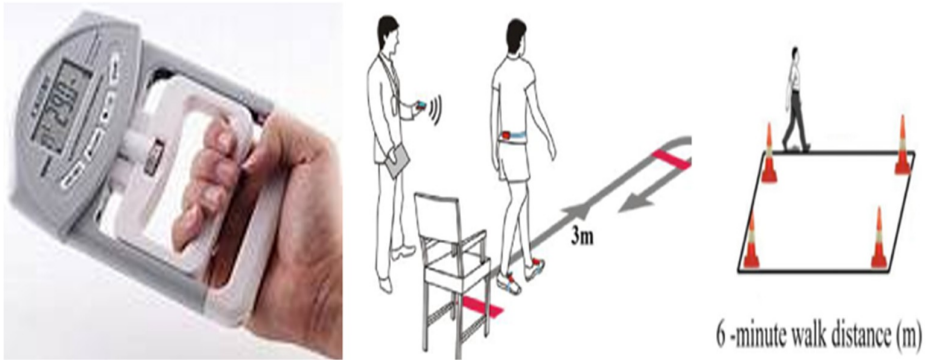


**Table 2**

*Experimental Aerobic Training Program for Older Adults in District Bahawalpur*

| Heading | Explanation |
|---|---|
| Type of investigation | Experimental design |
| Training | Aerobic |
| | 40 to 50 minutes of aerobic training/Physical Activity |
| | 5- 10 minutes of cool down |
| Duration of training | 12 Weeks (5 days a week) |
| Target Population | District Bahawalpur |
| Participants age | 50 years 80 Years older adults |
| Strength of Participants | 67 (Male and Female) |

## Statistical Analyses

The mean and standard deviation for each variable were statistically subscribed and reported in tables according to group division. The questionnaires as evaluated by using ANOVA to find differences among groups (Galbreath et al., 2018). Factorial repeated measure ANOVA on the second factor was applied to find the mean difference among groups at the pre-stage of data collection and after 12 weeks of aerobic training effects. Tukey's post hoc was applied to find exact differences among groups at pre- and post-measurements. Like Armonk, NY, USA. Vaitkevicius et al. (2002) regression test was applied to examine the role of 12-week aerobic exercises on the physical fitness and health of older males and females. All assumptions of the one were an analysis of various, factorial repeated ANOVA and multiple regression. The significant value was adjusted at $P > 0.05$ to control type one and type two errors. The data was analyzed by using IBM SPS version 25 Statistics for Windows.

## Results

Figure 1 shows the demographic information of the participants including age, height, and weight of the experimental and control groups of male and female. All groups were homogenous in their age, height, and body weight. Figure 2 shows a substantial variance in groups $F = 4.067$; and $P = 0.048$. It shows that males of the non-training group smoked in the past, but the training group had a smoking addiction. The ANOVA test result indicates $F = 7.396$ and $P = 0.008$ that there is a substantial change in groups in involvement in vigorous exercise as the male group is more involved in vigorous exercise than females. The results $F = 9.864$ and $P = 0.003$ suggest that the experience of negative stress about financial pressure is significantly different between groups. The training followers suggestively reported $F = 16.064$ and $P = 0.000$ lesser negative stress than their counterparts.

Figure 3 displays a substantial variance of the right leg balance $F = 2.422$, $sig = .023$ in the twelve-week aerobic training program. According to Tukey post hoc depicts that the training improves the training follower than counterparts. Right handgrip strength of the training follower enhanced in males and females than counterparts $F = 2.681$, $sig = .013$. There was a substantial variation in the 6-minute walk of training follower enhanced in males and females than counterparts $F = 2.637$, $sig = .014$. There was a substantial variation in the ten m brisk walking of training

follower enhanced in males and females than counterparts $F = 3.284$, $sig = .003$. There was a highly substantial differentiation in the sit-to-stand training follower enhanced in males and females than counterparts $F = 7.436$, $sig = .000$.

**Figure 3**

*Demographic Measurements of the Experimental and Control Groups*

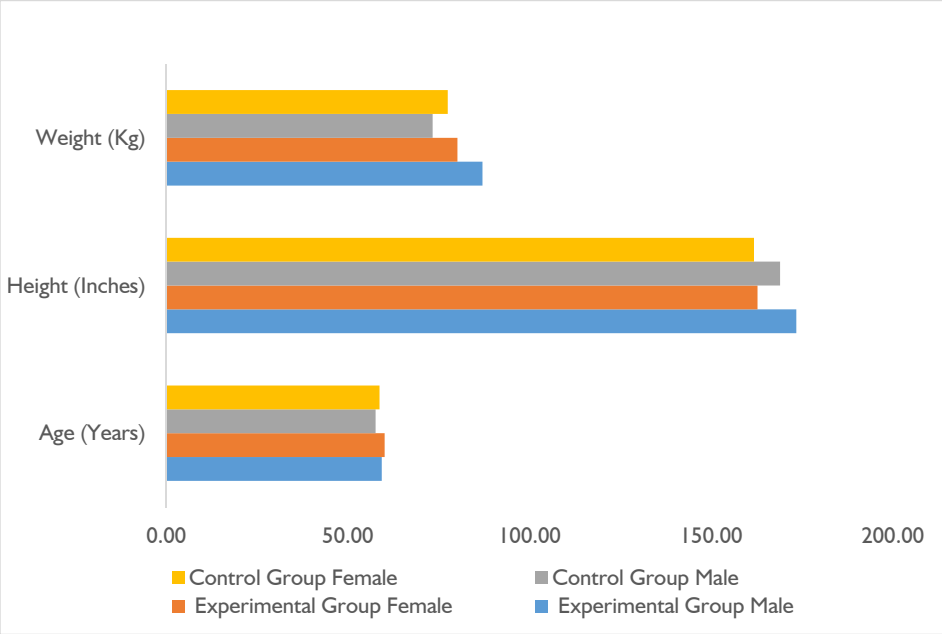


**Figure 4**

*Health Status of the experimental and control group of Bahawalpur City*

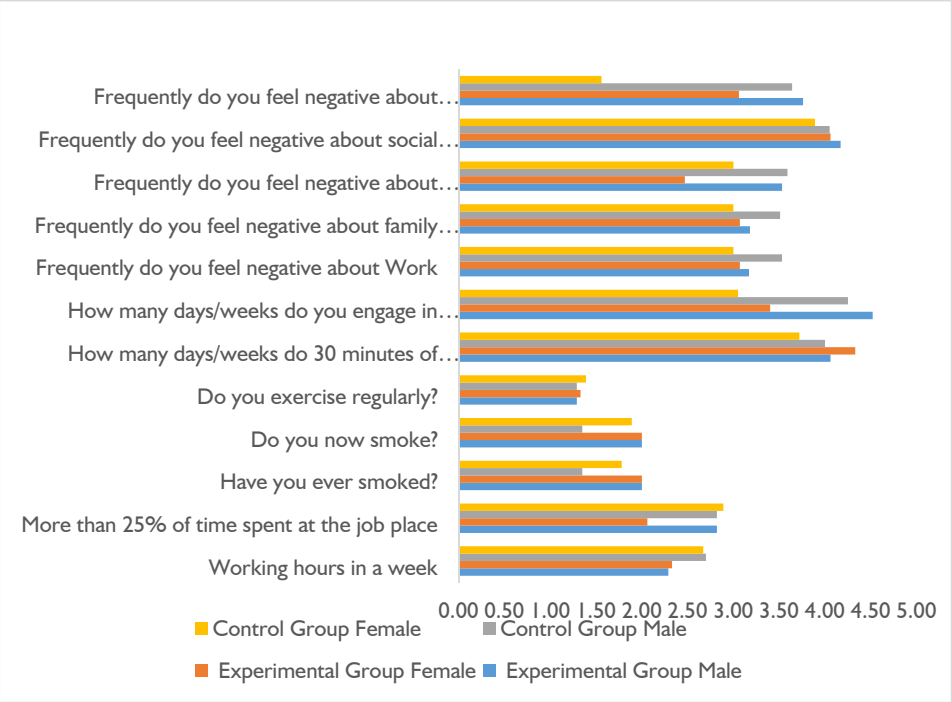

**Figure 5**

*Pre and Post Measurements of Physical Fitness of Male and Female Older Adult Participants of Experimental and Control Groups*

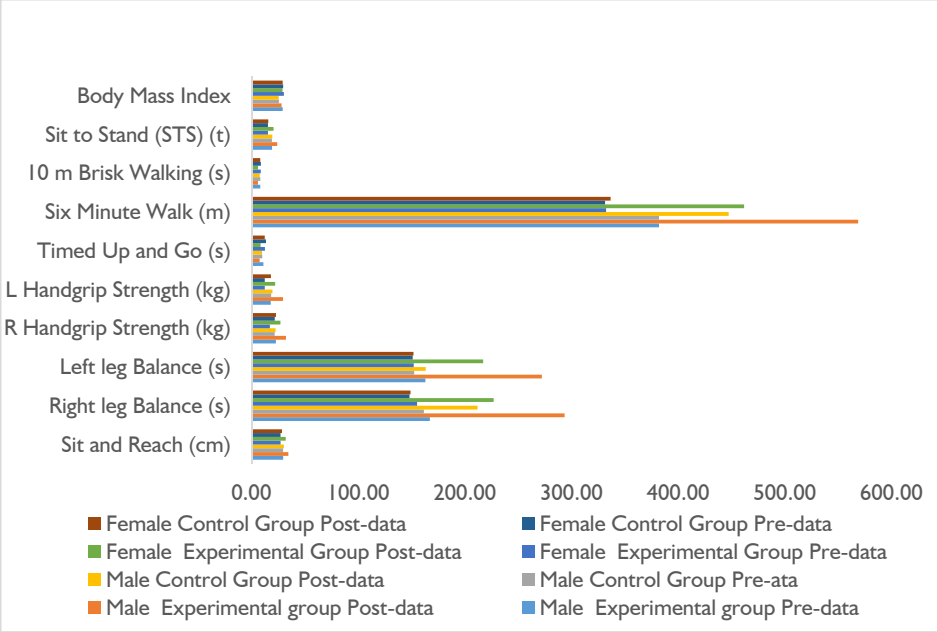


**Figure 6**

*Measurement of cardiovascular parameters (HR, SP, and DP) before and after the 30-second Harvard step test of an experimental group and a control group*

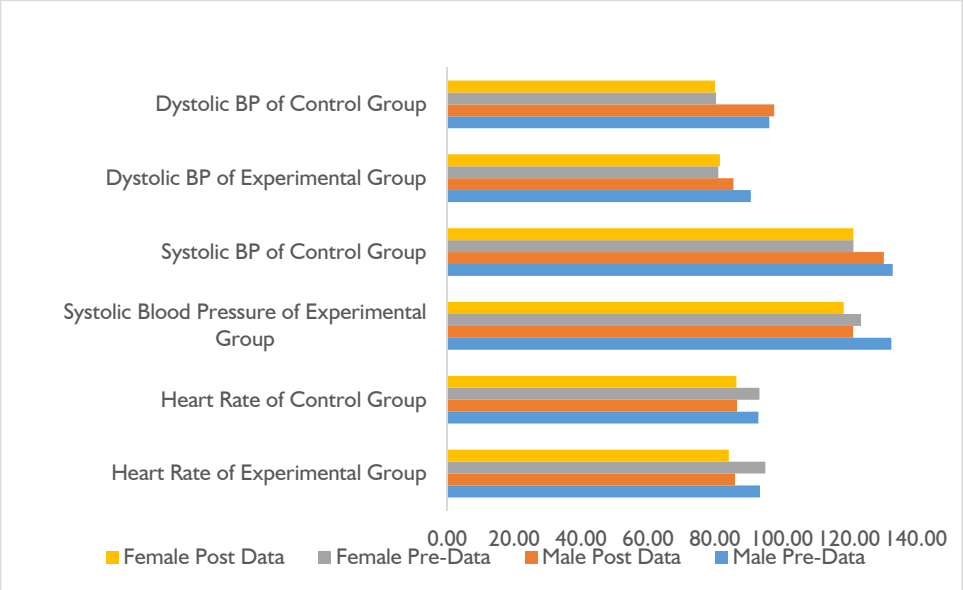


Figure 6 shows the substantial variance in the heart rate training follower enhanced in males and females than counterparts $F = 14.61$ and $P = 0.000$, also in systolic blood pressure $F = 13.54$ and $P = 0.000$, and diastolic blood pressure $F = 11.81$ and $P = 0.000$.

**Table 2**

*Multiple regression analysis predictors of Walk Test Performance of Males in Experimental and control groups*

| Predictors | Unstandardized Coefficients | Standardized Coefficients | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | B | Std. Error | Beta | T | P | $R^2$ | f | sig |
| (Constant) | 478.784 | 270.26 | | 1.77 | 0.09 | 0.529 | 3.01 | 0.02 |
| Sit and Reach (cm) | 0.318 | 3.18 | 0.02 | 0.10 | 0.92 | | | |
| Right Leg Balance (s) | -0.284 | 0.76 | -0.17 | -0.36 | 0.71 | | | |
| Left Leg Balance (s) | 0.571 | 0.65 | 0.40 | 0.88 | 0.39 | | | |
| R Handgrip Strength (kg) | -7.800 | 6.13 | -0.65 | -1.27 | 0.22 | | | |
| L Handgrip Strength (kg) | 4.966 | 5.37 | 0.43 | 0.95 | 0.36 | | | |
| Timed Up and Go (s) | -11.369 | 7.94 | -0.27 | -1.43 | 0.17 | | | |
| 10 m Brisk Walking (s) | -10.072 | 24.18 | -0.10 | -0.42 | 0.68 | | | |
| Sit to Stand (STS) (t) | 16.327 | 7.96 | 0.50 | 2.05 | 0.05 | | | |
| Body Mass Index (BMI) | -4.954 | 3.16 | -0.24 | -1.57 | 0.13 | | | |

Significant value P<0.05; cm=centimeter, s=seconds, kg=kilogram, t=times

The results in Table 2 substantially do not predict a six-minute walk influence of flexibility, balance grip strength agility speed, and body mass index as (R2 = 0.529, $F$ = 2.998, $P$ < 0.05), except the stand to sit the test.

**Table 3**

*Multiple regression analysis predictors of walk test performance in females of Experimental and control groups*

| Predictors | Unstandardized Coefficients | Standardized Coefficients | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | *B* | *Std. Error* | *Beta* | *T* | *P* | $R^2$ | *F* | *sig* |
| (Constant) | 209.49 | 180.41 | | 1.16 | 0.26 | 0.58 | 3.46 | 0.01 |
| Sit and Reach (cm) | 0.54 | 2.62 | 0.03 | 0.21 | 0.84 | | | |
| Right Leg Balance (s) | 0.91 | 0.51 | 0.48 | 1.78 | 0.09 | | | |
| Left Leg Balance (s) | 0.00 | 0.56 | 0.00 | 0.01 | 1.01 | | | |
| R Handgrip Strength (kg) | 3.029 | 6.41 | 0.16 | 0.47 | 0.64 | | | |
| L Handgrip Strength (kg) | -2.46 | 5.73 | -0.14 | -0.43 | 0.67 | | | |
| Timed Up and Go (s) | -10.40 | 4.13 | -0.45 | -2.52 | 0.02 | | | |
| 10 m Brisk Walking(s) | 6.42 | 10.75 | 0.12 | 0.60 | 0.56 | | | |
| Sit to Stand (STS) (t) | 0.37 | 3.43 | 0.02 | 0.11 | 0.92 | | | |
| Body Mass Index (BMI) | 1.10 | 3.06 | 0.06 | 0.36 | 0.72 | | | |

*Significant value $P < 0.05$; cm = centimeter, s = seconds, kg = kilogram, t = times*

Table 3 substantially predicted the six-minute walk flexibility, balance, hand grip strength, speed, and body mass index (R2 = 0.575, $F$ = 3.456, $P$ < 0.05).

## Discussion

The control group reported a higher percentage of current smokers, lower in high-intensity exercise, financial pressure, and health stress, which is supported by earlier research (Lange et al., 2018). Older adults' body weight changed significantly after aerobic training; this finding contradicts Ramos et al. (2019). Regular training enhances e fitness as cardiovascular, muscle strength, flexibility, and balance (Shahana et al., 2010; Chomiak et al., 2015). The capacity for a good balance reduces the risk of falls in the older population. When comparing the present study's findings with those of

Saillant et al. (2021), it is interesting to note the differences in results. While his study found no significant differences between the Aerobic and Control groups in handgrip strength, the current study found a significant difference in right handgrip strength ($P = 0.013$). These discrepancies could be attributed to differences in the study design, including differences in sample size, duration and intensity of exercise program, and the specific handgrip strength tests used.

However, the current study found a higher significance level in both the 6-minute walk test ($P = 0.014$) and the 10-minute brisk walking test ($P = 0.003$), The findings of the present study were confirmed by (DiPiro et al., 2015; Harmsen et al., 2017; Hsu et al. (2017). It shows that aerobic training and regularity in exercises have an encouraging influence on the health and fitness of older people. The sit-to-stand is useful for measuring the lower limb strength of old people (Csuka & McCarty, 1985). In a study conducted the to-stand (STS) test was used to measure physical fitness and found a significant difference that is consistent with this study. The results of this study were confirmed with the findings of Lange et al. (2018). It indicates that regular walking and aerobic training increase leg strength as reported (Eijkeren et al. (2008) and confirmed with the finding of this study in the results of brisk walking for ten minutes. Finally, the balance timing of the older people in this study and past studies was confirmed by the findings (Vaitkevicius et al. (2002). However, handgrip strength and BMI are associated with the improvement of fitness of older women.

## Conclusion

The finding of this study indicates that regularity in aerobic exercise has favorable fitness benefits for older people. These groups of exercises improve agility, flexibility, upper and lower limb strength, and endurance capacity of older people as former research reported (Devereux-Fitzgerald et al., 2016; (Di Lorito et al., 2021), it also reduces the aging factor which makes older limitation and daily work (Vaitkevicius et al., 2002). The findings of this study highlight the importance of consistent and regular exercise are very important for older people. This study also provides data and information about the fitness and health status of the old people of Bahawalpur, Pakistan.

## Recommendations

Therefore, it is proposed that older should be regular exercise, especially in aerobic type of exercises. To make older people is the responsibility of the community like doctors, physical trainers, family of the old person. Finally, it is recommended for future research to probe the different training programs that may be suitable to the older population.

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