



The Impact of Aerobic and Anaerobic Exercises on the Level of Depression, Anxiety, Stress and Happiness of Non-Athlete Male

Toktam Kianian,¹ Fatihe Kermansaravi,² Saman Saber,^{3,*} and Fahime Aghamohamadi⁴

¹Department of Community Health Nursing, School of Nursing and Midwifery, Tabriz University of Medical Sciences, Tabriz, Iran

²Department of Community Health Nursing, Community Nursing Research Center, School of Nursing and Midwifery, Zahedan University of Medical Sciences, Zahedan, Iran

³Department of Psychiatric Nursing, School of Nursing and Midwifery, Iran University of Medical Sciences, Tehran, Iran

⁴Department of Physiology, Islamic Azad University of Kerman, Kerman, Iran

*Corresponding author: Saman Saber, Department of Psychiatric Nursing, School of Nursing and Midwifery, Iran University of Medical Sciences, Tehran, Iran. E-mail: samansaber16@gmail.com

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Abstract

Background and Objectives: Exercises bring about health. Therefore, knowing what kind of exercise is more effective in individuals' spiritual health indices is important. Thus, the present study aims at comparing the impact of aerobic and anaerobic exercises on the level of depression, anxiety, stress, and happiness of nonathletic male students.

Methods: In this clinical trial study, sample included the nonathletic male students of Zahedan Azad University in 2014. 90 students were selected through convenience sampling and they were divided randomly into two experimental groups (aerobic and anaerobic) and one control group. The aerobic group must do aerobic exercises and the anaerobic group must do anaerobic exercises for a period of 10 weeks (3 sessions a week, each lasted for 60 minutes). The data were collected using DASS-21 questionnaire for measuring the level of depression, anxiety and stress, and Oxford OHI questionnaire for measuring the amount of happiness before and after the intervention. The results were analyzed using statistical tests of MANCOVA in SPSS-13.

Results: The results showed that in both aerobic and anaerobic groups the mean score of depression, anxiety, stress and happiness improved after treatment. However, the improve in the mean score of anxiety, stress and happiness was more apparent in the anaerobic group. The results also showed that only stress and happiness resulted in a significant difference in different groups.

Conclusions: Both aerobic and anaerobic exercises result in reduction of stress and Anxiety. So it seems necessary to include such exercises in students' daily schedule.

Keywords: Aerobic, Anaerobic, Exercise, Depression, Anxiety, Stress, Happiness

1. Background

Students experience situations like being away from home and being separated from family, and facing problems related to education, which are all part of stressful events in their lives [1-3]. Stress and tension are the first factors that threaten someone's mental health [4, 5]. However, recent studies have demonstrated that about 21 percent of Iranian students suffer from stress and anxiety [6]. These two disorders can lead to students' physical and mental illnesses, disorder in performance and their ability to adapt themselves to different situations and finally they can result in depression [7, 8]. Stress, depression and anxiety are the most common mental disorders which have harmful negative effects on the students' performance in society and in work environments; they are regarded as one of the major reasons of educational deterioration [9, 10].

On the other hand, one of the human mental needs which is against stress, anxiety and depression is happi-

ness. Encouraging happiness, the effect of negative mental pressures can be reduced [11, 12]. This is of more importance for students who are constantly dealing with a scientific and research places and shape the future of the country.

Therefore, finding a solution to reduce the consequences of stress and anxiety and make this group of society happy is of great importance. On the other hand, everybody knows the role of sport in reducing mental disorders and in reinforcing positive emotions such as happiness [13, 14] (but it is very important to know which sport can be more useful in reducing the consequences of stress and anxiety).

Generally, exercises are divided into two types of aerobic and anaerobic exercises [15]. In fact, aerobic and anaerobic exercises exert different changes on physiology of the body. However, previous studies conducted to show what type of exercise can be a proper modulator for mental in-

dices have revealed contradictory results [16]. For instance, on a study conducted on male football players, Meister et al. (2013) found that anaerobic exercises have no effect on mental indices [17]. However, the result of Stein and Motta's (1992) study was contrary to the result of the previous studies. They reported that anaerobic exercises are very effective in reducing anxiety [18]. While in a study conducted on students in Jahrom, Sabetghadam et al. (2014) reported that regular physical exercises, especially aerobic exercises have positive effect on reducing depression symptoms [19]. Therefore, regarding the importance of controlling stress, anxiety, and depression in students and the importance of happiness in this valuable group of society, and regarding the contradictory results of previous studies in this field, the purpose of the present study is to determine the effect of aerobic and anaerobic exercises on the level of depression, anxiety, stress and happiness in non-athlete male students.

2. Methods

This randomized controlled trial study was conducted in 2014 on male nonathletic nursing students of Zahedan Islamic Azad University, Zahedan, Iran.

Inclusion criteria of research included being non-athlete (VO_2 max below 40 mL/kg/min and student's non regular or professional exercise during the last six months), [17] healthy body, non-Cardiorespiratory disease, lack of tobacco. Exclusion criteria consisted of exercise intolerance and student's lack of regular attendance in training courses. The data of inclusion and exclusion criteria was obtained from interviews with students and controlling the presence in training courses.

According to study by Soltani et al. [20], the sample size was obtained equal to 93 at the confidence level of 95% and statistical power of 80% through sample size formula ($(X_2) = 6.5$, $(X_1) = 5.8$, $S_2 = 1.7$, $S_1 = 1.7$, $Z_{1-\alpha/2} = 1.96$, and $Z_{(1-\beta)} = 0.85$).

Due to the limited number of students in the study setting, we could recruit just thirty students to each group. Sampling was done conveniently. Students were randomly assigned to an aerobic exercise, an anaerobic exercise, and a control group. For random allocation, three cards labeled A, B, and C were used. Each student was asked to randomly select one card. Students who selected the A, B, or C card were respectively allocated to the aerobic exercise, anaerobic exercise, and control groups.

2.1. Instrument

In this study in addition to demographic forms, depression, anxiety and stress, DASS questionnaires and Oxford Happiness questionnaire were administered to each

group in order to measure the mental health indices before and after the intervention.

The depression, anxiety and stress questionnaire (DASS-21) consists of 21 questions developed by Lovibond et al. (1995). A set of three self-report scales was used for measuring negative emotional mood in depression, anxiety and stress. The above instrument is scored based on the four-point Likert scale from 1 to 4. Eventually, score 1 shows the minimum score and score 84 shows maximum level [21]. The reliability and validity of the scales (DASS-21) were examined by Samani and Jokar (2007) in Iran [22].

The Oxford happiness questionnaire (OHI) was developed by Argyle et al. (1989). This questionnaire consists of 29 sections which is categorized according to 4-point Likert scale. Each section is between 0 to 3 and the minimum total score is 0 and maximum score is 87. The more the individual's score, the higher their happiness will be interpreted. Argyle et al. (1989) reported reliability of 90% for this instrument using Cronbach Alpha coefficient [23]. The reliability and the validity of this instrument has been already confirmed by Alipoor [24].

Students in the aerobic and the anaerobic groups were required to attend a sports hall in the even and the odd weekdays, respectively. Aerobic and anaerobic exercise sessions were offered by the third researcher in thirty sessions held in ten consecutive weeks, i.e. three sessions a week. Each session consisted of three parts, namely warming up exercise (including a six-minute jogging followed by a four-minute stretching exercise), aerobic or anaerobic exercise, and cooling down exercise (including a four-minute jogging and a five-minute stretching exercise). Moreover, they were asked to do their activities of daily living and avoid any other regular exercise program during the study.

Standard aerobic exercise program: Exercise was started with 10 three-session weeks; and the first session with 50% of maximal oxygen uptake (VO_2 Max) consumption for 20 minutes, and then the severity and duration of exercise were increased in each exercise session according to the overload principle. In the final ninth and tenth weeks, the time was increased by 38 minutes and the VO_2 Max of 70% was consumed [25] (Table 1).

2.2. Standard Anaerobic Exercise Program

The exercise was started with 10 three-session weeks; and the first session with repeated sprints (30 m: 3 repeats, 60 m, 100 m: 1 repeat) with VO_2 Max of 95%. The severity and duration of exercise were increased in each exercise session according to the overload principle. In the final ninth and tenth weeks, the participants finished the distances of 30 meters with 11 repeats, 60 m with 6 repeats, and 100 m with 2 repeats with VO_2 Max of > 100 [26] (Table 1). The maximum oxygen consumption ($\%VO_2$ Max) = 15

Table 1. The Aerobic and Anaerobic Exercise Programs

Weeks	Anaerobic			Aerobic	
	Number of Repeats	Distance, m	%VO ₂ Max	Duration, min	%VO ₂ Max
First	3	30	≈ 95	20	≈ 50
	2	60			
	1	100			
Second	3	30	≈ 95	22	≈ 50
	2	60			
	1	100			
Third	5	30	≈ 100	24	≈ 55
	3	60			
	1	100			
Fourth	5	30	≈ 100	26	≈ 55
	3	60			
	1	100			
Fifth	7	30	< 100	28	≈ 60
	4	60			
	1	100			
Sixth	7	30	< 100	30	≈ 60
	4	60			
	1	100			
Seventh	9	30	< 100	32	≈ 65
	5	60			
	1	100			
Eighth	9	30	< 100	34	≈ 65
	5	60			
	1	100			
Ninth	11	30	< 100	36	≈ 70
	6	60			
	2	100			
Tenth	11	30	< 100	38	≈ 70
	6	60			
	2	100			

× (Maximum heart rate divided by the resting heart rate)
Maximum heart rate of each person is equal to age of person minus the fixed number 220 your age [27].

2.3. Analysis

Data analysis was done via the SPSS software (v. 13.0). The Kolmogorov-Smirnov test was conducted to test the assumption of normality while the measures of descriptive statistics (such as mean, standard deviation, and absolute and relative frequencies) were employed for data description and presentation. The Chi-square test and MANCOVA were run to compare the groups regarding students' marital status, age, weight, body mass index, DASS scores and OHI scores. The significant level in the statistical analysis was less than 0.05.

3. Results

This study was made on ninety students. During the study, three students left the study (one from the aerobic and two from the anaerobic groups). In other words, respectively 29, 28, and 30 students from the aerobic, anaerobic, and control groups completed the study. Students aged 18-25 years old, with a mean of 20.83 ± 1.80 . No significant difference was observed among the groups respecting students' age, weight, body mass index, and marital status ($P > 0.05$; Table 2).

No significant statistical difference was observed among three groups before intervention in terms of depression, anxiety, stress, and happiness variables ($P > 0.05$).

Multivariate analysis results in Table 3 indicate that considering four variables of depression, anxiety, stress, and happiness, difference among three groups is significant at varying levels of stress and anxiety dependent variable after intervention, and almost 11 percent of total variance or individual differences in stress and 7 percent in anxiety is related to the difference in three groups.

4. Discussion

Research findings also showed that stress and anxiety decreased in both aerobic and anaerobic groups after intervention, but severity of this reduction was higher in anaerobic group. The results for aerobic exercise is in line with the findings of the research already conducted on the effect of aerobic exercises on mental indices. For instance, some studies examined the changes in the level of Neoadrenalin, serotonin and Dopamine with aerobic exercises and stated that although there are many differences between experimental protocols, results demonstrate evidences for positive changes in synthesis and metabolism of Monoamines during this type of exercise. There are even other evidences that show aerobic exercises can cause a positive change in the density of neural conveyer in neural system and could have anti stress effects on reducing muscular tension and hormones level [28-30]. In another study, von Haeren et al. (2016) reported that through affecting automatic neural system, aerobic exercises can reduce the level of stress and anxiety, which endanger the human health, and take a positive step toward reducing anxiety and depression [31]. This may happen due to changes in cortisol level during doing aerobic exercises because various studies have reported the impact of aerobic exercise on reducing the level of cortisol and anxiety [32, 33].

However, the impact of anaerobic exercises on mental indices has been less studied. Martin et al. (2015) in their study demonstrated that although anaerobic exercises can

Table 2. Comparison of Personal Characteristics in Three Groups^a

Variables	Group			P Value ^b
	Aerobic	Anaerobic	Control	
Age, y	21.13 ± 1.88	21.00 ± 2.01	20.36 ± 1.42	0.17
Weight, kg	66.54 ± 6.27	66.12 ± 7.34	65.66 ± 7.1	0.81
Body mass index	21.07 ± 2.26	22.02 ± 2.02	22.08 ± 2.28	0.14
Marital status				
Single	26 (86.6)	18 (60)	22 (73.3)	0.24
Married	4 (13.4)	12 (40)	8 (26.7)	

^aValues are expressed as No. (%) or mean ± SD.

^bAnalysis of variance was performed for age, weight, body mass index while the Chi-square test was performed for marital status.

Table 3. the Mean of the Level of Anxiety, Depression, Stress and Happiness of the Participants Before and After the Intervention^a

Variable	Group					
	Before Treatment			After Treatment		
	Aerobic	Anaerobic	Control	Aerobic	Anaerobic	Control
Depression	16.18 ± 22.11	14.48 ± 4.28	13.96 ± 3.82	11.11 ± 4.82	10.96 ± 3.72	13.06 ± 4.54
Anxiety	12.70 ± 3.76	14.81 ± 5.47	13.13 ± 3.79	11.0 ± 3.13	11.21 ± 3.75	13.53 ± 6.58
Stress	14.40 ± 3.42	15.72 ± 4.54	15.10 ± 4.06	11.40 ± 3.95	11.54 ± 4.22	15.50 ± 4.84
Happiness	38.00 ± 11.40	37.39 ± 13.48	38.46 ± 8.03	43.77 ± 13.03	44.90 ± 14.53	38.46 ± 8.14

^aValues are expressed as mean ± SD.

Table 4. Multivariate Analysis of Covariance Results for Effects of Group on Depression Disorders, Anxiety, Stress, and Happiness

Source	Dependent Variable	SS	df	MS	F	Sig	Eta Squared
Groups	Depression	100.053	2	41.493	2.784	0.067	0.060
	Anxiety	148.274	2	58.737	3.514	0.034	0.075
	Stress	182.289	2	91.144	5.293	0.007	0.108
	Happiness	723.095	2	361.547	2.400	0.097	0.052
Error	Depression	1563.503	87	17.971	-	-	-
	Anxiety	1835.682	87	21.100	-	-	-
	Stress	1498.200	87	17.221	-	-	-
	Happiness	13104.861	87	150.631	-	-	-

reduce the tensions and mental challenges of the participants, this different was not statistically significant before the treatment and after that [34]. The results are in line with the results of the current study. However, they are different regarding the type of anaerobic exercises, study population and measuring instruments. In another study conducted by Meister et al. (2013) on professional football players, it was found that 3 weeks of anaerobic exercises can not change any mental indices of the athletes [17] while

in the present study mental indices of the youth having done anaerobic exercises have enhanced as well. However, the difference was not significant. This may be due to the difference in the study population in Meister et al. study that were all athletes and the way mental indices have been examined.

Contrary to the result of previous studies, Stein and Motta (1992) reported in a study that anaerobic exercises are more effective and useful than aerobic exercises. These

results are also in line with the results of the current study [18].

Kim et al. (2014) in a qualitative study examined the responses of 5 participants who did aerobic exercises and anaerobic exercises. The participants stated that different kinds of aerobic, anaerobic and even mental exercises had positive effect on their mental health and happiness, each with different degree which verifies the results of the present study [35].

On the other hand, contrary to the present study, some other studies which compared various sports individually, showed that aerobic and group activities are more effective on mental well-being than anaerobic and individual exercises [36]. This may be due to the different age group of the participants, as most studies conducted on middle age and elderly people.

In Sabetghadam et al. (2014) study, the students were treated by sport protocol of 10 weeks, 2 days a week and 60 minutes a day. The results demonstrated that doing various physical activity regularly especially aerobic exercises has a significant positive effect on reducing depression symptoms and appearing the happiness symptoms which is not in line with the results of the present study [19], as the findings of the present research indicate that happiness and depression were developed in participants after intervention, but the change was not statistically significant. It might be due to impact of various factors on these two important mood variables. Factors such as biological, emotional, and cognitive processes may be influential, accurate examination of which is recommended in the future works.

The limitations of the study include limited number of sample, not performing the bio physiologic or biochemical evaluation (for accurate examination of the effect of sport metabolism) and not pursuing the effect of exercise on reducing anxiety, stress, depression and happiness enhancement in long term. It is suggested that they are obviously considered in the future studies.

4.1. Conclusion

Although the findings of the present study confirm the positive effects of both aerobic and anaerobic exercises on reducing anxiety and stress. Therefore, the present results emphasize that exercises can be used as an effective strategy for reducing mental pressures. However, further studies are required to clarify the main metabolism of anti anxiety effects.

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Footnotes

Authors' Contribution: Toktam Kianian, participation in data analysis, research compilation; Fatihe Kermansaravi and Saman Saber, study design, data analysis, participation in research compilation; Fahime Aghamohamadi, study design, data collection, research compilation.

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