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A Comparative Study of the Efficacy of Cognitive Group Therapy and Aerobic Exercise in the Treatment of Depression among the Students

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Abstract

Background: Depression is one of the most common mental disorders. Finding effective treatments for such a disorder with higher efficiency lower side effects and affordability is an active area of research in psychiatry. This study aimed to comparatively analyze the effects of the cognitive group therapy and aerobic exercises on depression, automatic negative thoughts and dysfunctional attitudes of students at Kermanshah University of Medical Science.

Methods: In this clinical trial, 46 associate and undergraduate students at Kermanshah University of Medical Science were randomly divided into three groups: cognitive therapy, aerobic exercise, and control. The data was gathered both before and 8 weeks after the intervention. Beck Depression Inventory (BDI-II), automatic negative thoughts (ATQ), and the Dysfunctional Attitude Scale (DAS) were used as the data collection instruments. The data were analyzed with SPSS version 15 using paired samples T-test, chi-square test, Kruskal-Wallis test, and analysis of variance (ANOVA).

Results: Cognitive therapy caused a significant decrease in depression, belief in automatic negative thoughts, and dysfunctional attitudes in comparison to the control group ($p<0.05$). Although aerobics compared to the control group causes more reductions in the variables, however, It was only meaningful for the depression variable ($p=0.049$). Cognitive therapy also reduced the variables more than the aerobic exercise, but the decrease was not statistically significant.

Conclusions: Cognitive group therapy and aerobic exercise are effective in treating depression. For treating depression, aerobic exercise can be used as a therapy itself or along with cognitive-behavioral therapy and pharmacotherapy.

Keywords: cognitive group therapy, aerobic exercise, depression, students

1. Background

Depression is one of the most common mental disorders and a general problem of human life which is often called the common cold of psychiatry disorder (Seligman, 1975; mentioned in Hawton et al., 1989). The main feature of this disorder is at least a two-week period in which a person is either depressed or loses his interest or

pleasure in almost all his activities. Changes in appetite or weight, sleep and psychomotor activities, fatigue and loss of energy, which may appear in decreasing social, educational and occupational performances, feelings of worthlessness or guilt, thinking, concentrating or decision making problems, and thinking about or trying to commit a suicide, are from among other depression symptoms**.** In recent studies, major depression disorder has the highest lifetime prevalence among other psychiatric disorders (about 17%) (Sadock et al., 2007). Studies of depression in student groups also show a high range of depression (Hashemi & Kamkar, 2001; Ildarabady et al., 2004; Tavakoli zade & Mohamadpoor, 2001; Zohoor & Mosakhani, 2001). In recent years, many researchers confirm the usefulness and effectiveness of non- pharmacotherapy for depression. One of the non-pharmacotherapies of depression is cognitive therapy. Aaron T. Beck's cognitive therapy concentrates on cognitive changes that are supposed to have a role in the formation of depression. Cognitive therapy aims to relieve depression and prevent its recurrence through identifying negative cognitions, creating different, flexible and positive ways of thinking, and practicing cognitive and behavioral responses (Sadock et al., 2007). Studies on the efficacy of cognitive-behavioral group therapy for depression have shown that this treatment is effective in treating depression (Kahrizi et al., 2012; Taheri & Jamshidifar, 2007). Studies have shown that although pharmacotherapy and cognitive-behavioral therapy are useful in the treatment of such a disorder, exercise can also be effective in the treatment for depression. Many studies have examined the effects of aerobic exercise on depression and revealed that aerobic exercise is effective in improving depression and it can lead to a reduction in the depression symptoms of patients (Dimeo et al., 2001; McCann & Holmes, 1984; Zarshenas et al., 2008). Some studies have also represented that exercise has the same effect as cognitive therapy and pharmacotherapy. For example, in a study by Lawlor and Hopker in 2001, there were no significant difference between the effect of cognitive-behavioral therapy and exercise (Lawlor & Hopker, 2001). In another study, exercise and treatment by antidepressants were compared and there was no significant difference among the groups who received exercise interventions, medication, or both (Blumenthal et al., 1999). According to what was mentioned earlier, cognitive behavioral therapy and aerobic exercise are effective in treating depression, and cognitive treatment improves depression by affecting automatic negative thoughts and dysfunctional attitudes. This study was an attempt to examine the effects of aerobic exercise on automatic negative thoughts and dysfunctional attitudes. It was also aimed to find what the effects of cognitive therapy are on depression and its cognitive components in comparison to aerobic exercise and the control group.

2. Methods

This study was done as clinical trial; the population was all the students of Kermanshah University of medical sciences (KUMS) in 2013. In addition, it is recorded at the Iranian Registry of Clinical Trials (IRCT).

2.1 Participants

The sample of this study consisted of 46 associate and undergraduate students from the KUMS, who have been referred to the university counseling centers and recruited after clinical interview to diagnose depression, furthermore, they took the scores of 13 to 28 by completing the Beck Depression Inventory (BDI- II) after the interview. The inclusion criteria were having the score of 13-28 in the BDI-II test, receiving no medications, having strength, consent and willingness to participate in the study. Those who had a significant abnormality other than depression in axis I (using the SCID-I), drug abuse or addiction, abnormality in axis II (using the SCID-II), having suicidal thoughts and having psychotic symptoms such as hallucinations and delusions were excluded from the study. Three groups of cognitive therapy, aerobic exercise and control were equal in terms of demographic characteristics (age, sex, being indigenous and non-indigenous) and the pre-test score of the depression, which was evaluated using a questionnaire.

2.2 Measures

The instruments of this study included Beck Depression Inventory- 2nd version (BDI- II), Dysfunctional Attitude Scale (DAS) and Automatic Thoughts Questionnaire (ATQ).

Beck Depression Inventory (BDI-II): This questionnaire is a self report 21-item questionnaire for measuring the severity of depression in adolescents and adults which was reviewed in 1996 to conform to the requirements of DSM-VI for depression. In this questionnaire, the answers are scored 0 to 3. The BDI-II cut-off point is: 0-13=not depressed, 14-19=mild-moderate depression, 20-28=moderate-severe depression and 29-63=severe depression. Higher scores indicate more severe depressive symptoms. BDI-II, based on the Hamilton Rating Scale for Depression has the correlation of r=+0.71, and the reliability of its one week retest is 0.93 (Beck et al., 1996). In a sample of 94 individuals in Iran, psychometric properties were as follows: alpha coefficient of 0.91, the correlation coefficient between the two halves of 0.89, and test/retest reliability coefficient of 0.94 (Fata et al., 2005).

Dysfunctional Attitude Scale (DAS): This scale has been adjusted by Beck and Wissman in 1978. Which, developed based on Beck's cognitive theory of depression and anxiety? DAS consists of two parallel forms, each containing 40 clauses that the participants should comment on it based on the scale containing the complete agreement to complete disagreement. For grading DAS, scores from 1 (completely disagree) to 7 (totally agree) are utilized. However, for number 2, 6, 12, 17, 24, 29, 30, 35, 37 and 40, the grading is vice versa in comparison to the other cases. Therefore, the scores will theoretically range from a minimum of 40 to a maximum of 280. Beck et al. reported the reliability of 0.89 and more for the forms A and B. The correlation between the two tests was reported to be more than 0.81. In a survey to obtain the reliability coefficient, this test was done and evaluated on 50 participants (18 females, 32 males, with ages ranging from 21 to 36, (SD=3.46 and M=25) from the Kurdistan Islamic Azad University in the city of Sanandaj. The way of obtaining reliability was a test-retest method with an interval of two weeks. The results showed the reliability coefficient of 0.87 (Rahmani, 1998).

Automatic Thoughts Questionnaire (ATQ): The questionnaire was developed in 1980 by Hollon & Kendall. In 30 phrases of this questionnaire, some examples of automatic thoughts of depressed patients are presented. Patients will show severity and frequency of their thoughts by selecting options from 1 to 5. Gharraee in 2003 obtained the reliability coefficient of 0.78 for the beliefs rate and 0.85 for their frequency by implementing the test in a two-week interval 30 female and male students (Naziry, 2004).

2.3 Procedure

In the aerobic exercise group, before starting each session, subjects were asked to be on the location (dormitory or campus) 30 minutes earlier to be taught how to measure Radial and Carotid pulse and to have enough practice for them. In order to be sure of the aerobic nature of the exercise, the heart rates were measured. Each exercise session included: measuring and recording resting heart's rate before starting by the Carotid or wrist pulse, starting with warm-up exercises, stretching, breathing, meditation and initial respiration. Typically, the movements started from the head, neck or legs and continued by running in place. This stage took about 10 minutes. Then, the movements were carried on with greater intensity. The average intensity of movements was 0.60 to 0.80 heart rate. This step was faster with gestures and movements of the hands and feet separately, one-way, two-way, and cross legs. At this stage, the heart rate was measured and recorded by Radial or Carotid pulse. Duration of this period was 30 to 35 minutes. The final stage was the cooling down stage with less intensity, lasting for almost 10-15 minutes (Aerobic exercise sessions were conducted under the supervision of an expert sport).

The cognitive therapy group received 12 sessions of cognitive behavior therapy, 2 sessions per week, in the first half of treatment, and 1 session per week for the second half based on the cognitive model of Michael Frey (1996), as presented in the Table 1.

Table 1. The contents of the cognitive behavior therapy session

Session	Content
1	Welcome and presentation of the basic rules of thought and feeling
2	Cognitive theory, the theory of emotional, approach to identify automatic thoughts and resistance to treatment
3	Behavioral outcomes beliefs, vertical arrow method and advanced vertical arrow
4	Categories beliefs
5	Cognitive maps and the use of ratings(SUD)
6	Test beliefs
7	Homology analysis and useful analysis of beliefs
8	Logical analysis
9	Hierarchy based on cognitive map, Alternative belief and its features
10	Change perceptions and cortical inhibition
11	Discuss your punishment-reward and the use of imagination
12	Review and Closing

The members of the control group gathered in a classroom or the amphitheater of the Faculty of Health at KUMS. They tried to discuss the issues raised by themselves. The sessions in all the three groups lasted about 45 to 60 minutes.

2.4 Data Analysis

The statistical analysis was performed using SPSS. For normal distribution of quantitative data, Kolmogorov-Smirnov test, for the homogeneity of variances, the leven's test, for the comparison between groups, one way Analysis of variance (ANOVA) and for the nonparametric equivalent of this test the Kruskal-Wallis test were used. Then, the post hoc tests (Scheffe) were utilized. In terms of the adherence to ethics, the participants in this study were permitted to withdraw from the study in case of aggravating the symptoms, especially suicidal thoughts. The subjects suffered from severe depression were referred to the psychiatrist for treatment. It should be noted that the tasks of the therapy and the evaluation were separately performed by two individuals.

3. Results

Among 46 people participated in the study, 16 patients were in the aerobic exercise group (3 girls and 13 boys), 16 in the cognitive therapy group (4 girls and 12 boys) and 14 in the control group (3 girls and 11 boys). The average age in the aerobic exercise group was 20.93±1.06, in cognitive therapy group 21.12±1.25, and in the control group 20.92±1.20 years (P=0.938).The studied groups were not significantly different in terms of sex, being indigenous or non-indigenous before intervention and the pre-test variable scores (P>0.05) (Table 2).

Table 2. One way ANOVA for comparing scores of pre-test, posttest and differences between pre-test and post-test in the tree groups

variable	groups	Pre-test	P-value	Post-test	Different between pre-test and post-test	p-value
		Mean±SD		Mean±SD		
depression	Cognitive therapy	22.62±3.40	0.76	11.06±4.13	11.56±4.5	**0.006**
	Aerobic exercise	23.12±3.61		13.31±5.40	9.81±7.16	
	control	22.70±4.84		18.35±6.14	3.71±7.68	
Frequency of negative automatic thought	Cognitive therapy	67.50±19.96	0.72	48.06±14.59	19.43±17.82	**0.134**
	Aerobic exercise	64.31±20.47		49.43±14.78	14.87±18.31	
	control	70.28±20.96		64.35±17.14	5.92±18.43	
Believe to negative automatic thought	Cognitive therapy	66±17.31	0.27	46.25±12.60	19.75±13.02	**0.007**
	Aerobic exercise	58.81±15.28		49.18±15.31	9.62±13.84	
	control	67.42±14.05		63.71±18.28	3.71±13.33	
Dysfunctional Attitude	Cognitive therapy	143.62±24.84	0.102	124.68±27.19	18.93±11.44	**0.027**
	Aerobic exercise	141±33.10		133.56±30.43	7.43±21.49	
	control	162.64±28.74		161±29.91	2.53±13.97	

To compare the differences among the groups, firstly, their pre-test scores before were subtracted from their post-test scores. Secondly, one way Analysis of variance (ANOVA) and Scheffé's Post hoc test were used to compare and contrast the differences.

Considering the groups, the variables of depression (P=0.006), believing in automatic negative thoughts (P=0.007), and dysfunctional attitudes (P=0.027) were significantly different between the groups after the intervention (Table 2).

In order to find the groups which were significantly different, a Scheffé's test was used. The results of the test revealed that the cognitive group therapy in relation to the control group has caused a significant reduction in depression (P=0.008), believing in automatic negative thoughts (P=0.008), and dysfunctional attitudes (P=0.036). However, comparing both groups regarding the frequency of believing in automatic negative thoughts, there was

no significant difference. Although aerobics in the control group causes more reductions in the variables, It was only meaningful for the depression variable (P=0.049). Additionally, the cognitive therapy group shows more reductions comparing with aerobics exercises group; however, they are not statistically significant (Table 3).

Table 3. Scheffe test for comparing scores of differences between pre-test and post-test in the tree group

variable	(i) Groups	(j)Groups	Mean Difference (I-j)	p-value
Depression	Cognitive therapy	Aerobic exercise	1.75	0.75
		control	7.84	0.008
	Aerobic exercise	control	6.09	0.049
Frequency of negative automatic thought	Cognitive therapy	Aerobic exercise	4.56	0.77
		control	13.50	0.14
	Aerobic exercise	control	8.94	0.41
Believe to negative automatic thought	Cognitive therapy	Aerobic exercise	10.12	0.114
		control	16.03	0.008
Dysfunctional attitude	Cognitive therapy	Aerobic exercise	11.5	0.151
		control	16.39	0.036
	Aerobic exercise	control	4.89	0.72

4. Discussion

The present study has demonstrated that the cognitive group therapy significantly caused more meaningful reductions in depression, automatic negative thoughts and dysfunctional attitudes than the control group. The meaningful reduction in depression after 12 sessions of cognitive-behavioral therapy is in line with the findings of Wong (2008) Taheri and Jamshidifar (2007), Ranjbar et al. (2010) Forouzande et al (2003)

Along with the findings of Oei et al., the results of this study demonstrated that the cognitive-behavioral therapy causes meaningful reductions in automatic negative thoughts, believing in automatic thoughts and dysfunctional attitudes (Oei et al., 2006).

According to Beck depression model, experience in individuals would result in making assumptions and schema about the self and the environment. These assumptions play crucial roles in organizing cognition and behavior control. If these assumptions are inflexible and extreme, they are dysfunctional and if they are activated, they will cause automatic negative thoughts which are related to undesirable excitements leading to depression's symptoms. The more the automatic negative thoughts, the more depressed the individual. Cognitive therapist can help to break this vicious circle (Hawton et al., 1989).

Moreover, the results are in accordance with the casual cognitive model. This model suggests that automatic negative thoughts and dysfunctional attitudes are involved in the beginning and the maintenance of depression. Cognitive intervention firstly targets the automatic negative thoughts, which are the mediator of depression; then it will focus on replacing them with more compatible thoughts. According to theory, reduction in negative automatic thoughts should bring about a reduction in depressive symptoms. Next, the dysfunctional attitudes that are replaced by more realistic ones should further reduce negative automatic and depressive symptoms (Oei et al., 2006).

The findings of the present study also demonstrates that the participant in aerobic exercise group have shown significant reduction in the scores of depression in comparison to the control group. This is compatible with the findings of Nabkasorn et al. (2006), McCann and Holmes (1984), Dimeo et al. (2001) Zarshenas et al. (2008) and Craft (2005).

As several factors might be at work, one is biological processes. The reported data is in congruous with the assumption that in behavioral disorders, maladjustments in biological amines could be responsible. Norepinephrine and Serotonin neurotransmitter are among the biological amines which have the highest level of intervention in Pathophysiology of mood disorders. However, there are theories considering the role of Dopamine in depression as well. It seems that in depression disorders, the level of this neurotransmitter decreases (Sadock et al., 2007). A number of studies have examined the levels of Noradrenalin, Serotonin and Dopamine while exercising. Although there were significant differences in experimental protocols, the results have shown that there are changes in Synthesis and monoamine metabolism during exercising (Meeusen & De

Meirleir, 1995). There have even been studies demonstrating that exercising could change the concentration of Neurotransmitter (Chaouloff, 1997). Thusly, physical exercise might be a therapeutic strategy in treating severe depression because of evacuation of neurotransmitters (Sadock et al., 2007). According to British National Association of Health, exercising increases the level of Serotonin in the brain (Hemat-Far et al., 2012).

Another factor for justifying the results of this study might be related to psychological variables. For instance, in a study Craft et al. demonstrated that not only exercising decreases depression but also increases self-esteem (Craft et al., 2005). Foley et al. also showed that the severity of depression has a significant negative relationship with changes in coping efficacy and episodic memory. Generally speaking, this study demonstrated that physical exercises are related to positive cognitive and psychological changes in patients with depression (Foley et al., 2008).

Another model for explaining this study is that of distraction or Time-out Hypothesis. It suggests that through the act of engaging in exercise, a psychological release is provided from the primary source of worry or depression (Alfermann & Stoll, 2000). Considering that in the control group the element of distraction was present, this might be one of the reasons of the significant differences between the groups. Although the cognitive therapy group shows more reductions comparing to aerobics exercises group, they are not statistically significant. This might be a result of distraction in cognitive group therapy in the control group. Somehow, participants' attention was drawn to the issues being discussed in the sessions; ergo they were distracted from the sources of anxiety. Hence, there negative thoughts were decreased. Perhaps, this matter is one of the reasons that the variable of cognition was not significant in comparison to the aerobic exercise and the control group.

Additionally, the result of this study indicates that there is no significant difference between cognitive-behavioral and aerobics therapy. This is in congruous with the findings of Lawlor and Hopker (2001), Fremont and Craighead (1987). As far as the researchers know, there is no research on comparing the impact of aerobics and cognitive therapies on the variables of automatic negative thoughts, its frequency and dysfunctional attitudes.

5. Conclusion

According to the results of the present study, both cognitive-behavioral and aerobics therapy are effective in the treatment of depression. Accordingly, aerobics could be employed alone in the treatment schedule of patients suffering from depression or with cognitive therapy and pharmacotherapy. Aerobics is easy to learn and requires no specialist not to mention the fact that it is cheaper than cognitive-behavioral therapy. Thus, aerobics is better than cognitive therapy in terms of expenses and availability. However, cognitive-behavioral therapy reduces depression and its cognitive symptoms more. Moreover, in the long run, it probably has better results than aerobics therapy. Considering the limits of the present study, this was not possible to investigate in this study.

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Conflict of Interest

The authors declare that there is no conflict of interests regarding the publication of this paper.

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