



## The Short-term Effect of Aerobics on Depressive Symptoms toward Healthy People

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### Authors' contributions

*This work was carried out in collaboration between both authors. Author TS designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Author NY managed the analyses of the study. Both authors read and approved the final manuscript.*

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### ABSTRACT

**Aims:** To clarify whether short-term aerobics can ameliorate depressive symptoms.

**Study Design:** Open trial without comparison.

**Place and Duration of Study:** Aerobics exercise course was held on Saga Newspaper Culture Center, Saga, Japan. Duration of this study was three months between April 1, 2010, and June 30, 2010.

**Methodology:** Eleven healthy people who participated in the aerobics exercise, of which 5 were men and 6 were women. The age range is 25 to 75 years (mean 49.2 ± SD 14.3). In the aerobic exercise program, one session (90 minutes) was composed of brief meeting (10 minutes), warm-up exercises (5 minutes), the primary exercises (low impact and high impact, 30-35 minutes), stretch (10 minutes), muscle training (25 minutes), and cooling down (5 minutes). The two outcome measures, Zung's Self Depression Scale (SDS) and Beck Depression Inventory (BDI) were assessed at baseline and three months.

**Results:** At baseline, mean ± SD for SDS and BDI were 35.5 ± 8.8 and 5.6 ± 9.7, and 31.9 ± 5.8 and 2.2 ± 3.5 at the three month follow up. There was only significant improvement in SDS (SDS, z = -2.014, p = 0.044; BDI, z = -0.294, p = 0.294).

**Conclusion:** Aerobic exercise program seems to decline depressive symptoms among healthy people. In particular, this effect may be reflected in SDS not in BDI among Japanese people.

**Keywords:** Aerobics; depressive symptoms; zung's self depression scale; beck depression inventory.

## 1. INTRODUCTION

It is well known that exercise helps maintain healthy physical and physiological functions such as muscles, bones, joints, circulatory system and other internal organs [1,2]. However, recently, it has become increasingly clear that exercise also affects mental aspects such as emotions [1] [3-7]. The psychological effects of performing such exercises and sports not only temporarily reduce negative emotions such as anxiety, anger, hostile aggression, and other unpleasant emotions and emotional tensions, but also temporarily reduce them. It has been reported to enhance positive emotions such as vitality and positivity [8-10]. The importance of exercise as a stress manager has also been pointed out [11]. Therefore, based on these findings, the purpose of this study was to examine how aerobic exercise affects basic physical fitness and mental state.

In modern society, as is often referred to as a stressful society, the number of people suffering from psychological and social stress is increasing, and most of the illnesses are related to stress. Under these circumstances today, this study seeks to explore the possibility of exercise prescription for mental health purposes.

In the previous literature, it has been reported that aerobics exercise was significantly improved for elderly people with depression [12]. Therefore, we would like to evaluate how much depressive symptoms are improved by performing aerobics exercise for healthy people.

## 2. METHODOLOGY

The subjects of the research are 11 healthy people who participate in "Metabolic Syndrome, Depression Elimination! Power Aerobics" which is held as an extension course of the Saga Newspaper Cultural Center. Of the 11 participants, 5 were male and 6 were female. The age of the research subjects is 25 to 75 years (mean 49.2 ± SD 14.3). The research period was 3 months from April 1, 2010, to June 30, 2010, and a 90-minute aerobics exercise was conducted once a week (Friday) from 7:00 pm to 8:30 pm. The aerobics exercise was performed 12 times in total over 3 months.

Then, two depressive symptom evaluation scales, Zung's Self Depression Scale (SDS) [13] and Beck Depression Inventory (BDI) [14], were

evaluated before and 3 months after the aerobics exercise.

The flow of aerobics exercise (90 minutes) in this study is explained below.

(1) At the meeting held before aerobics, participants gather to discuss topics related to exercise. (2) Warming up for 5 minutes. Warming up raises body temperature and heart rate, and by moving and stretching a little, you can exercise with high intensity. (3) First exercise for 30 to 35 minutes (low impact1 and high impact1) low impact 1 warms the body with movements centered on walking. First, stretch your limbs and don't make too complicated movements. High impact 1 is centered on jogging, and aerobics is performed by adding hand movements to jogging, fast vertical and horizontal movements, and arranging the basic step. (4) 25 minutes muscle training (low impact 2 and high impact. (5) Five minutes cool down. Hydration causes the body to lose water due to sweating during exercise, so hydrate in a timely manner before feeling thirsty. Water supply was performed. (6) 10 minutes stretch Stretching moves joints to slowly stretch the target muscle, and when it is stretched moderately, it maintains its posture for a moderate amount of time. (7) 25 minutes of muscle training: performing muscle training centered on abdominal exercises using a mat. (8) 5 minutes cool down: Cool-down stretch is performed to relieve muscle fatigue and increase the flexibility of the body to return to the body before exercise. To evaluate depressive symptoms, the following 2 psychological instruments were used: The Zung's Self Depression Scale (SDS) and Beck Depression Inventory (BDI) described detail below.

### 2.1 SDS (Self-rating Depression Scale)

SDS is a self-assessment scale devised by Zung WK to evaluate depressiveness, especially in terms of physical symptoms. The 20 items are self-evaluated in 4 stages, the 1st and 3rd items are about emotions, the 2nd and 4th to 10th items are about physiological aspects, and the 11th to 20th items are about psychological symptoms. SDS has 10 items, which is half of all items, as inverted items, and is devised so that the pattern is difficult for patients to understand. For each item, "not" or "occasionally" = 1 point, "sometimes" = 2 points, "quite for a while" = 3

points, "almost always" = 4 points, and the total score is given.

## 2.2 BDI (Beck Depression Inventory)

BDI was devised by the psychiatrist Beck AT, who constructed cognitive-behavioral therapy, and is a typical psychological test for self-assessment of cognitive depressive symptoms. Created according to the diagnostic criteria of DSM-IV, it answers 21 questions about the condition of the past two weeks, and the tendency to take things pessimistically and the tendency to have no bright prospects for the future are remarkable. By performing BDI on a regular basis, the state of mood can be measured numerically. It is used as one of the diagnoses of depression.

For the analysis, Wilcoxon signed-rank test (SPSS version), which can be used regardless of the distribution form of the data, was used. The background is that the number of subjects in the experimental group was small, the SDS and BDI scores in the experimental group did not show a normal distribution, and a paired before and after comparison was made. The statistically significant difference was  $p < 0.05$ .

## 3. RESULTS AND DISCUSSION

Based on comparison of depression assessments, on the SDS depressive symptom evaluation scale, mean  $\pm$  SD ( $35.5 \pm 8.8$ ) before aerobics exercise was performed, and after 3

months of follow-up, mean  $\pm$  SD ( $31.9 \pm 5.8$ ), BDI on the depressive symptom evaluation scale, aerobics exercise. There was a change in mean  $\pm$  SD ( $5.6 \pm 9.7$ ) before the procedure and mean  $\pm$  SD ( $2.2 \pm 3.5$ ) after the follow-up after 3 months. In SDS ( $z = -2.014$ ,  $p = 0.044$ ), BDI ( $z = -0.294$ ,  $p = 0.294$ ), and a significant improvement in depressive symptoms was observed on the depressive symptom evaluation scale of SDS ( $p < 0.05$ ) (Fig 1.).

It was suggested that aerobic exercise, which is an aerobic exercise, significantly reduces depressive symptoms from the viewpoint of SDS depressive symptom evaluation scale. However, the aerobics movement is carried out in a group setting, and it is possible that the mutual social interaction of the participants may lead to the improvement of depressive symptoms. This possibility is thought to be due to the fact that there are peers with the same aspirations in the same space, and counseling between peers is natural, so communication within the group accounts for a large proportion. From a communication point of view, it is not possible in today's study to determine whether improvement in depressive symptoms is due to aerobics exercise or another effect, but more about whether group exercise can improve depressive symptoms. It needs to be scrutinized. Furthermore, in order to clarify whether aerobics exercise has a direct effect, it is also necessary to investigate whether there is a change in depressive symptoms due to differences in settings between the group and the individual (home).

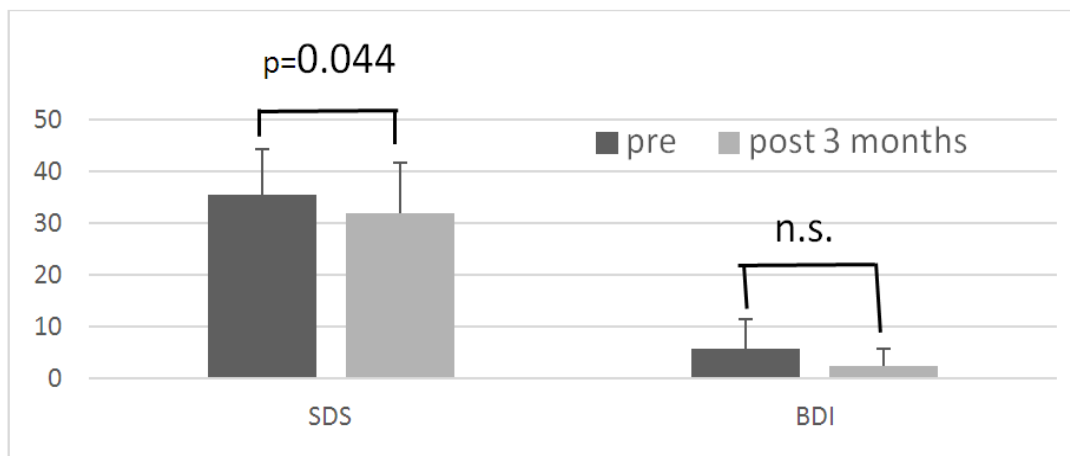


Fig.1. Changes of depressive symptoms

It is necessary to investigate how effective aerobics exercise is in improving depressive symptoms by comparing the group that has aerobics exercise for 3 months individually while watching the DVD and the group that has aerobics exercise in a group. In that case, the content and duration of the aerobics exercise must be the same. In addition, it was suggested that the effect of aerobics exercise may be more apparent in Japanese people in SDS, which evaluates depressive symptoms from the physical aspect, than in BDI, which looks at the cognitive aspect. Changes in the physical surface can be sensitive to even the slightest changes based on individual subjective judgment, so it is possible that the changes will also be affected by the physical condition at that time. Therefore, in the future, if we evaluate depressive symptoms using SDS and BDI under the same conditions not only for Japanese but also for people from other countries, we will investigate how much difference will occur due to differences in race, culture, etc. It is also possible to do. At that time, pursuing the validity of SDS is also established as part of the research. From the above, aerobic exercise, which is an aerobic exercise, has a great effect on both mental and physical aspects, especially on the mental side, and good improvement was seen even in a short-term aerobic exercise, so the usefulness of exercise prescription for mental health.

#### 4. CONCLUSION

Even short-term aerobics exercise was significant effective method to ameliorate depressive symptoms according to psychological test, Zung's SDS. We suggest it is important to incorporate more aerobics exercise into the treatment of depression.

#### CONSENT AND ETHICAL APPROVAL

This research was conducted by getting approved by the Institutional Review Board of the Faculty of Medicine, Saga University, and an additional application was submitted to add some items, which was approved by the Institutional Review Board in 2010. In addition, the subjects were asked to cooperate after explaining the purpose and content of the research and gaining their understanding. Participation or non-participation in the research is the person's free will, non-participation in the survey, interruption of response, incompleteness, etc. will not be disadvantageous, and consent can be withdrawn at any time. We verbally explained in advance,

and a questionnaire was distributed to those who obtained their consent. We explained that we would anonymize and strictly protect the data so that it would not identify individuals, and that we would not use the data for purposes other than research "Principles of laboratory animal care" (NIH publication No. 85-23, revised 1985) were followed, as well as specific national laws where applicable. All experiments have been examined and approved by the appropriate ethics committee. All psychological tests have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

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#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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