Psychiatria Danubina, 2022; Vol. 34, Suppl. 1, pp 967-971 *Article*

RESEARCH ON THE EFFECT OF BASKETBALL ON MENTAL REHABILITATION OF DEPRESSED PATIENTS

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SUMMARY

***Introduction**: Statistics from the Global Health Data Exchange (GHDx) show that 5.0% of the adults in the world suffer from depression, especially among Chinese college students. According to the World Health Organization, a quarter of Chinese college students have admitted to having depressive symptoms. Studies have shown that aerobic exercise has a good therapeutic effect on depression. This paper takes basketball as an example to explore its effect on the mental rehabilitation of Chinese college students with depression.*

***Subjects and methods**: The subjects were divided into four groups. Experimental group 1 received basketball therapy once or twice a week, experimental group 2 three to five times a week, and group 3 six or seven times a week. The study lasted for two months, and the BDI total score was tested once a week for a total of 9 tests. Then data analysis was performed using SPSS24.0.*

***Results**: The BDI scores of the control group and the experimental group 1 were significantly different at the 0.01 level ($t = 5.526$, $P < 0.01$). The BDI scores of the control group and the experimental group 2 were significantly different at the 0.05 level ($t = 3.022$, $P < 0.05$). The BDI scores of the control group and the experimental group 3 were significantly different at the 0.05 level ($t = 20873$, $P < 0.05$). After the treatment with basketball exercise therapy, the patients' depression levels decreased significantly.*

***Conclusions**: After treatment supplemented with basketball exercise therapy, it significantly improved the treatment effect of depression in patients. Under the condition of ensuring the amount of exercise, it has the most obvious improvement effect on depression when the patients play basketball three to five times a week or as much as possible.*

***Key words**: basketball - sports - depression - treatment - mental rehabilitation - college students*

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INTRODUCTION

"Depression" in a broad sense refers to a large group of mental disorders collectively referred to as "mood disorders". According to the Global Health Data Exchange (GHDx), 5.0% of adults worldwide suffer from depression. Depression is distinct from the usual mood swings and short-lived emotional responses to challenges in everyday life (Ionescu et al. 2013). Especially when depression recurs and reaches moderate or severe levels, it can become a serious health condition. Patients can be greatly affected, perform poorly at work, at school and at home, and at worst, depression can lead to suicide (Halbreich & Kahn 2007). So far, the cause of depression has not been very clear. However, it is certain that many aspects of biological, psychological, and social environmental factors are involved in the pathogenesis of depression. Biological factors mainly involve genetics, neurobiochemistry, neuroendocrine, and neurodegeneration. The psychological predisposition qualities that are closely related to depression are pre-morbid personality traits, such as depressive temperament (Goldberg 2014). Stressful life events in adulthood are important triggers for clinically significant depressive episodes. These factors do not act individually but have a very complex interaction (Ashaie et al. 2019).

During a depressive episode, the patient is depressed (feeling sad, irritable, empty) most of the day, almost every day for more than two weeks, and loses pleasure or interest in any activities. Other symptoms may include poor concentration, excessive guilt or self-deprecation, hopelessness about the future, thoughts of death or suicide, sleep disturbances, changes in appetite or weight, and feeling particularly tired or lacking energy (Parker & Roy 2001). Patients have significant difficulties in personal, family, social, educational, occupational, or other important functional areas. College students are in a necessary period of transition to maturity. Their physical, psychological, and social adaptation is in an important development period. On the one hand, students are immature and more malleable, on the other hand, they begin to move towards social and step into a complex social life (Gonzalez-Forteza et al. 2019). For these two reasons, young college students are prone to react strongly to many things but do not deal well with them, thus increasing their psychological burden and prone to a series of psychological and behavioral problems (Vieira et al. 2021). A survey by the China University Media Alliance found that 39.9% of the interviewed college students had suspected depression, and 34.38% of the respondents said that even if they suffer from depression, they would not choose to seek help from a psychiatrist. The World Health Organization has also pointed out that a quarter

of Chinese college students have admitted to having depressive symptoms (Liao et al. 2010).

The exact mechanism by which physical activity improves mental health is largely unknown, but so does psychotherapy and medication. Antidepressant therapy is likely to work due to a combination of effects, including changes in thought, emotion, and brain pathways, and may also have a placebo or desired effect (Monteiro et al. 2021). A study by the University of California found that intense exercise for half an hour to an hour can significantly increase the levels of neurotransmitters glutamate and GABA in the brain. Glutamate and GABA are the most common neurotransmitters in the brain and are important for signal communication between neurons in the brain (Koo & Kim 2020). The increase in these two neurotransmitters in the brain after exercise may also be one reason why exercise can treat depression. Aerobic exercise not only treats but also prevents depression, and even very small amounts of exercise (such as a 20-minute walk per day) can significantly prevent depression and can be effective in people of any age (Ashdown-Franks et al. 2017). By studying the therapeutic effect of basketball on patients with depression, this paper provides some references for the improvement and solution of depression among students.

SUBJECTS AND METHODS

Subjects

This study selected 84 undergraduates suffering from depression from a university in Hunan Province of China as the research subjects. All subjects were informed and consented to the research background and protocol.

Characteristics of subjects

By gender: 38 males and 46 females.

By grade: 35 freshmen, 23 sophomores, 19 juniors, and 7 seniors.

Scale

Depression self-rating questionnaire (BDI), also known as the Beck depression rating scale, was compiled by the famous American psychologist Beck AT in the 1960s and has been widely used in clinical epidemiological surveys (Hong & Wong 2005).

The BDI is composed of 13 items, and the corresponding symptoms are depression, pessimism, sense of failure, lack of satisfaction, self-guilt, self-disappointment, negative tendencies, social withdrawal, indecision, self-image changes, fatigue, loss of appetite. Items are scored in four grades, with no symptoms as 0; mild as 1; moderate as 2; severe as 3. Specifically for each item (question), there are 4 short sentences, and the subject is asked to choose the one that best matches his mood or situation at the time. For example, the descriptive phrases for item 1 depression are: "0. I don't feel blue", "1. I feel blue or depressed", "2. I feel blue all day and I can't get rid of it", "3. I Feeling very depressed, I can't stand it anymore", the subjects need to choose one item from 0-3. The BDI has only two statistical indicators, a single score, and total score. Beck proposed that the presence and severity of depressive symptoms can be distinguished by a total score, 0-4: (basically) no depressive symptoms; 5-7: mild depression; 8-15: moderate depression; 16-39 points: severe depression (Svanborg & Asberg 2001).

Scale notes

1. Like other self-assessment scales, this scale requires the subjects to have a clear understanding of the assessment method before starting the assessment.
2. Be sure to emphasize the time frame of the assessment. This scale assesses the current (today or present) situation or mood.
3. Generally speaking, this scale is not suitable for illiterate and low-educated people.
4. The scale is completely anonymous.

Research process

The subjects were divided into four groups, the control group and the experimental group 1, the experimental group 2, and experimental group 3. According to the diagnosis results of psychiatrists, the control group was treated with normal depression treatment methods (such as drug treatment, etc.), and the experimental group was supplemented with basketball exercise therapy on the basis of normal treatment. Experimental group 1 was administered 1-2 times a week, 30-60 minutes of basketball exercise treatment each time. Experimental group 2 took 3-5 times a week, 30-60 minutes each time. Experimental group 3 took 6-7 times a week, 30-60 minutes each time. The study lasted for two months and the BDI total score was tested once a week for a total of 9 tests.

RESULTS

In the data processing link after the experiment, according to the Dixon Criterion, $f0$ is compared with $f(n, \alpha)$, if $f0 > f(n, \alpha)$, the data is determined to be abnormal data to be excluded. The effective data are classified and counted, the arithmetic mean of each group of data is shown in Table 1, and the line graph of BDI score changes is shown in Figure 1.

A total BDI score of 5-7 is mildly depressive. The patient may feel anxious, pessimistic, and misanthropic to a certain extent, which may affect normal interpersonal communication and cause underlying diseases.

The total BDI score of 8-15 is moderately depressive. The patient has a low and bad mood, obvious symptoms of insomnia, slow thinking and

action, obvious anxiety symptoms, and depressive symptoms are already very obvious. When conditions permit, it is necessary to contact a psychiatrist or relevant experts for treatment in a timely manner in order to improve their living environment and sleep quality and strengthen communication with family members while cooperating with drug treatment.

The total BDI score of 16-39 is severely depressive. The symptoms are very serious and must be actively cooperated with the doctor's treatment. Patients with a severe depressive disorder are depressed most of the time, lose interest in activities of ordinary interest, significantly loss or gain weight, significantly reduce or increase appetite, sleep insomnia or sleep too much every day and other symptoms, and are highly likely to commit suicide. The patient's family members should take safety precautions, actively cooperate with the doctor's treatment, create a good living environment for the patient and help the patient recover as soon as possible.

Table 1. Statistics of BDI scores in each group

	1st time	2nd time	3rd time	4th time	5th time	6th time	7th time	8th time	9th time
Control group	16.17	15.56	15.01	14.66	14.31	14.24	13.39	12.40	11.66
Experimental group 1	16.07	15.26	14.28	14.04	13.34	13.27	12.89	11.18	10.38
Experimental group 2	16.91	16.06	14.47	13.59	11.95	9.03	8.94	8.37	7.21
Experimental group 3	16.27	16.24	15.35	13.42	12.75	11.31	9.93	9.61	8.21

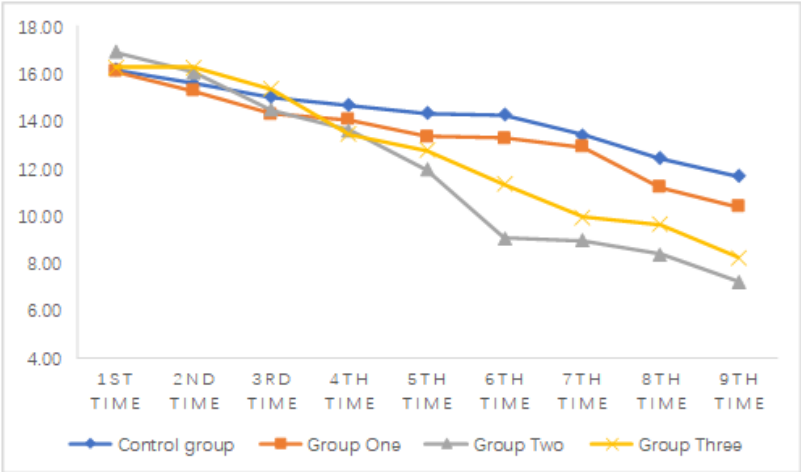

Figure 1. Line chart of changes in BDI score

From Table 1, Figure 1, and the original data, it can be seen that before the treatment, the depression degree of the patients was generally between moderate and severe, and the symptoms were obvious, which requires the intervention of a psychiatrist. After the synergistic treatment of psychology and sports, the degree of depression of the patients generally decreased. The *t*-test results of the BDI scores of the control group and each experimental group are shown in Table 2, and the details of the data of each group are shown in Table 3.

Table 2. *t*-test of BDI scores in the control group and each experimental group

	M	S	95% CI	*t*	*P*
Control group & experimental group 1	0.743	0.404	0.433-1.054	5.526	0.001
Control group & experimental group 2	2.319	2.302	0.549-4.088	3.022	0.017
Control group & experimental group 3	1.590	1.660	0.314-2.866	2.873	0.021

Table 3. Data details of each group

	R	Min	Max	M	S	S^2
Control group	4.51	11.66	16.17	14.156	1.455	2.118
Experimental group 1	5.69	10.38	16.07	13.412	1.806	3.263
Experimental group 2	9.7	7.21	16.91	11.837	3.593	12.911
Experimental group 3	8.06	8.21	16.27	12.566	2.999	8.996

CONCLUSION

The results of this experiment prove that, on the basis of general depression treatment, supplemented with basketball exercise therapy can significantly improve the depression treatment effect of patients. Under the condition of ensuring 30 to 60 minutes of daily exercise, the depression relief effect of exercising three to five times a week is the most prominent. The depression relief effect of exercising six or seven times a week is basically close to that of exercising three to five times a week, but slightly lower than the latter. Exercise once or twice per week was less effective in reducing depression than three to seven times a week. Even so, it was better than no exercise at all. Through this experiment, the result that can be drawn is that under the condition of ensuring the amount of exercise (30 to 60 minutes a day), trying to play basketball three to five times a week has the most obvious improvement effect on depression symptoms.

The research results of this experiment should not be rigidly interpreted. We also need to focus on the individual differences of different people. During the specific experiment process, we found many subjects that did not conform to the overall data. For example, some individuals' depressive symptoms were greatly improved after prolonged exercise seven times per week, but some individuals experienced physical discomfort due to high-intensity exercise, which led to poor relief of depressive symptoms (Haltenhof & Brack 2004). From the viewpoint of exercise physiology, people who are slightly less physically fit or who have participated in physical exercise for the first time should not adopt an excessively frequent physical exercise mode. They can wait a few weeks or months after exercising, and then increase the frequency of exercise according to their physical conditions. People who are overweight and physically weak are prone to respiratory, circulatory, digestive and other systemic reactions and muscle soreness, so they should be especially cautious when increasing the frequency of exercise (Panza et al. 2020).

Exercising can be challenging for anyone. Developing a daily exercise program can be especially difficult for someone battling depression. Low motivation, lack of fun, difficulty planning, and fatigue are real barriers to physical activity. In these situations, simple behavioral strategies or techniques can help patients incorporate more physical activity into their daily lives (Dinoff et al. 2018). First, patients can take psychological cues to help themselves become more positive and remove cues that make them less positive. Examples of positive cues are marked, such as sneakers placed prominently, notes on a calendar, an app on a phone, etc. Second, patients can set schedules and goals that match their needs and preferences. Motivation is likely to be an issue for someone with depression. A simple and easily realistic goal, like shooting 30 times a day, can help the sufferer get started. Make sure not to set too many goals at once. Focus on one physical activity first, and try new ones when you reach your set goals. In addition, strong social support is equally important as lack of support is a risk factor for depression. Support can take many forms, including having someone to encourage oneself, or having someone who can help with a physical activity program. Multiple different sources of social support are the ideal situation.

Acknowledgements:

This work is financially supported by the Key Project of Education Department of Hunan Province (No. 20A099); The Outstanding Youth Project in Scientific Research of Hunan Education Department (No. 18B018); The Social Science achievements in Hunan Province Selection Committee Topics (No. XSP22YBC395); Teaching Reform Research Project of Hunan Normal University in 2020; Academic Degree and Postgraduate Teaching Reform Research Project in Hunan Province (No. 2021JGSZ038).

Conflict of interest: *None to declare.*

Contribution of individual authors:

Shun Shan: is responsible for the overall design of the research and the writing of the paper.

Pei Luo: the corresponding author who is responsible for the analysis and processing of data and participates in the writing of the paper.

Haiting Xiao: is responsible for the overall design of the research and the writing of the paper.

Xiaofen Ding & Caifen Hu: is mainly responsible for the collection and interview of research data.

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