

Effects of flotation therapy on relaxation and mental state

HU Pei-cheng 胡佩诚 and SU Ying 苏英

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Flotation therapy is one of the models of Restricted Environmental Stimulation Therapy (REST). It has been studied and used in clinics in western countries for many years. According to the research results, flotation therapy can be used effectively in many ways.¹ Some of the research done in China showed that flotation therapy could be helpful in the treatment of hypertension² as well as cerebral paraplegia. It has also been observed in clinics that flotation therapy can induce deep relaxation, improve emotional states and have beneficial effects on some kinds of neurosis and psychosomatic diseases. But the effect of flotation therapy on the basic psychological and physiological function of ordinary Chinese has not been studied systemically. And there is no objective research result that has demonstrated the benefits of flotation therapy in Chinese clinics.

The purpose of this research was to find out the effect of flotation therapy on the basic psychological and physiological function of ordinary Chinese, focusing especially on the effectiveness of promoting relaxation and improving emotion states.

METHODS

Subjects

University students were recruited through on-campus advertisement. Only the volunteers who were healthy and aged from (18 - 24) years were accepted. Forty four persons took part in this study at beginning, but 3 did not return after the first session. Of the 41 persons who completed the whole study, 20 were male and 21 were female. Their ages averaged 20.6 years (range 18 to 24, SD = 1.24).

Apparatus

PF-3 flotation therapy instrument was developed by the Department of Medical Engineering of Peking University Health Science Centre. It consists of flotation therapy tank and control system. Temperature in the tank is kept at (28.0 ± 1.0) and the temperature of the flotation liquid is kept at (35.0 ± 0.2). The tank and the control system

are in different rooms. During the therapy, the therapist stays with the control system, listening and talking to the subjects through an intercom.

JD-2A Electromyogram (EMG) biofeedback instrument was manufactured by Beijing Boda Technique Institute (Beijing, China).

Procedure

Two sets of questionnaires were applied to the subjects, Self-Rating Anxiety Scale (SAS) and Self-Rating Depression Scale (SDS) and Symptom Checklist 90 (SCL-90). All subjects accepted flotation therapy four times in two weeks. The average interval time was 3 - 4 days. Every session was at the same time of the day and the basic processes were similar: heart rate and frontal EMG were measured before and after each flotation therapy session. During the first session, before the therapy, SAS, SDS, EPQ and SCL-90 questionnaires were filled in. During the third session, before the therapy, SAS and SDS were completed for the second time. During the last session, after the therapy, SAS and SDS were completed for the third time and SCL-90 was completed for the second time. SPSS was used to analyze the data. A *P* value < 0.05 was considered statistically significant, and a *P* value < 0.01 was considered statistically highly significant.

RESULTS

The effect of flotation therapy on heart rate

The paired-samples *t* test was used to compare the heart rate of the subjects before and after each session. In each session, the heart rate after flotation therapy was

Department of Medical Psychology, Peking University Health Science Centre, Beijing 100083, China (Hu PC)

College of Psychology, Beijing Normal University, Beijing 100875, China (Su Y)

Correspondence to: Dr. Hu Pei-cheng, Department of Medical Psychology, Peking University, Health Science Centre, Beijing 100083, China (Tel: 86-10-82802506. Email: pchu@mail.bjmu.edu.cn)

significantly lower than that before the therapy. *P* values were 0.000, 0.003, 0.023 and 0.000 for consecutive sessions.

The effect of flotation therapy on frontal EMG

The paired-samples *t* test was used to compare the frontal EMG of the subjects before and after each session. Significant differences were observed in each session. The frontal EMG after flotation therapy was significantly lower than that before the therapy and all *P* values were 0.000 (Fig.).

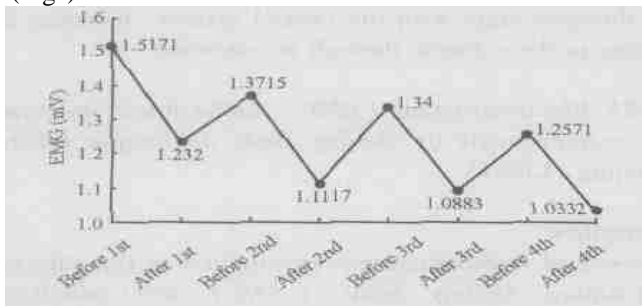


Fig. The influence of flotation therapy on frontal EMG of the subjects. Before the second, third and fourth therapies, the frontal EMG were significantly lower than it before the first therapy. *P* values were 0.046, 0.010 and 0.001, respectively. So perhaps the effect can last beyond the therapy sessions. The difference of frontal EMG before first session and after fourth session (*J*₁-*J*₈) had a statistical relationship with the subjects' first SAS score (*SAS*₁). The Pearson correlation coefficient was 0.366. Two-tailed test showed *P* = 0.032. Linear regression line was *J*₁-*J*₈ = 0.032*SAS*₁ - 0.611.

The effect of flotation therapy on the mood state

The anxiety and depression scores reduced significantly after two flotation therapies. The *P* values were 0.000 and 0.001, respectively. The scores after the fourth therapy were also significantly lower than the scores before the first therapy, the the *P* values were both 0.000.

The total change of SAS score before the first session and after the fourth session (*SAS*₁₋₃) was statistically related to *SAS*₁. The Pearson correlation coefficient was 0.466. Two-tailed test showed *P* = 0.002. *SAS*₁₋₃ = 0.467*SAS*₁ - 9.422.

The total change of SDS score before the first session and after fourth session *SDS*₁₋₃ was statistically related to both *SAS*₁ and first SDS score (*SDS*₁). *SDS*₁₋₃ = 0.589*SDS*₁ - 0.377*SAS*₁ - 2.362. The coefficient was 0.537, *F* = 7.707, *P* = 0.002.

The effect of flotation therapy on the SCL-90 scores

Significant differences were observed in all ten sub-scales and gross scores before and after four sessions (Table).

Table. The influence of flotation therapy on mean scores of the subjects in SCL-90 (n = 41)

	Before treatment	After treatment *
Somatization	1.4406 ±0.3828	1.1716 ±0.1848
Obsessive-Compulsive	2.1194 ±0.6400	1.6258 ±0.3706
Interpersonal sensitivity	1.9858 ±0.5534	1.6743 ±0.4176
Depression	1.7603 ±0.5221	1.4177 ±0.2971
Anxiety	1.6677 ±0.4714	1.3452 ±0.2706
Hostility	1.6552 ±0.4156	1.3984 ±0.3591
Phobic anxiety	1.3045 ±0.3418	1.1197 ±0.1986
Paranoid ideation	1.8123 ±0.6520	1.5435 ±0.3725
Psychoticism	1.6935 ±0.5039	1.3452 ±0.3325
Additional items	1.5942 ±0.4051	1.2952 ±0.2660

* *P* < 0.01, comparisons of all parameters between before and after treatment.

The differences of the effects between genders

Before the first session, the mean score of female subjects on the depression sub-scale of SCL-90 were significantly bigger than that of male subjects. The mean female score was 1.96 and that of the males was 1.58, *P* = 0.042.

The changes between the scores before and after the therapies on some sub-scales were significantly different between male and female subjects. Depression sub-scale. Means of change were 0.56 for female and 0.14 for male, *P* = 0.006. Hostility sub-scale. Means of changes were 0.45 for female and 0.07 for male, *P* = 0.017. Additional symptoms sub-scale. Means of changes were 0.44 for female and 0.17 for male, *P* = 0.021. Gross scores. Means of changes were 37.80 for female and 20.13 for male. *P* = 0.036. It seems that the improvement of the mental state was better in female than in male.

DISCUSSION

Deepening relaxation and reducing stress level

Inducing deep relaxation is the basic function of flotation therapy.^{3,4} Heart rate and EMG are common relaxation indexes used in REST studies.³ The changes of these two objective indices in this study suggest the subject's body is relaxed deeply during flotation. Previous studies⁵ have shown that when relaxed, the arousal level of cerebral cortex is lowered, the activity of the sympathetic nervous system is also lowered whereas the activity of the parasympathetic nervous system is heightened. Through the changes of neural system, endocrine system and autonomic nervous system, the functioning of the human body becomes modified.⁵ Therefore, it was suggested that flotation therapy could promote the healthy functioning of the human body.

We believe that because flotation therapy eliminates most external stimuli, the stimulating events the individual needs to deal with during the process are few. Thus, one would

expect the stress level of the subjects to go down during flotation therapy. Combined with the effects of inducing deep relaxation and lowering the functions of the thalamus-pituitary-adrenal gland axis,⁶ it can be suggested that flotation therapy reduces stress level.

Emotional state improved

It has been reported that flotation therapy can improve the subject's emotion state.^{4,7,8,9} The results of this study show flotation could improve mood state and reduce anxiety and depression level significantly. The mechanisms may be as follows: Some psychologists have proposed that along with cognitive activities and emotions, every individual has their own ideal level of stimulation and arousal. Researchers studying flotation therapy believe that the usual level of stimulation encountered in modern society is too much for some individuals to handle. An environment of overwhelming stimulation leads to too much stimulation and information flooding the cognitive system of the individual. The individual cannot deal with all this information and stimulation effectively. So maladaptive reactions to the situation occur. If the individual is taken out of that environment and put into a less demanding one, these reactions could be avoided, reduced or eliminated. The persons' whole mood status could be improved as well. According to the cognitive theory of emotion, emotion is affected by three factors: environmental, physiological and cognitive.¹⁰ During flotation therapy, external stimuli are extremely reduced so the stimulating events are few. So the mood is improved. Some preliminary studies have suggested that flotation therapy may facilitate the release of endogenous beta-endorphin in the brain: beta-endorphin is a peptide that can induce euphoria state in human beings.⁶

Flotation can induce deep relaxation. An individual feels comfortable, amused and pleasing when he or she is relaxed. The effect of improving mood state may come from the collaborative operation of all the mechanisms.

Considering the results of this study and other studies, it can be suggested that flotation therapy may be helpful in the treatment of many psychological disorders and psychosomatic diseases. In hypertensive patients we have obtained good

results through flotation therapy, but in patients with other psychological disorders or psychosomatic diseases must be tested in further studies and clinic works.

A previous study has shown that gender has no influence on the effects of REST. The results of this study shows that gender may influence the mood improving effect of flotation therapy. The improvement for women is better than that for men. This show that the flotation therapy may be better suited for females, but it needs further study and clinical work.

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