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Comparison of the effects of the three methods of massage, selected yoga exercises and massage-yoga combination on the depression in elderly women

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Abstract

Introduction: The present study aims to compare the effects of massage, selected yoga exercises and massage-yoga combination methods on symptoms of depression. **Materials and Methods:** According to the research criteria, 60 available samples were selected and randomly divided into three experimental groups and single control one. The Beck Depression Inventory was completed by the examinees before the intervention, two months after its beginning and one month after ending. Each experimental group received one of the massage interventions, selected yoga exercises and massage-yoga combination for eight weeks, three sessions per week and for a period of 40 minutes per session. The data were analyzed using 4 (group) × 3 (measurement) factorial analysis of variance method (ANOVA) and Bonferroni post hoc test was employed to compare the intragroup differences in the measurement steps and intergroup ones. The significance level of alpha was considered to be 0.05. **Results:** The results showed that there was a significant difference in the level of depression within the three experimental groups of massage (0.001), yoga (0.00) and combination (0.00). There was also a significant difference between the four groups in the depression variable (0.001). But the combined exercise program of massage and yoga had the most effect in improving the symptoms of depression. **Conclusion:** The results of this research showed that all three methods of massage intervention, selected yoga exercises and the combination of massage and yoga led to the improvement of depression symptom. However, there was a significant difference between the three approaches and the massage-yoga combinative exercise program was found to have the greatest effect on functioning of people with depression.

Keywords

depressed, yoga, massage, depression, elderly

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Cover Page Footnote

The authors of the article thank and appreciate all the elderly who participated in this research.

Article

Comparison of the effects of the three methods of massage, selected yoga exercises and massage-yoga combination on the depression in elderly women

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1. Introduction

Due to medical advances and reduced mortality during the recent decades, the elderly population has grown. This increase is especially significant in the female population because life expectancy in women is higher than in men by 6–8 years [1]. In fact, depression is still a major cause of disability worldwide [2]. The content analysis studies have reported the global prevalence of end-of-life depression to be 4.7–16% [3], which is likely to lead to suicide attempts in depressed elders [4]. Cognitive impairment, dysfunction, physical illness, insufficient or lack of social support, sleep disorders, grief or depression in adolescence and middle age are considered as depression risk factors in elderly people [5]. Almost all over the world and in all countries and cultures, the prevalence of

major depressive disorder in women is twice as high as in men. According to the presented hypotheses, this difference is mainly due to several reasons, such as hormonal differences, effects of delivery, differences between the psychosocial pressures in men and women and also the behavioral patterns associated with the learned helplessness [6]. Depression is a mood disorder followed by a combination of emotional (sadness and sorrow), cognitive (mental retardation, concentrating problems) and physical (changes in appetite, insomnia) symptoms [7–9]. The clinical demonstrations of depression in elderly people are observable in the form of mood disorders, psychological and physical manifestations. Mood symptoms may appear in terms of depression, irritability or anxiety, persistent crying, low or lack of self-confidence, poor concentration and memory, decreased life satisfaction, loss of interest in normal activities, social isolation, pessimism, disappointment, increased dependence, delusions of guilt and worthlessness, delusions of disease and illness, thinking of death and suicidal thoughts. However, physical manifestations are reflected by mental-motor retardation, exhaustion, restlessness, anorexia, weight loss, insomnia, lack of personal hygiene and physical complaints such as various body aches [10, 11]. Depression in elderly people might lead to other health effects, such as malnutrition, decreased physical activity, decreased performance, decreased life quality, increased drug use and health costs, illness, increased hospital staying length, increased risk of suicide and eventually death [10]. This disorder imposes an economic burden on the government, reduces the productivity and increases the health costs. Hence, an effective, inexpensive and prompt strategy is essential to improve the mental and general health of the elderly [12].

Elderly people are not able to perform any type of activity due to some physiological, physical and motor limitations [13]. Yoga is a Sanskrit word which means unity of mind and body and is based on concentration, movement and breathing. This technique emphasizes the promotion of tranquility and awareness [14]. It is a set of posture-based physical (asana), controlled breathing (pranayama) as well as relaxation (Shavasana) exercises. How to breathe in yoga, known as pranayama, is of high importance. Pranayama means deep, complete and controlled breathing [15]. The key position in yoga is the relaxation state being performed at the end of a session. In this status, one completes the previously performed movements by lying down for 5–10 minutes and through progressive relaxation [14].

Yoga affects the body and mind by changing the internal environment which controls the nervous system, ultimately affecting the sympathetic and parasympathetic system, release of neurotransmitters, hormonal outflow, mind and brain functioning, thought processes, i.e. it affects the whole homeostasis of the body. Therefore, it has a very diverse effect on the body and mind physiology [16]. One of the physiological hypotheses about the causes of depression is the monoamine hypothesis. This hypothesis states that an imbalance in dopamine (a neurotransmitter related to reward and pleasure) and serotonin (neurotransmitter related to happiness) causes depression. The recent positron emission tomography studies indicate that yoga exercises increase the dopamine levels in the striatum by 65% [17]. In addition, regular yoga exercises lead to an increment in the serotonin level along with a decrease in the monoamine oxidase one and improves the mood and state of well-being [18]. Another cause of depression is associated with the decreased neural balance in the hippocampus and hypothalamic-pituitary-adrenal axis [19]. Brain-derived neurotrophic factor (BDNF) is an available factor in most tissues, which is produced in the hippocampus and cortex and found in the blood [20, 21]. Clinical studies focusing on the BDNF measurement in the blood have reported lower levels of this factor in patients with depression [20]. Yoga exercises may act as a powerful stimulant for the hypothalamic-pituitary-adrenal and noradrenergic systems and reduce depression by reducing the cortisol and increasing BDNF [22]. Dalgas et al. [23] concluded that yoga exercises control the mind and the central nervous system by nature, which, unlike other exercises, has a moderating effect on the functioning of the internal nervous system, secretion of internal hormones, physiological factors, regulation of nervous messages, etc. According

to this viewpoint, in addition to music, yoga, exercise, study and meditation also leads to the happiness and relaxation and thus reduces depression [24]. On the other hand, increasing brain activity improves concentration and social relationships and, consequently, reduces depression [25]. In fact, yoga practice techniques both exercise the body and stimulate the mind. Yoga helps one in increasing adaptation by reducing stress and brings body and mind relaxation through limiting stress and reducing arousal of the cerebral cortex and thus reduces anxiety and depression [26].

Regarding the sedative feedback resulting from massage, several mechanisms have been proposed which are used as complementary treatments for increasing the serotonin and dopamine and reducing cortisol levels in order to treat depressed patients [27].

Overall, there seems to be no general agreement on the effects of massage therapy and yoga on depression. Therefore, considering the above-mentioned points, increasing elderly persons' life quality as well as using non-pharmaceutical methods as a complementary treatment for mental illnesses, especially depression, are of high prominence. So far, no study has been conducted on the effects of the three methods of massage, selected yoga exercises and a massage/yoga combination on depression in elderly women. In this regard, the present study seeks to answer the question whether the above-mentioned approaches affect the depression level in depressed elderly women and whether there is a difference between these three methods?

2. Materials and method

2.1. Study design

The current research is a semi-experimental study with three experimental groups and a control one together with pre-test, post-test and follow-up designs.

2.2. Participants

Since the World Health Organization (WHO) currently agrees with the cut-off point of 60 years for determining the elderly population [28], the statistical population of the present study consisted of depressed 60–85-year old elderly women from the centers of Farhikhtegan and Jahandidehgan Senior Sanatoria of Shahrekord. A total number of 60 depressed elderly people was purposefully selected based on the inclusion criteria of the research from these centers in 2020 and randomly classified into four 15-membered groups including three experimental groups (massage, yoga and massage/yoga combination) and a control one. The participants participated in this research completely voluntarily. Depression was assessed by a psychologist using the Beck depression questionnaire. According to the examination of the medical records, the participants had been suffering from depression for two years. The mean age of the participants was 74.33 ± 5.86 years and their mean weight and height were estimated as 59.95 ± 4.42 kg and 153 ± 3.66 cm, respectively. The inclusion criteria were the age range of 60–85 years, completing and signing the consent letter form after being informed of the research details, a score of 20–30 on the Beck depression questionnaire, no history of regular participation in massage and sports programs for at least the last six months, no auditory, visual and speech problems, being aware of the place, time, objects and individuals, no history of hospitalization in psychiatric hospitals, no history of psychotherapy and experience of grief in the past six months, not receiving any treatment which could impair the mental ability, memory or thinking, no history of mental illness. In turn, the exclusion criteria were being absent for more than two sessions, the emergence of a serious crisis or illness in the life of the research sample or his/her family members, withdrawal or unwillingness to attend the programs during the research period.

2.3. Measures

The Beck depression questionnaire is a 21-item self-report questionnaire whose purpose is to assess the depressive symptoms on a Likert scale ranging from 0 to 3 with anchors to each scale value, for example, item 1: {0¼ I do not feel sad, 1¼ I feel sad, 2¼ I am sad all the time and I can't snap out of it, 3¼ I am so sad and unhappy that I can't stand it}; item 2: {0¼ I am not particularly discouraged about the future; 1¼ I feel discouraged about the future, 2¼ I feel I have nothing to look forward to, 3¼ I feel the future is hopeless and that things cannot improve}. The sum of the BDI scores identifies the depression level. The recommended cutoff scores are 0–9¼, 10–18¼, 19–29¼ and 30–63¼ corresponding to no or minimal, mild to moderate, moderate to severe and severe depression, respectively [29]. This scale is a self-assessment tool which is used in order to determine the severity of depression. Its content has been validated by many studies. Furthermore, most researchers have reported the alpha coefficient for this questionnaire to be higher than 0.75 on average [30]. In this study, the Cronbach's alpha coefficient for this tool has been considered to be 0.78 to arrive at higher reliability.

2.4. Procedure

Nowadays, use of non-pharmaceutical methods in the treatment of mental health issues in the elderly people has attracted much attention because most of the elders are under treatment with several drugs due to multiple diseases which might pose a greater risk of side effects [11]. However, elderly people are not able to perform any type of activity due to some physiological, physical and motor limitations [13]. Yoga is one of the suggested exercises for reducing depression [31]. Massage therapy is another novel treatment of depression. Researchers have recommended this method to be used as an effective and complementary one along with other techniques in the rehabilitation process of depressed patients [32].

The current study has been conducted under the supervision of a physician, psychologist, coach, sports specialist and massage instructor. The elderly people of the four groups completed the medical background and the Beck depression questionnaire prior to the research. In the first experimental group, after assuring the samples about the safety of massaging and obtaining their consent, a massage course was carried out for them by massage specialists in a quiet and silent atmosphere with appropriate light and ventilation under perfectly hygienic conditions. Also, the massaging conditions were the same for all participants, and it was performed lying on a bed in one of the sanatorium rooms, using lavender oil. The massage group underwent a classic Russian massage on the back, neck, upper and lower organs three times a week for 40 minutes for a total period of eight weeks. The applied massage program included a combination of effleurage, compression, petrissage and vibrating techniques. The massage started from the ankle, leg, knee and thigh using effleurage, compression, petrissage, tapotement, rubbing and vibrating methods for seven minutes for each foot, respectively. Then, massaging the back and neck was performed for 10 minutes from the coccyx area up to the hair growth location, around the vertebrae and muscles of the back and cervical region. The upper organs were also massaged from the fingers, wrists, forearms, elbows and arms for 16 minutes. The second experimental group practiced yoga relaxation and breathing exercises for eight weeks. These exercises were performed three times a week for 40 minutes by an instructor at the sanatorium gym. Yoga relaxation and breathing exercises included controlled breathing (pranayama) as well as release and relaxation (shavasana) exercises. The pranayama practices include breathing exercises, usually in the form of deep breathing completed, breath holding and deep exhalation together with concentration. At the end of the breathing exercises, the shavasana (meditation) ones were performed which include sleeping in solitude, breathing at the right beat, isometric contractions of the large muscles, tensing and releasing, relaxation and concentration. In each session, 30 and 10 minutes were devoted to the breathing and meditation exercises, respectively. The third experimental group

underwent a combinative program of massage and selected yoga exercises three sessions per week, 40 minutes per session and for a total period of eight weeks. For this group, the massage program was performed as 20-minute sessions, while the breathing and yoga relaxation exercise protocols lasted about 20 minutes, 15 and 5 minutes of which were devoted to the breathing and meditation exercises, respectively. The control group had a normal life in eight weeks. 48 hours after the last practice session of the experimental groups, the Beck depression questionnaire was completed through face-to-face interviews with the elderly of all groups. After finishing the massage and yoga sessions, the researcher monitored all four groups by attending the centers for a period of one month. Then, the researcher performed the follow-up test again by completing the Beck depression questionnaire.

2.5. Statistical analyses

First, the central tendency and standard deviation indices were employed in order to describe the data. In the inferential statistics section, the absence of deviated data was checked, and the Kolmogorov-Smirnov test was used to evaluate the normality of data distribution. The data were analyzed using 4 (group) \times 3 (measurement) factorial analysis of variance method (ANOVA), and Bonferroni post hoc test was employed to compare the intragroup differences in the measurement steps and intergroup ones. The significance level was considered at alpha of 0.05.

3. Results

The normal distribution of the pre-test scores of the depression variable in the four groups was confirmed through the Kolmogorov-Smirnov test, the results of which are shown in Table 1.

Table 1. The results of the Kolmogorov-Smirnov test in the variable of depression.

Groups	Pre-test	
	Kolmogorov-Smirnov (K-S)	Sig.
Massage	0.59	0.87
Yoga exercises	0.41	0.99
Yoga/massage combination	0.51	0.95
Control	0.55	0.92

Table 2 lists the mean and standard deviation of elderly women's depression scores associated with the three stages of pre-test, post-test and follow-up for the experimental and control groups.

Table 2. Mean and standard deviation of depression scores associated with four groups at three stages of pre-test, post-test and follow-up.

Groups	Pre-test	Post-test	Follow-up
	Mean \pm SD	Mean \pm SD	Mean \pm SD
Massage	24.20 \pm 3.14	16.66 \pm 2.87	17.33 \pm 2.74
Yoga exercises	23.90 \pm 3.03	19.80 \pm 3.09	20.13 \pm 3.24
Yoga/massage combination	23.50 \pm 3.34	13.80 \pm 2.70	14.33 \pm 2.35
Control	24.26 \pm 3.12	23.86 \pm 3.33	23.40 \pm 3.24

As can be seen from Table 2, before the training, the mean pre-test depression scores of the three experimental groups and the control group were close to one another. After eight weeks of training, the mean depression scores of post-test and the follow-up test, of the experimental groups decreased, but this decrease was not visible in the control group.

The results of mixed analysis of variance 4 (group) \times 3 (measurement) within and between groups for three stages of measurement in four groups are presented in Table 3.

Table 3. The results of mixed analysis of variance within and between groups for three stages of measurement in four groups.

Source of changes	Total squares	Degree of freedom	Mean squares	F-statistic	Significance level	η -squared
Depression	27.09	1.22	22.07	8.67	0.003	0.14
Group-depression interaction	182.79	3.86	49.64	19.50	0.001	0.52
Group	527.35	3	175.74	9.45	0.001	0.34

According to Table 3, depression had a significant difference in three stages of measurement ($P = 0.003$). Therefore, the Bonferroni test was used to compare the measurement stages for each group and the corresponding results are presented in Table 4.

Table 4. Results of the Bonferroni post hoc test for the comparison of depression measurement stages associated with each group.

Groups	Pre- and post-test Sig	Pre-test and follow-up Sig	Post-test and follow-up Sig
Massage	0.001	0.001	0.26
Yoga exercises	0.001	0.001	0.79
Yoga/massage combination	0.001	0.001	0.80

As shown in Table 4, there is a significant difference in depression in each group of massage, yoga, yoga/massage combination between pre- and post-test ($P = 0.001$) and between pre-test and follow-up ($P = 0.001$). There was no significant difference between the post-test and the follow-up test in any of the three groups.

The interaction effect of depression and group was significant ($P = 0.001$). In addition, a one-way ANOVA test was used to determine the interaction effect in each group, the results of which are listed in Table 5.

Table 5. Repeated measure of ANOVA results related to the time of depression measurement.

Source of changes	Group	Total squares	Degree of freedom	Mean squares	F-statistic	Significance level	η -squared
Group and depression interaction	Massage	534.53	1.20	445.46	106.70	0.001	0.88
	Yoga	185.73	1.25	148.50	120.38	0.001	0.89
	Combination	1042.53	1.13	917.31	196.88	0.001	0.93
	Control	5.64	1.28	4.39	4.64	0.37	0.24

As observed in Table 5, the group*depression interaction effect was significant in the massage ($P = 0.001$), yoga ($P = 0.001$) and massage/yoga combination ($P = 0.001$) groups and non-significant in the control group ($P = 0.370$). The supplementary results showed that there was a significant difference between the pre-test with post-test and follow-up test ($P = 0.001$) in all three groups of massage, yoga and combined.

According to the results of Table 3, there is a significant difference between the depression variable between the four groups ($P = 0.001$). Due to the significance of the depression variable in the four groups, the Bonferroni post hoc test was employed to make a comparison between the groups whose results are presented in Table 6.

Table 6. Results of Bonferroni post hoc test, pairwise comparison of groups regarding the post-test depression variable.

Paired groups	Significance
Massage and yoga	0.791
Massage and combination	0.186
Massage and control	0.001
Yoga and combination	0.001
Yoga and control	0.023
Combination and control	0.001

4. Discussion

So far, there has been a lot of research on the effect of yoga on depression, some of which has been consistent with current research and some of which has been contradictory. Bazzano et al. [33], Singphow et al. [34], El Refaye [35] and Rani et al. [36] investigated the effect of yoga on depression. The results of all mentioned research were consistent with the results of the present research.

4.1. The effect of yoga on depression

The aim of the present study was to compare the effect of three methods, namely massage, selected yoga exercises and massage/yoga combination on the depression level of depressed elderly women. Several studies have been conducted in this field which are consistent or inconsistent with the present study. Several studies have shown that yoga not only treats stress, anxiety and mild to moderate depression, but also prevents its occurrence [14]. The results of this study showed that yoga significantly reduces the depression scores after 12 weeks. Telles et al. [38] investigated the effect of yoga on depression in cardiovascular patients and concluded that these exercises improve depression in these individuals. Also, Schuver and Lewis [39] examined the effects of yoga on 20–60-year-old women with depression and indicated that yoga improves their depression. However, Oken et al. [40] arrived at results being inconsistent with the present ones. However, this inconsistency might be related to the type of selected yoga exercises that focus only on physical exercises, as well as the intensity of the practices and the stress induced by the research conditions.

4.2. The effect of massage on depression

Massage therapy has been reported to reduce depression by many researchers [41–44]. Hassan et al. [45] investigated the effect of massage therapy on the mood and pain of patients with cardiac catheterization after surgery and concluded that this technique reduces depression and improves these individuals' mood. Examining the effect of massage therapy in cancer patients, Alves et al. [32] concluded that this method improves depression in patients. Zadkhosh et al. [46] investigated the influence of massage therapy on

depression, anxiety and stress in adolescent wrestlers. Their results indicated that massage therapy significantly reduces the depression level and improves the mental health of these sportsmen. The effect of massage therapy on the depressed pregnant women was examined by Field et al. [47]. The result was that massage significantly reduces these patients' depression. Imanishi et al. [48] assessed the effect of massage therapy on the psychological and immunological factors of twelve patients with breast cancer. In their research, aromatherapy massage was performed for the patients for four weeks (eight 30-minute sessions). This study illustrated a depression reduction in the massage therapy group compared to the control one. Although several studies have claimed that massage is effective in treating depression, in a review study, Coelho et al. [49] illustrated that there was incomplete evidence to testify this. Albert et al. [50] also did not find a significant difference between the rates of depression in patients before and after the massage therapy intervention, contradicting the present findings. In another study, Kutner et al. [51] indicated that the type of massage, how it is performed, duration and the environment in which the massage is performed are important in achieving an effective result. However, the discrepancies between the results of the above-mentioned studies and the present research might be due to the type of Swedish massage therapy protocol which is different from the classical massage protocol of the current study, method, duration and environment in which the massage was performed.

4.3. The effect of the combination of yoga and massage and yoga on depression

Other results of the present study illustrated that the rate of depression associated with the massage/yoga combination group at the post-test and follow-up stages decreases compared to that of the pre-test one. Also, the rate of depression in the combinative group decreased compared to the control one. To the best of the present authors' knowledge, no study has concerned examining the effect of a combination of massage and yoga on the depression level in the elderly. It seems that just as massage and yoga alone with their physiological and psychological effects leading to a reduction in the level of depression in the elderly, the implementation of the combined protocol of these two interventions may also reduce the level of depression in the relevant group.

The sense of touch may have a specific effect on the emotions of older adults [52]. Through connections with the paraventricular nucleus, the thalamus stimulates the synthesis of oxytocin when a touch is perceived as pleasant [53]. Evidence shows that massage improves depression by improving the blood flow in the frontal cortex of the brain. Massage therapy, by stimulating the body's soft tissues, causes the restoration of metabolic balance and also reinforces a sense of care and support and expression of love to the patient [54]. A gentle, empathetic touch is generally experienced as pleasant. It can soothe feelings of social exclusion and facilitate interpersonal binding [55].

A recent comprehensive review of the potential mechanisms by which physical activity may reduce depressive symptoms identified a range of biopsychosocial pathways that are likely to have broad relevance to understanding the mechanisms of yoga [56]. The slow rhythmic breathing practices and meditative/relaxation practices of yoga are designed to induce a sense of calm, well-being, stress tolerance, and mental focus, all of which may minimize depression [57, 58]. However, research exists on physiological or neurological mechanisms that could mediate the positive effects of yoga on mood and symptoms of psychological depression [59]. In addition, slow breathing patterns that stimulate the vagus nerve, similar to those used in yoga, have been shown to increase levels of prolactin, dopamine and serotonin [60]. In addition, yoga may influence the inflammatory processes involved in depression by influencing the vagus nerve. Via the neurotransmitter acetylcholine, efferent vagal nerve fibers exert anti-inflammatory actions [61]. The yoga components of slow breathing and relaxation practices, mindfulness of sensations in the body, and physical postures may influence drives on brain pathways to the limbic and cortical areas involved in mood regulation that influence the parasympathetic outflow. Indeed, slow breathing practices found in yoga have been shown to affect

decreased blood pressure, presumably via enhanced efferent parasympathetic responsiveness [60]. Thus, because inflammation is implicated as contributing to depressive symptoms, activation of the vagal anti-inflammatory pathway could be an important mechanism by which yoga practice could decrease symptoms of depression [59].

Kinser et al. [59] stated that yoga practice had long-term positive effects. This was one of the few studies that evaluated the long-term effects of yoga on depression, and as such, the findings of this study provide important insights into the potential long-term effects of yoga on depression. This study showed that depression seemed to improve with yoga intervention not only in the short term but also one year after exposure to yoga. Regardless of whether an individual continues to practice yoga or not, exposure to the yoga intervention appears to provide lasting benefits. This is important because it is rare for any pharmacological or non-pharmacological intervention for depression to produce such lasting effects for people with depressive disorder, especially after discontinuation of treatment [59]. While several studies have shown the effectiveness of antidepressants in preventing the recurrence of depression, the effects of antidepressants do not continue after stopping the medication [62]. Therefore, yoga may be a similarly effective intervention for exerting sustained beneficial effects.

Limitations

The limitations of the present study were sampling among women in sanatoria of Shahrekord city due to the unavailability of all depressed elders, lack of control over factors such as genetics, individual discrepancies, elderly behaviors and their sleep outside the intervention time, mental and emotional conditions and their socio-economic and family status. On the other hand, since the present study was conducted on the elderly, its results cannot be generalized to all depressed people with low depression levels. Hence, it is suggested that a comparative study be conducted specifically with these interventions for other depressed people of different age ranges. It is also suggested that the effects of three interventions of massage, yoga and massage-yoga combination be considered in future research on other psychological factors taking the sex factor into consideration. Finally, based on the present findings, the authors suggest that these three methods be used as effective and complementary techniques along with other methods in the process of improving depression in elderly women.

5. Conclusions

The results of this research showed that all three methods, namely massage intervention, yoga exercises and the combination of massage and yoga lead to an improvement in depression symptoms. In addition, in this research, the effect of a combination of massage and yoga on depression was far greater than the effect of yoga and massage exercises separately. This issue can be explained by a probable combination of breathing exercises and relaxation of yoga with massage that has led to an increase in psychological and physiological effects and has caused more improvement in depressed elderly women.

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