MIDDLE-AGED FEMALE DEPRESSION IN PERIMENOPAUSAL PERIOD AND SQUARE DANCE INTERVENTION

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SUMMARY

Background: *Depression is one of the most common psychiatric illnesses among perimenopausal women. Currently, drug treatments for the disorder tend to have higher risks than other forms of treatment. On the contrary, aerobic exercise can effectively relieve menopausal syndrome among perimenopausal women. Square dance, a kind of aerobic exercise favored by middle-aged women in China, could be a beneficial intervention for perimenopausal depression.*

Subjects and methods: *A total of 321 women in perimenopause were chosen from Nangang Community, DaoLi Community, and Daowai Community in Harbin, Heilongjiang Province, from September 2015 through April 2016. Of the women with depressive symptoms, 60 did not participate in square dance. The subjects were randomly assigned to the intervention group (n=26) and control group (n=24). Intervention group patients participated in guided square dance exercise 60-90 min at least 5 times per week at a regular time for 3 months. The women in the control group received no intervention.*

Results: *Of the screened subjects, 72 women (22.4%) suffered mild to severe depression; younger, working married women who square danced regularly presented a low depression rate (p<0.05). The depression index score of the intervention group after three months was 0.43±0.09, a statistically significant decrease (t=5.658, p<0.001). The difference in the depression index changes of the intervention and control group was also significant (t=5.407, p<0.001).*

Conclusion: *The depression rate among women in perimenopause is high. Some intervention measures, such as promoting female employment, organizing collective activities for retired or unemployed women, and stabilizing family ties can prevent or improve the depression of women in perimenopause. Square dance can effectively reduce the depression levels of women in perimenopause.*

Key words: *depression - middle-aged - perimenopausal period - square dance - intervention*

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INTRODUCTION

Perimenopause is the period leading up to meno-pause, featuring the occurrence of menopause-related internal secretion and biological and clinical features, with menopause usually occurring within one year. In this period, ovarian function slowly declines until it is completely lost, and two thirds of women show varying degrees of vasomotion disorder and neuropsychiatric symptoms (Chichanovskaia et al. 2014, Clayton & Ninan 2010). This period is a normal physiological change period for women. Freeman conducted an eight-year longitudinal study on women in perimenopause and found that high CES-D scores (≥16) were more than four times more likely to occur during a woman's menopausal transition compared with when she was premenopausal (Freeman et al. 2006). In 2000, China's population census data showed that perimenopausal women accounted for about 10% of the total population, i.e., 120–130 million. By 2030, the number of women aged over 50 will exceed 280 million. Thus, it is impor-tant for individuals, families, and society to pay atten-tion to the health of these women, prevent relevant diseases, and improve their living quality (Ma & Tai 2008). Due to the population aging trend and the rise in social pressure, the morbidity of perimenopausal syn-drome is on the rise.

Perimenopausal depression is a common feature of perimenopause. A study of two double-blind placebos found that estrogen treatment (percutaneous estradiol) had a significant antidepressant effect on perimenopau-sal women with depression (Schmidt et al. 2000, Soares et al. 2001). Recently, some researchers have carried out antidepressant drug or estrogen treatments for peri-menopausal women with depression. One four-week experiment showed that hormonotherapy could relieve the depressive symptoms of perimenopausal women in the short term. It is necessary to evaluate whether the patient can gain anti-depression benefits from estrogen treatment when treating perimenopausal women (Cohen et al. 2003). In China, most hospitals use estrogen to treat or prevent depression in perimenopausal women (Li et al. 2010). However, some research suggests that long-term estrogen treatment may result in larger clinical risks and drug side effects (Grady et al. 2000). Slaven & Lee (1997) suggested that aerobic exercise should be adopted to intervene in perimenopausal de-pression (Taghian et al. 2014, Peng et al. 2015). They divided their study subjects into four groups – premeno-pause, perimenopause, no hormonotherapy after meno-pause, and post-menopause hormonotherapy - and compared the four groups with POMS and WHQ. They found that the women with exercise habits had more positive mood than the sedentary women, and aerobic

exercise could help women in perimenopause to relieve some climacteric symptoms.

Square dance is an increasingly popular exercise form in China. It integrates the advantages of social participation, physical and psychological recreation, and health benefits. The activity is carried out nationwide and is especially favored by middle-aged and old people (Wang et al. 2014). Compared to traditional exercise such as running and swimming, square dancing is characterized by simple movements and easy acceptance by common people. Additionally, it is not restricted by space, time, theme, or rhythm. Square dancing not only positively affects fitness and health, but also helps mediate participants' emotions and improve interpersonal relationships. Yang et al. (2014) randomly assigned 65 middle-aged and old (45–70 years old) female depression patients from a Chinese community into a research group participating in square dance exercise and a control group given Escitalopram and estradiol valerate treatment. The results showed that square dancing could effectively improve the somatization, depression, and anxiety symptoms of middle-aged and old female depression patients, and the occurrence rate of side reactions in the experimental group was lower than that in the control group. The above studies suggest that depression patients can indeed find relief for their symptoms through participation in physical exercise, and physical exercise even has functions that some drugs cannot replace. Moreover, square dance is a collective physical exercise most favored by middle-aged and old women in China. In light of these considerations, this study investigates the effect of participation in square dance exercise on the symptoms of perimenopausal depression patients. We hope our findings will provide a useful reference for improving or preventing depression in perimenopausal women.

SUBJECTS AND METHODS

Subjects

A total of 321 women in perimenopause from Nangang Community, DaoLi Community, and Daowai Community in Harbin, Heilongjiang Province were chosen to participate in the study from September 2015 through April 2016. Inclusion standards (He et al. 2010, Zhang et al. 2013): 1) age: 45–55; 2) married women; 3) have children and spouse, not divorced; 4) no organic disease such as joint, muscle, or visceral organ disease; 5) no coronary heart disease or angina, diastolic blood pressure: 60–90 mm Hg, systolic pressure: 90–140 mm Hg (naturally or with aid of medication); 6) no exercise contraindications; 7) no infectious diseases or cancer; 8) menelipsis within 1 year; 9) Self-Rating Depression Scale (SDS) scoring index ≥0.5 (Zung 1965); 10) no estrogen drugs or psychotropic drugs taken within last 3 months; 11) know basic contents of the experiment, voluntarily participate in the experiment, and sign informed consent form. A total of 334 subjects complied with inclusion standards, and 13 subjects were excluded due to incomplete data. The data of 321 subjects was included in the study analysis. There were 32 women in the intervention group, of whom 26 completed the intervention follow-up. There were 28 women in the control group, of whom 24 completed the intervention follow-up.

Grouping and Intervention Methods

A database was set up for 321 eligible women in perimenopause. According to our status investigation, 60 depression patients had not participated in square dance exercise before. According to relative geographic distance of the communities where the subjects lived, the subjects were divided into the intervention group and control group through the random number method. The two groups did not take any drug. The intervention group patients participated in square dance exercise 1h after supper (around 19:20h) under the guidance of a professional coach and doctor for 60–90 min, with a 5 min break every 30 min, at least 5 times per week. The duration of the experiment was 3 months. The exercise intensity was moderate, and movement arrangement was simple. The women in the control group lived normally without any intervention. A general situation questionnaire was filled out by participants at the start of the study, while SDS was filled out before and after intervention.

Instruments

- General situation questionnaire: a self-designed questionnaire including respondents' sociodemographic characteristics, marital status, availability to square dance at a regular time, working conditions, housing area, menstruation situation, household economic conditions, etc.

- SDS (devised by Zung in 1965) is a self-rating scale (Zung 1965). After Wang et al. (1984) translated it into Chinese, it was widely applied by Chinese scholars for special populations such as mental patients, senior high school students, undergraduate students, and middle school teachers. Reliable results have been obtained (Zung 1965, Wang et al. 1984, Li et al. 2010). The scale consists of 20 declarative sentences, each item representing a relevant symptom. The 20 items cover four groups of specific symptoms of depression: spirituality–emotionality, corporality disorder, psychomotor disorder, and psychological disorder. Each item is rated on a scale from 1 to 4: 1 (never or occasionally), 2 (sometimes), 3 (frequently), 4 (always). Depression severity index = cumulative score of all items/80 (the highest total score); index range: 0.25–1.0, where 0.5 or below means no depression, 0.5–0.59 means mild depression, 0.6–0.69 means moderate depression, and 0.7 or above means severe depression (Zung 1965, Wang et al. 1984, Li et al. 2010, Simona et al. 2015).

Statistical Analysis

SPSS 16.0 statistical software was used to analyze the data. Quantitative data were expressed as mean value ± standard deviation. An independent-sample t-test was used for inter-group comparison of two groups of mean values, while a paired t-test was used for intra-group comparison. Qualitative data were expressed with case number and constituent ratio. A chi-square test or Fisher's exact probability was used for intra-group comparison. Multiple logistic regression analysis was used for relative factor analysis of depression detection rate. A value of $p<0.05$ was considered statistically significant.

RESULTS

General Information

The average age of the subjects was 52.5±4.3, with a median of 52.1 ys. Subjects were mainly of Han nationality, accounting for 97.2%. The average household living area was 88.9±7.8 m². Two hundred two subjects were unemployed, and 119 were employed. The mean value of the SDS index was 0.45±0.10. Two hundred forty-nine subjects (77.6%) did not suffer from depression; 72 (22.4%) had mild to severe depression, including 54 subjects (16.8%) with mild depression, 15 (4.7%) with moderate depression, and 3 (0.9%) with severe depression. See Table 1 and Table 2 for other basic information.

Comparison of Depression Detection Rates of Different Factors

As shown in Table 1, although the depression rates of subjects with different nationalities, education degrees, menstruation situations, housing conditions, housing areas, and family economic conditions were slightly different, the chi-square test showed there was no statistical significance ($p>0.05$). The depression rate of married subjects in the low age group who agreed to square dance regularly and worked was low, and the difference

Table 1. Comparison of Depression Rates among Different Subjects

		Total number	Number of depressed subjects	Depression rate (%)	χ^2	p
Nationality	Han	312	70	22.4	0.000	0.988
	Others	9	3	33.3		
Age	45–49	101	18	17.8	7.707	0.021
	50–54	128	24	18.8		
	55–59	92	30	32.6		
Education degree	Junior high school or below	234	57	24.4	2.368	0.306
	Senior high school or technical secondary school	56	11	19.6		
	Junior college or above	31	4	12.9		
Marital status	Married	267	51	19.1	10.665	0.005
	Single	10	3	30.0		
	Others	44	18	40.9		
Menstruation situation	Non-menopause	138	26	18.8	1.792	0.181
	Menopause	183	46	25.1		
Whether to square dance at regular time	No	207	60	29.0	14.397	0.000
	Yes	114	12	10.5		
Working conditions	Have no work	202	53	26.2	4.541	0.033
	Have work	119	19	16.0		
Living arrangement	Alone	34	11	32.4	4.264	0.234
	Live with spouse	85	18	21.2		
	Live with children	132	24	18.2		
	Others	70	19	27.1		
Housing area	≤80	119	27	22.7	1.556	0.459
	81–100	143	26	18.2		
	≥101	59	9	15.3		
Family economic conditions	Very poor	42	5	11.9	7.228	0.124
	Poor	75	14	18.7		
	Average	121	36	29.8		
	Good	67	14	20.9		
	Very good	16	3	18.8		
Total		321	72	22.4		

Table 2. Comparison of Basic Information of Intervention Group and Control Group

		Intervention group (n=26)	Control group (n=24)	p
Age		54.5±4.5	53.5±4.7	0.446
Depression index score		0.58±0.10	0.59±0.11	0.738
Housing area		89±7	92±9	0.193
Education degree	Junior high school or below	15	13	0.427
	Senior high school or technical secondary school	7	4	
	Junior college or above	4	7	
Marital status	Married	20	17	0.834
	Single	2	3	
	Others	4	4	
Menstruation situation	Non-menopause	14	11	0.571
	Menopause	12	13	
Nationality	Han	24	23	1.000
	Others	2	1	
Working conditions	Have no work	14	11	
	Have work	10	13	0.729
Living arrangement	Alone	3	4	
	Live with spouse	8	5	
	Live with children	12	10	
	Others	3	5	
Family economic conditions	Very poor	4	3	0.932
	Poor	7	6	
	Average	10	11	
	Good	4	2	
	Very good	1	2	

was statistically significant (p<0.05). The multiple logistic regression analysis results showed that after the effects of age, marital status, and working situation were eliminated, the probability that subjects who did not agree to the square dancing suffered depression was 2.32 (1.45–3.55) times that of the subjects who did agree to participate in square dancing. The difference was statistically significant (p=0.015).
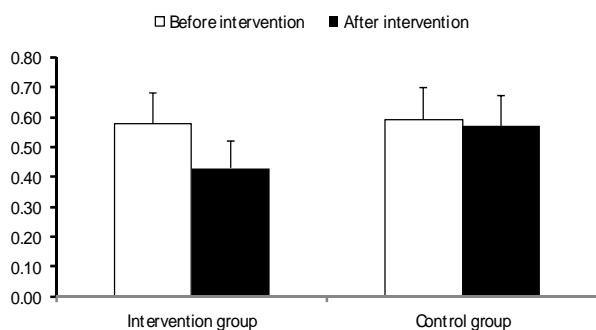
Figure 1. Depression index changes of intervention group and control group before and after square dance intervention

Intervention Effect of Square Dance on Depression of Subjects

Table 2 compares the basic information of the two groups. After the three-month intervention, the depression index score of the intervention group was 0.43±0.09, a significant decrease compared with pre-intervention (t=5.658, p<0.001). The depression index score of the control group was 0.57±0.10, which was not a statistically significant difference compared with pre-intervention (t=0.659, p=0.513). The change in the depression index of the intervention group (0.15±0.08) was greater than that of the control group (0.02±0.09), a statistically significant different (t=5.407, p<0.001). See Figure 1 for details.

DISCUSSION

Depression Rate Differences Among Subjects

Of the 321 eligible subjects screened in this study, 22.4% suffered mild to severe depression, a lower proportion than the 29.94% reported by Li et al. (2006). This may be related to the fact that our samples came from a developed city (Harbin, provincial capital of Heilongjiang in China). Some research suggests that compared with Chinese urban women, Chinese rural women have lower education levels and may lack reproductive health knowledge; additionally, rural health conditions lag behind those of cities-hence, the psychological health levels of rural women in perimenopause are lower than those of urban women (Li et al. 2006). This study did not investigate Chinese rural women because middle-aged and old women in Chinese rural areas have little enthusiasm for participation in square

dancing. Many rural people are not aware of the benefits brought by exercise; of those who do take active part in exercise, most suffer from hypertension, diabetes, or another illness and exercise in order to improve those conditions (Pan 2012). Hence, we chose not to investigate subjects from rural areas or underdeveloped cities in western China.

Our results show that depression rates of middle-aged women vary with age, marital status, square dancing situation, and working situation. Younger, working married women presented a low rate of depression. As the age of women in perimenopause increases, their ovarian function declines significantly; as a result, follicle-stimulating hormone and luteinizing hormone levels rise. It has been found that changes in these hormones are related to involutional melancholia (Soares et al. 2001). For this reason, hormonotherapy is one of the treatment methods for involutional melancholia. An epidemiological survey in Beijing also found that the average age of women with natural menopause in the perimenopausal period was 48.41, and that involutional melancholia significantly increased with age (Deng & Zhang 2002). Moreover, with age, female climacteric syndrome becomes more obvious, and physical and psychological disorders become more serious. These factors may increase the depression occurrence rate.

From the perspective of marriage, married women had a lower rate of depression than single and divorced women or widows. This result is consistent with many research results. For example, Cui & Chen (2008) investigated women aged 45–55 and found that women with healthy spouses had a low occurrence rate of climacteric syndrome and involutional melancholia, while divorced women had a high occurrence rate. Research by Niu et al. (2009) also showed that marital status was related to involutional melancholia; divorced women and widows had the highest occurrence rate of climacteric syndrome and involutional melancholia. Good marital status can give women higher quality of sexual life and conjugal relations and promote physical and psychological health. Intact marriage can also provide social support for women in perimenopause and help them deal with stressful events which may result in depression. Furthermore, divorce and losing a spouse are serious stressors, making depression more likely.

We also found that women who worked during perimenopause had a lower depression occurrence rate than those without work. Yue & Yang (2010) also found that retired or laid-off menopausal women suffered more serious depressive symptoms than employed women. Compared with nonworking women, working women have economic guarantees, so they have a higher sense of security and can experience self-value in their work. They also have a wider network of interpersonal relationships and support. All of these factors contribute to maintaining physical and mental well-being and self-affirmation and reducing the occurrence of depression. It is worth noting that the

influence of working status on depression of women in perimenopause does not lie in simple work, but in working pressure and job satisfaction. Some studies have found that the depression occurrence in women employed during perimenopause is also high. Feng & Chen (2009) found that the involutional depression occurrence rates in working women and nonworking women were 73.37% and 91.05%, respectively. Li et al. (2014) investigated different occupational groups in Beijing and found the people with low feelings of competence in their work, low sense of achievement, and lack of acceptance from their superiors had higher depression risks than those with high feelings of competence, high sense of achievement, and acceptance from superiors. Dong et al. (2010) surveyed 2400 women aged 45–55 in 22 provinces and found that women with high work pressure who did manual work had a higher involutional melancholia occurrence rate. Therefore, for working women in perimenopause, improving job satisfaction and reducing work pressure are important steps for decreasing depressive symptoms.

Depressive disorder in the above subjects may be related to individual neurological, developmental, and psychosocial factors. For example, heredity, family factors, individual personality traits, and negative events in life will result in a certain degree of depression. However, there are special reasons for the genesis and development of depressive symptoms in perimenopausal women. Perimenopausal women are in middle age, which is often a period of social role transition, so they often have specific socio-psychological stress sources. Female life and work in this period changes greatly, and there are a series of crises that need to be dealt with, such as empty-nest syndrome ("empty nest" refers to middle-aged people who do not live with children or have no children), economic problems (in some Chinese families, the parents need to buy housing for children who have just started working), death of good friends or parents, and physical health crises (Ma et al. 2012).

Influence of square dance on depressive symptoms of women in perimenopause

We found that the women who participated in the square dance intervention had a lower depression rate than the women who did not participate. Square dancing could also significantly reduce the depressive symptoms of perimenopausal women. This result is consistent with some previous research. Yang et al. (2014) found that square dancing could effectively improve somatization, depression, and anxiety symptoms of middle-aged and old depressive women. There are a number of potential reasons for the effectiveness of the square dance intervention. First, square dance integrates fitness and recreation and can directly promote exercisers' physiological and psychological indices. Zhou & Li (2014) found that square dance and fitness could improve the

cardiopulmonary function of middle-aged and old women; the women in the square dance group showed better effects on physical quality index and psychological emotion adjustment than the women in the walking group. Meanwhile, moderate-intensity aerobic exercise can also improve the sleep quality of middle-aged and old women (Reid et al. 2010). In addition improving physiological factors, exercise can reduce psychological feelings of helplessness in depression patients (Roca et al. 2015). For people who square dance regularly for a long term, the secretion quantity of neurotransmitter chemicals such as adrenaline and dopamine increases, and the cardiovascular system, immune system, endocrine system, and spiritual cognitive system improve. Second, square dance provides a rhythm sensation and is accompanied with bright and graceful music. Thus, it can ease physical feeling of fatigue, bring emotional feelings of pleasure, and directly relieve and adjust depression and other negative moods (Cross et al. 2012). Finally, square dance is a social event. People can get acquainted with partners and peers during the training process, and they may interact to reduce aloneness and ease depressive symptoms (Fiske et al. 2009). However, proper precautions need to be taken to gain maximum physical and psychological benefits. For instance, dancing on an empty stomach is not allowed, and the amount of exercise should be reasonable; after the exercise, it is necessary to have a rest.

CONCLUSION

Of the 321 perimenopausal women screened in this study, 72 (22.4%) suffered mild-severe depression. The depression rates of middle-aged women varied with age, marital status, square dancing situation, and working situation. Younger, working married women presented a low depression detention rate. The women who participated in the square dance intervention showed a statistically significant decrease in depression indices, while those who did not participate showed no significant change.

Some intervention measures can effectively prevent or ease the depressive symptoms of women in perimenopause. These measures include promoting female employment, organizing collective activities for retired or unemployed women, and stabilizing family ties. In addition, square dancing regularly for a long period can effectively improve the depressive symptoms of perimenopausal women without the side effects or high costs of traditional drug therapy. Therefore, this method of treatment deserves our attention. If patients maintain the treatment for the long term, the effects could be very significant. Due to time and region restrictions, our survey samples came from a developed city. Our future research will expand the samples and consider Chinese rural areas and underdeveloped cities. We will also measure blood pressure, blood fat, cholesterol, and other physiological indices for comparative study.

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