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EFFECT OF AEROBIC EXERCISE VERSUS DIET RICH IN TRYPTOPHAN ON POSTMENOPAUSAL DEPRESSION

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ABSTRACT

Purpose: This study was conducted to determine the effect of aerobic exercise versus diet rich in tryptophan on post-menopausal depression.
Methods: Twenty two post-menopausal women participated in this study. They complained from mild to moderate depression (diagnosed according to Beck depression inventory). They were chosen from outpatient clinic of faculty of physical therapy Cairo University. Their ages were ranged from 55 to 65 years old. They were divided randomly into two groups equal in number, group (A) was treated by aerobic exercise 40 min 3 times/ week for 4 weeks while group (B) was treated by diet rich in tryptophan for 4weeks. Depression was evaluated by the Beck depression inventory before and after the program for both groups.
Results: The obtained results showed a statistically significant decrease ($P<0.05$) in depression in both groups, when both groups were compared together, a statistically significant decrease ($P<0.05$) in depression was found in group (A) than group(B).
Conclusion: It could be concluded that aerobic exercise and diet rich in tryptophan were effective adjunct methods in reducing postmenopausal depression but aerobic exercise is more effective than diet rich in tryptophan.
Key words: Post menopause - Depression - Aerobic exercise - Tryptophan.

INTRODUCTION

Menopause is the permanent end of menstruation and fertility, and it is manifested by the cessation of menstrual flow lasting at least 12 months. Menopause is a natural process, not a medical illness. Even so, the physical and emotional symptoms of menopause can disrupt woman's sleep, sap her energy and at least indirectly trigger feelings of sadness and loss [1].

The mean age of the menopause in Egypt is 46.7 years, which is low compared to many countries, but this age has been rising recently. The incidence of premenopausal and menopause-associated symptoms in Egyptian women is higher than in the west, probably because of the different 'Socio-cultural attitudes' towards menopause in different communities[2].

Menopause can trigger feelings of sadness and episodes of depression in a number of women. It is thought that

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somewhere between 8% and 15% of menopausal women experience some form of depression[3].

Depression, irritability, anxiety and nervousness induced by hormonal changes may be worsened by other distressing symptoms such as hot flushes, poor sleep and fatigue, weight gain and increase the amount of central body fat resulting from altered body metabolism, this is also associated with aging and a change in lifestyle, morning Joint pain and stiffness of the hands, knees, hips, shoulders and lower back are also common distressing issues[4].

Depression post menopause is likely due to fluctuating and declining estrogen levels in part. Steroid hormones, such as estrogen, act in the CNS by means of various mechanisms. For instance, they stimulate the synthesis of neurotransmitters, the expression of receptors, and influence membrane permeability5.

Regulation of serotonin and norepinephrine may change as estrogen levels fluctuate and thus contribute to depression. Because estrogen facilitates the actions of serotonin and norepinephrine, a decline in estrogen concentrations may, in turn, decrease levels of these hormones, Changes in estrogen levels, perhaps due to mechanisms involving these neurotransmitters, may be related to psychological symptoms in the menopausal transition of some women[6].

Depression is a mental disorder that is characterized by low mood, accompanied by low self-esteem and loss of interest or pleasure in normally enjoyable activities. It is also called (major depressive disorder, clinical depression, and major depression). Depression is a disabling condition that adversely affects a person's family, work, sleeping, eating habits and general health7.

Aerobic exercise has been prescribed for the treatment of a wide range of medical disorders, hyperlipidemia[8], osteoarthritis[9], fibromyalgia[10], and diabetes[11].In addition, exercise may have a number of psychological benefits[12,13], and it has been suggested as a potential treatment for a variety of psychiatric conditions, especially depression[14].

The Royal College of Obstetricians and Gynecologists in the UK and the North American Menopause Society, 2002 have recommended that women be advised to consider aerobic exercise as a treatment for vasomotor menopausal symptoms suggests that aerobic exercise can improve psychological health and quality of life in vasomotor symptomatic women, in addition, several studies of middle-aged/menopausal-aged women have found that aerobic exercise can invoke significant improvements in several common menopause related symptoms such as mood, health-related quality of life and insomnia[15] .

Exercise is extremely important through a woman's lifetime and particularly as she gets older. Regular exercise benefits the heart and bones, regulate weight, contribute to a sense of overall well-being and improve mood. If woman is physically inactive, she is far more prone to coronary heart disease,

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obesity, high blood pressure, diabetes and psychological diseases16.

Exercise increases the brain's aminergic synaptic transmission i.e. the monoamines such as serotonin and dopamine, have an improved transmission rate when exercise occurs. Just how exercise reduces symptoms of depression and anxiety isn't fully understood. Researchers believe that exercise prompts changes in both mind and body[17].

Research has shown that exercise is an effective but often underused treatment for mild to moderate depression. During exercise, the body releases chemicals called endorphins. These endorphins interact with the receptors in the brain that reduce the perception of pain; Endorphins also trigger a positive feeling in the body, similar to that of morphine[18].

A controlled program of physical exercise for postmenopausal women alleviates symptoms of anxiety and depression, and its inclusion in primary healthcare programs should be considered[19].

Poor nutrition has been proposed as a risk factor for developing depression. In a study of older adults, poor nutrition was a strong predictor of depressive symptoms[20].

The factor that could play a role in raising brain serotonin is diet. According to some evidence, tryptophan, which increases brain serotonin in humans as in experimental animals, is an effective antidepressant in mild-to-moderate depression[21].

Tryptophan is an essential amino acid which must be obtained through a person's diet (as opposed to non-essential amino acids which the body can manufacture on its own). Once in the body, tryptophan is converted into niacin, serotonin and melatonin. Most anti-depressant drugs work to increase the amount of serotonin in the brain, usually by preventing the serotonin from being depleted. Tryptophan actually increases serotonin levels, and has the advantage of doing it naturally without the extreme side effects associated with traditional anti-depressant drugs[22].

MATERIALS AND METHODES

Twenty two volunteer women after menopause shared in this study complained from mild to moderate depression (diagnosed according to beck depression inventory) were chosen from outpatient clinic faculty of physical therapy Cairo University, they all physically examined to be sure that they hadn't any physical problems that interfere with the program of exercises. They all were nonsmoker and at the same socioeconomic standard. Also, they had no history of renal, liver or endocrinal disorders, or cardiac affection. Their ages ranged from 55 to 65 years old and they complained from mild to moderate depression 14-28 on beck depression inventory. They were divided randomly into two groups equal in number, group (A) was treated by aerobic exercise 3 times / week for 4 weeks, each session was 40 min 20 min on treadmill and 20 min on stationary bicycle at 60-70% HR max while group (B) was treated by diet rich in tryptophan daily for 4 weeks (high carbohydrate – low protein diet) designed by registered nutritionist at the national institute of

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nutrition. Then every participant in this study signed a consent form after a demonstration about the aim and the procedure would be done in this study.

None of participants were on hormonal replacement therapy (HRT) and\or antidepressant drugs before starting this study by 3 months and\or during this study period. The mean values of age, weight, height and BMI between group A (57.07 ± 4.94), (81.33 ± 8.63), (160.07 ± 3.54) and (31.67 ± 3.09) and group B (56.47 ± 3.78), (82.87 ± 6.27), (160.47 ± 2.03) and (32.14 ± 2.51) respectively.

For treatment Group A**,** Eleven patients participated in this study with aerobic exercise only for 4 weeks. Aerobic exercise was taken three sessions a week. Each session 40 min. divided into 20 min on treadmill and 20 min on stationary bicycle and each 20 min divided into 5min warming up, 10 min exercise and 5 min cooling down. Exercise was at 60-70% HR max as HR max= 220 - Age. Group B, Eleven patients participated in this group for 4 weeks, with diet rich in tryptophan (low protein-high carbohydrate diet).

STATISTICAL ANALYSIS

Results were expressed as mean ± standard deviation (SD). Comparison between mean values of different variables in the two studied groups was performed using unpaired t test while comparison between pre- and post-treatment within the same group was performed using paired t test. Mean difference is calculated from the equation: Pre-treatment - post- treatment.

Statistical Package for Social Sciences (SPSS) computer program (version 19 windows) was used for data analysis. P value ≤ 0.05 was considered significant and < 0.01 was considered highly significant.

RESULTS

There was no statistical significant difference in the mean values of age, weight, height and BMI between group A & B.

Paired t test was used to show the statistical highly significant difference between pre- and post-treatment in the two studied groups. In group A, there was a statistical significant decrease in the mean BDI value measured post-treatment (13.40 ± 3.46) when compared with its corresponding pre-treatment (18.20 ± 4.35) with t test = 7.398and p value = 0.001. Also in group B, the mean BDI value was highly significantly decreased in post-treatment (14.40 ± 3.44) when compared with its corresponding value measured pre-treatment (14.40 ± 3.44) with t test = 7.519and p value = 0.001 (Table 5; Fig. 14). The percentage of improvement in BDI value was higher in group A (26.37%) than in group B (17.57%) (Table 1; Fig.2).

Table (1): Comparison between mean values of beck depression inventory measured pre- and post-treatment (within group) in the two studied groups.

	Group A (n= 11)	**Group B (n= 11)**
Pre-treatment	18.20 ± 4.35	**17.47 ± 3.60**
Post-treatment	13.40 ± 3.46	**14.40 ± 3.44**
Difference	4.80	**3.07**

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% of improvement	26.37	**17.57**
t value	7.398	**7.519**
p value	**0.001****	**0.001****

Data are expressed as mean ± SD.
**p< 0.01= highly significant

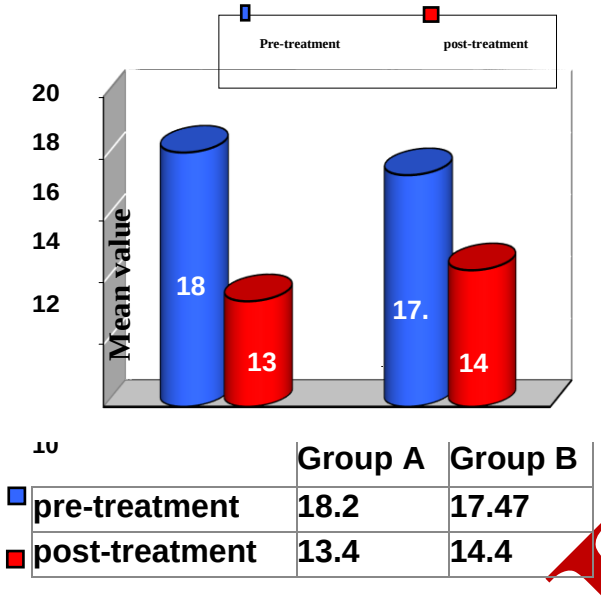

Fig. (2): Comparison between mean values of BDI measured pre- and post-treatment in the two studied groups.

Unpaired t test was used to show statistical significant difference between the two groups measured pre- and post-treatment. Pre- treatment, there was no statistical significant difference between the mean value of BDI in group A (18.20 ± 4.35) and group B (17.47 ± 3.60) with t test = 0.503 and p value = 0.619(Table 2).

The mean difference is calculated to get the exact effect of (the two modalities) aerobic exercise and diet in the two studied groups. There was a statistical significant increase in the mean value of difference in BDI of group A (4.80 ± 2.51) when compared with its corresponding in group B (3.07 ± 1.58) with t test = 2.262 and p value = 0.032 (Table2).

Table (2): Comparison between mean values of BDI in the two studied groups measured pre- and post-treatment.

	Group A (n= 11)	**Group B (n= 11)**	**t value**	**P value**
Pre-treatment	18.20 ± 4.35	17.47 ± 3.60	0.503	**0.619 (NS)**
BDI Difference	**4.80 ± 2.51**	**3.07 ± 1.58**	**2.262**	**0.032***

Data are expressed as mean ± SD.
NS= p> 0.05= not significant. *p< 0.05= significant.

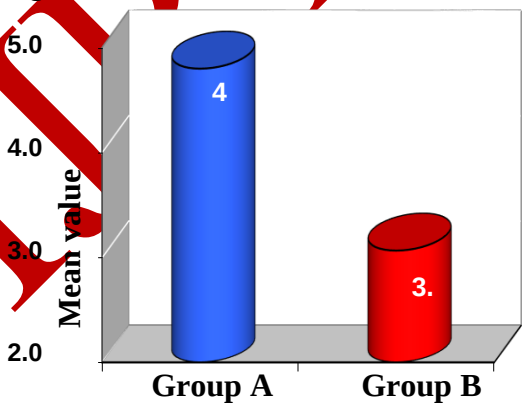

Fig. (3): Comparison between mean values of difference in beck depression inventory (BDI) in the two studied groups.

DISCUSSION

It is widely believed that physical activity and exercise help depressed patients and promote quicker and better relief from depression. They are also thought to help antidepressants and psychotherapy work better, many find walking, for example, to be of great help. Exercise produces higher levels of chemicals in the brain, notably dopamine, serotonin, and norepinephrine. In general this leads to improvements in mood and sleep disturbance, which is effective in

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countering depression[23].

Therapeutic exercise programs have become an obligatory component in the modern treatment of many internal and orthopedic conditions. In the field of psychiatry, the interaction of physical fitness and mental well-being has been increasingly recognized. In the meanwhile, solid evidence has emerged that regular exercise is associated with therapeutic effects in psychiatric patients suffering from depressive and other psychiatric disorders[24].

On the other hand, Plasma L-tryptophan levels can be raised through dietary intake of L-tryptophan, which raises serotonin levels in the brain, and thereby lessens the depressive state[25].

The present study was conducted to determine the effect of aerobic exercise versus effect of diet rich in tryptophan in reducing depression in post-menopausal women.

The result of the current study revealed that aerobic exercise and diet rich in tryptophan were effective adjunct methods in reducing postmenopausal depression but aerobic exercise is more effective than diet rich in tryptophan.

The results of this study were in agreement with Paluska and Schwenk, (2000) who stated that people who practice regular physical activity are less susceptible to depression and chronic physical disorders than sedentary individuals[26]. Walking is the most popular physical activity among adults. Many researchers suggest that at least 30 minutes of exercise a day for at least 3-5 days a week is significantly improves symptoms of depression. However, smaller amounts of activity as 10-15 minutes at a time have been shown to improve in the short time. So, small bouts of exercise may be a great way to get started if it's initially too difficult to do more.

Babyak et al., 2000agreed with our results as they found that exercise can reduce depression recurrencerates[27].

Castren, (2005)agreed with our results as he found that physical activity and exercise help depressed patients and promote quicker and better relief from depression. They are also thought to help antidepressants and psychotherapy work better, many find walking, for example, to be of great help. Exercise produces higher levels of chemicals in the brain, notably dopamine, serotonin, and norepinephrine. In general this leads to improvements in mood and sleep disturbance, which is effective in counteringdepression[23].

On the other hand, Young and Gauthier, (1981)agreed with our results as they found that the factor that could play a role in raising brain serotonin is diet. According to some evidence, tryptophan, which increases brain serotonin in humans as in experimental animals, is an effective antidepressant in mild-to-moderatedepression[21].

Eccleston, (1993)agreed with our results as he said that tryptophan acts as an effective anti-depressant for some patients and tryptophan depletion can induce depression in recovered depressed patients. This has been well demonstrated by research at Oxford

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University's Department of Psychiatry, in which 15 women with a history of depression were given a diet excluding or including tryptophan under double-blind conditions. Ten out of fifteen experienced clinically significant symptoms of depression on the tryptophan- free diet, while none experienced mood changes on the diet including tryptophan. Tryptophan rich foods include fish, turkey, chicken, cottage cheese, avocados, bananas and wheatgerm[28].

CONCLUSION

It could be concluded that the aerobic exercise and diet rich in tryptophan were very effective adjunct methods in reducing depression in postmenopausal women.

REFERENCES

1. Chattha R. 2008: Treating the climacteric symptoms in Indian women with an integrated approach to yoga therapy: A randomized control study. Menopause: The Journal of the North American Menopause Society. 15:862.

2. Sallam H, Galal A. and Rashed A. 2006: Menopause in Egypt: past and present perspectives. Climacteric journal; 9(6):421-9.

3. Soares CN. 2004: Perimenopause-related mood disturbance: an update on risk factors and novel treatment strategies available. In: Meeting Program and Abstracts. Psychopharmacology and Reproductive Transitions Symposium. American Psychiatric Association 157th Annual Meeting; May 1-6, 2004; New York, NY. Arlington, VA: American Psychiatric Publishing: 51-61.

4. Curtis M, overholt S, Hopkins M. 2005: glass office gynecology. 6th Ed. Lippincott Williams.

5. Wise D, Felker A, Stephen M. 2008: Tailoring Treatment of Depression for Women across the Reproductive Lifecycle: The Importance of Pregnancy, Vasomotor Symptoms, and Other Estrogen-Related Events in Psychopharmacology. CNS Spectr; 13(8):647- 62.

6. Watson S, Rebecca A, Cunningham K, Jeng Y. 2010: Estrogens of multiple classes and their role in mental health disease mechanisms. International Journal of Women's Health; 2(1):153–66.

7. Barlow DH. 2005: Abnormal psychology: An integrative approach (5th ed.) pp248-249.

8. Tran ZV, Weltman A, Glass GV and Mood DP. 1983: The effects of exercise on blood lipids and lipoproteins: a meta-analysis of studies. Med Sci Sports Exerc; 15:393–402.

9. Keefe FJ, Kashikar-Zuck S, Opiteck J, Hage E, Dalrymple L and Blumenthal JA. 1996: Pain in arthritis and musculoskeletal disorders: the role of coping skills training and exercise interventions. J Orthop SportsPhysTher; 24:279–90.

10. Wigers et al. 1996: Effects of Aerobic Exercise Versus Stress Management Treatment in Fibromyalgia. Scandinavian Journal of Rheumatology 25(2):77-86

Corresponding Author Rehab S. Mamoon

11. Soman VR, Koivisto VA, Deibert D, Felig P and DeFronzo RA. 1979: Increased insulin sensitivity and insulin binding to monocytes after physical training. N Engl J Med; 301:1200–4.

12. Plante TG and Rodin J. 1981: Physical fitness training and mental health. Am J Psychiatry; 154:497–501.

13. Folkins CH and Sime WE. 1981: Physical fitness training and mental health. American Psychologist, 36, 373-389.

14. Gullette ECD and Blumenthal JA. 1996: Exercise therapy for the prevention and treatment of depression. J PractPsychiatrBehav Health; 5:263–71.

15. Kantola P. 2008: Dealing with Menopausal Sleep Disturbances. Medicine Clinics; 3(1):121-31.

16. Jeannette E. 2001: Osteoporosis: Part II. Nonpharmacologic and Pharmacologic Treatment. Am Fam Physician;63(1):1121-8

17. Sunao U, Kohei S, Yuko M, Chie K. 2012: Exercise Effects on Sleep Physiology. Front Neurol; 3:48.

18. American Psychiatric Association. 2000: Practice Guideline for the Treatment of Patients with Major Depression.

19. Gutiérrez C, Luque G, Medina G and Castillo M. 2012: Influence of exercise on mood in postmenopausal women. Journal of Clinical Nursing; 21 (7-8):923-928.

20. Boult C, Krinke UB, Urdangarin CF and Skarin V. 1999: The validity of nutritional status as a marker for future disability and depressive symptoms among high-risk older adults. Journal of the American Geriatrics Society 47 (8): 995–9.

21. Young SN and Gauthier S. 1981: Effect of tryptophan administration on tryptophan, 5-hydroxyindoleacetic acid, and indoleacetic acid in human lumbar and cisternal cerebrospinal fluid. J. Neurol. Neurosurg. Psychiatry 44, 323–327.

22. Strand E. 2003: Psychology Today Magazine.

23. Castren E. 2005: Is mood chemistry? Nat Rev Neurosci; 6(3):241-6.

24. Broocks A, AherndtU and Sommer M. 2007: Physical training in the treatment of depressive disorders. PsychiatrPrax. ; 34(3):s300-4.

25. Wurtman RJ, Wurtman JJ, Regan MM, McDermott JM, Tsay RH and Breu JJ. 2003: Effects of normal meals rich in carbohydrates or proteins on plasma tryptophan and tyrosine ratios. Am J ClinNutr; 77:128–132.

26. Paluska S and Schwenk T. 2000: Physical activity and mental health: current concepts. Sports Med; 29(3):167-80.

27. Babyak M, Blumenthal JA and et al. 2000: Exercise treatment for major depression: maintenance of therapeutic benefit at 10 months. Psychosom Med 2000; 62:633-8.

28. Eccleston D. 1993: Psychiatric Bulletin. Depression- The Nutrition Connection 1993:17:223-224.

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