ORIGINAL RESEARCH

IJPHY

TO STUDY THE INFLUENCE OF STRUCTURED EXERCISE PROTOCOL ON PHYSICAL ACTIVITY IN PERIMENOPAUSAL WOMEN

D. Manjusha[1]

K. Madhavi[2]

ABSTRACT

Background: Peri-menopause is the stage immediately preceding menopause & lasts on average 4yrs. The hormonal changes in peri-menopausal women alter the cardiovascular status & increase the incidence of obesity. The purpose of this study is to improve physical activity of women to combat this risk in peri-menopausal women by using structured exercise protocol.

Methods: A total of thirty peri-menopausal women who met inclusive criteria participated in this study with age between 35-45yrs. They were randomly divided into 2 groups-experimental group (group 1, n=15) and control group (group 2, n=15), a 12-week exercise protocol were given under supervision for experimental group. The experimental group underwent the protocol of warm up for 10min following 25min exercise protocol and 10min of cool down period. The same exercise protocols were followed by control group without supervision.

Results: According to data analysis, a significant difference was found between pre and post values of BMI, WHR, Physical activity level and vo_2 peak in both experimental and control groups($p < 0.05$), but comparatively more significant changes were found in experimental rather than control group($p < 0.05$).

Conclusion: There was a significant change in physical factors like BMI, WHR and physical activity level and functional factors like vo2 peak. Hence, it is concluded that 12weeks exercise protocol is effective in peri-menopausal women.

Key words: Peri-menopausal women, physical activity, obesity, VO_2 peak

Received 15th July 2014, revised 26th July 2014, accepted 28th July 2014

DOI: 10.15621/ijphy/2014/v1i3/53470

www.ijphy.org

CORRESPONDING AUTHOR

[1]D. Manjusha,
MPT Post graduate student, College of Physiotherapy, Sri Venkateswara Institute of Medical Sciences, Tirupati, Andhra Pradesh, India.
e-Mail: manjushabpt@gmail.com

[2] Principal, College of Physiotherapy, Sri Venkateswara Institute of Medical Sciences, Tirupati, Andhra Pradesh, India.

INTRODUCTION

Women experience various changes in their life time, which may be developmental or transitional. Menopause is a unique stage of female reproductive life cycle, a transition from reproductive to non-reproductive stage. All women who live up to 50years or more go through a period of transition from reproductive to non-reproductive stage of life.[1]

Menopause is a greek word typically means "meno"-month; "pausis"-stop, it is the point at which menstruation ceases. Menopause is the end result of cessation of ovarian function constitutes an entire period of a women's life that lasts approximately 6-13years.[2]

World Menopause Day is celebrated on 18th October every year. World Menopause Day started all the way back in 1984 and was instituted by the International Menopause Society and World Health Organization (WHO). The menopause day is devoted in creating awareness about one of which most difficult period in women's life.

Women experience menopause between 40 and 58 years of age, the median age being 51 years. Menopause is a woman's last menstrual period, while the time period immediately prior to menopause is referred to as "peri-menopause" and the time following menopause is referred to as "post-menopause."[3]

Women transitioning from peri-menopause to post-menopause experience a lot of hormonal changes. Peri-menopause is a phase that represents declining ovarian function with menstrual irregularities and symptoms commonly start or become troublesome and this phase lasts till the end of menses. The declining levels of estrogen that accompany the peri-menopausal years and subsequent loss of estrogen that accompanies menopause may place the women at risk for numerous physiological alterations.[4]

According to Indian menopause society, India has a large population which has already crossed the one billion mark with 71 million people over 60 years of age and the number of menopausal women about 43 million. It is estimated that in the year 2026, the menopausal population in India will be 103 million. The average age of Indian menopausal women is 47.5 years and the mean age at menopause of women in South Karnataka is 48.7 years. According to Indian menopause society research there are about 65 million Indian women over the age of 45. Average age of menopause is around 48 years but it strikes Indian women as young as 30-35 years. Mean age at menopause ranges in Indian women from 40.32 to 48.84 years and in developed countries from 48.0 to 51 years.[5] So menopausal health demands even higher priority in Indian scenario.[6]

Women are born with about 1.5 million ova and reach menarche with around 4, 00,000. Most women menstruate about 400 times between menarche and menopause, using all responsive ova. When all these ova become atretic, the ovary is no longer capable of responding to pituitary gonadotropins, and the production of estrogen and progesterone, and the other ovarian hormones is reduced. The result of these low levels of hormones is often manifested by deleterious physical, psychological and sexual changes.[7]

Menopause is also a time period where women suffer with many symptoms and poor health status, which affect quality of life. Menopause is also associated with a number of physical, psychological and social changes. Menopausal symptoms can begin 2 to 8 years prior to menopause. Common Psychological symptoms of menopause include mental stress, mood disturbances, panic attacks, depression, irritability, anxiety, sleep disturbances, concentration difficulties, feeling of stress, fatigue, confusion, lowered judgment, lowered motor coordination, forgetfulness, insomnia, distractibility, restlessness, tension and loneliness. Behavioral changes of menopause women include avoiding social activities, lowered work performance.

Physiological changes associated with menopause are hot flushes, cold sweats, dizziness, faintness, nausea, vomiting, breast tenderness, bloating, weight gain, skin and hair disorders, anorexia nervosa, edema, swelling, pelvic discomfort, headaches or migraines, changes in bowel habit and reduced coordination. These in turn are thought to increase the risks of various chronic diseases including heart diseases and osteoporosis.[8]

After menopause, a woman's risk of heart disease grows to almost equal the risk of a man. Falling estrogen levels may lead to high cholesterol levels. The hormonal changes in peri-menopausal women leads to decreased physical inactivity which in turn leads to decreased cardiovascular fitness & increase in incidence of obesity, most of which can be lessened by improving physical activity. Physical activity is defined as any bodily movement produced by skeletal muscles that result in energy expenditure beyond resting expenditure[9]. Regular physical activity can prevent or lessen the impact of many of the physical and psychological changes in women experienced at this time.

The alternative therapies for menopausal symptoms are nontraditional. They include dietary and herbal supplements, acupuncture, chiropractic, massage therapy, biofeedback, homeopathy and eating certain foods that are thought to prevent disease or heal.[10]

Apart from above therapies physical activity and exercise are simple form of exercise protocols available which are simple and easy to adopt. Physical activity and exercise can helps in increasing the cardio respiratory function, minimizing weight gain, reducing the metabolic risks associated with declining estrogen, increases HDL, reduces LDL, reduces risk of high blood pressure, heart attacks, and strokes, increases bone mass and prevent osteoporosis.[11] The aim of the study is to find out the influence of structured exercise protocol on physical activity in peri-menopausal women.

METHODOLOGY

Thirty subjects were randomly selected into two groups. 15 are experimental, 15 are control group that subjects underwent intervention in which pre and post evaluation was done

Experimental Group: Subjects were commenced with warm-ups for 10 minutes which includes stretching's, followed by exercise protocol for 25 minutes. Exercise session ends with cool down period for 10 minutes which includes breathing exercises.

Control Group: Subjects under control group were given home advice of same exercise protocol without supervision.

EXERCISE PROTOCOL

The following protocols were advised for the experimental and control group for 12weeks. The pre therapeutic and post therapeutic outcome measures (BMI, WHR, PA LEVEL and VO_2 PEAK) were measured after 12weeks.

Alternate heel/toe lifting - In a sitting position, subjects lift their heels plantar-flexing their ankle joints while keeping the tips of their toes on the floor, put down their lifted heels, and then lifted their toes by dorsiflexing their ankle joints while keeping their heels on the floor.

Towel gathering - A towel laid on the floor is gathered completely with the right toe, then with the left toe.
Beanbag transfer - Soft beanbags are placed in a basket on the floor. The objective is to gather the beanbags with the right toe and then with the left toe bringing them out of the basket and placing them on the floor.

Weight-bearing on toes - The toes are kept in a spread position with web pads. Individuals balance themselves on the anterior part of a chair, trunk bent forward. Weight is then placed on the toes for 2 seconds.

Body weight stand with a chair - Using hands; without the use of hands; and without the use of hands using a lower chair.

Lower body strength with ankle weights - Knee extension, standing hip extension, standing hip abduction.
Upper body strength with dumbbells - Overhead press, bicep curls, triceps extension.

Resistance band - The exercise involves placing the band underneath the feet and reaching in front and to the side with the handles with resistance.

The outcome measures taken in this study are Physical Activity (PA) level to calculate the daily energy expenditure, Body Mass Index (BMI) for assessing physical variations, Waist-Hip Ratio (WHR) to analyze standard fat distribution and Bicycle ergometer to calculate functional capacity through vo2 peak

Physical Activity Level

Physical activity level (PAL) can be total daily energy expenditure (TDEE) and basal metabolic rate (BMR). The equation can be written as PAL = TDEE / BMR

An accurate calculation of BMR can only be done through Harris-Benedict equation. The equations use the variable of weight (w) in kilograms, height (h) in centimeters and age (a).

For women: BMR = (9.56 x w) + (1.85 x h) - (4.68 x a) + 655

TDEE takes into account the number of calories used in day both at rest (BMR) and during physical activities. Calculation for TDEE can be attained through the following equations:

For sedentary people (office workers or never exercise): TDEE = weight (in pounds) x 14
Place TDEE and BMR into the equation for physical activity level (PAL). General activity levels are expressed as:

Inactive: less than 1.4
Sedentary: 1.4 - 1.69
Moderately active: 1.70 - 1.99
Vigorously active: 2 - 2.4
Extremely active: greater than 2.4

Body Mass Index

BMI stands for body mass index. It is a measurement of a person's weight relative to his or

her height. It is an indicator, not a direct measurement of a person's total body fat.

It is expressed in: BMI = Weight (kgs)/ height (m^2)

Waist–hip ratio (WHR) is the ratio of the circumference of the waist to that of the hips. The waist circumference should be measured at the midpoint between the lower margin of the last palpable rib and the top of the iliac crest, using a stretch-resistant tape. Hip circumference should be measured around the widest portion of the buttocks, with the tape parallel to the floor.

VO_2peak Maximal oxygen consumption is the maximum capacity of an individual's body transport and use oxygen during incremental exercise, which reflects the physical fitness of the individual. Vo_2 peak was expressed an absolute rate in liters of O_2/min (lit/min).

Bicycle Ergometer (Test is used for prediction of VO_2peak) One of the popular ergometer is the cycle ergometer. This type of ergometer is a stationary exercise bicycle that permits accurate measurement of the amount of work performed. The most common type is the Astrand submaximal cycle ergometer for prediction of VO_2peak. The VO_2 peak is calculated using the formula

$$VO_2 \text{ peak} = \frac{10.8 \times \text{power}}{\text{Weight}} + 7$$

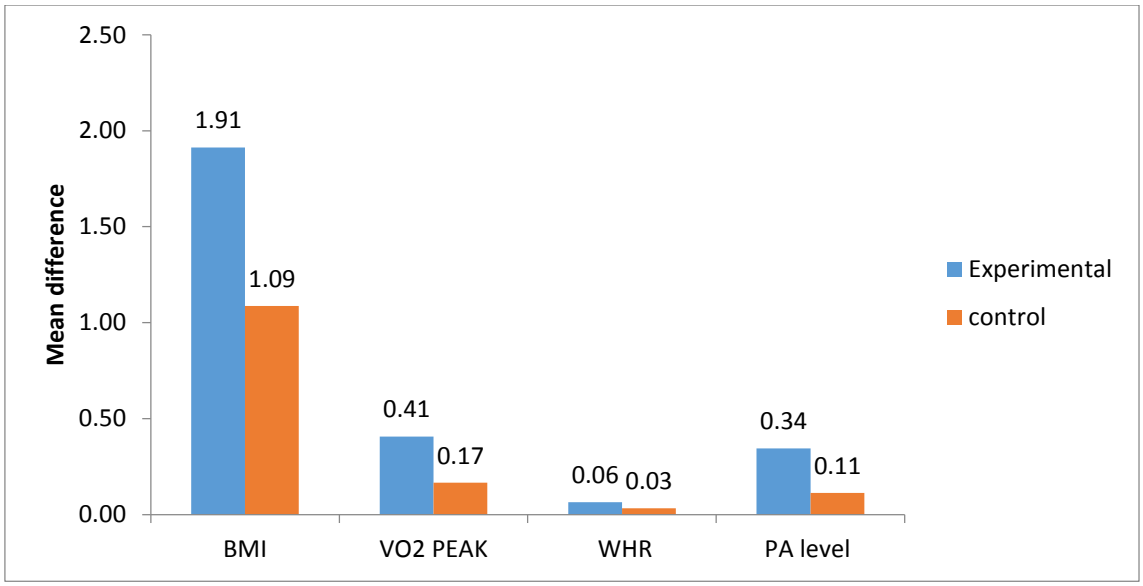
STATISTICAL ANALYSIS: Of the 30 subjects, 15 were randomized into control group and 15 were randomized into experimental group. All the 30 subjects completed entire protocol as defined by 6 weeks of treatment. The outcomes of the study were BMI, WHR, PA LEVEL and VO_2 PEAK. Statistical tools unpaired t-test has been applied for parameters in between groups and paired sample t-test for parameters within group. Descriptive measures like mean, standard deviation have been reported along with p-value.

Table-1
Mean Difference between Experimental and Control Groups

	Groups	N	Mean	Std. Deviation	Std.Error Mean
BMI	Experimental	15	1.9133	0.35024	0.09043
	Control	15	1.0867	0.49116	0.12682
WHR	Experimental	15	0.0647	0.01767	0.00456
	Control	15	0.0327	0.00961	0.00248
PA level	Experimental	15	0.344	0.0429	0.01108
	Control	15	0.1667	0.06172	0.00712
VO_2 PEAK	Experimental	15	0.4067	0.12228	0.03157
	Control	15	0.1667	0.06172	0.01594

Graph-1

Graphical Representation of Mean Difference between Experimental and Control Groups



The t-value and the sig (2-tailed) level (the p-value) will clarify whether the difference between experimental group and control group as significant. Now the p-value is less than 0.05 in all cases indicating that there is significant difference between Experimental group and Control group.

DISCUSSION

In the present study out of 30 cases, 15 cases were randomly selected for experimental and 15 cases were randomly selected for control group completed the course of structured exercise protocol (12 weeks) for both groups. There was a significant improvement in physical activity after using this structured exercise protocol ($p < 0.005$). The exercise programme resulted a decrease in the subject's WHR, BMI, PA level and VO_2 PEAK ($p < 0.005$). The process of transition from premenopausal to postmenopausal women, there was changing hormone levels can last for more than 10 years and women may experience widely varying hormone levels, specifically estrogen, progesterone, follicle stimulating hormone, and luteinizing hormone. These hormones alone, and in combination, are responsible for a wide range of processes within the body.

The changes that occur during this stage of life may result in disruptions to normal daily living. Habitual participation in physical activity results in many health benefits, including increased longevity, decreased risk of cardio-respiratory and metabolic diseases and some cancers. [12,13] It maintains the energy balance improves musculoskeletal, functional and mental health.

Physical activity and exercise training have risks that must be considered when recommending regular physical activity. The positive outcomes resulting from regular exercise and/or physical activity programs include increased cardiovascular fitness, improvements in body composition. Regular physical activity levels also improve the sensitivity of liver, skeletal muscle, and adipose tissue to insulin. Physical activity is also indirectly protective against CVD development because it decreases blood pressure and obesity.

Duval K, Strychar I, Josee CM, they found that physical activity is a confounding factor of the relation between eating frequency (EF) and body composition 85 premenopausal women were studied and investigated effect of physical activity energy (PAEE) and physical fitness of that association, mean EF was 4.6 + 0.9 eating associations. A significant positive correlation was found between EF and energy intake($r = 0.31$, $p < 0.01$) EF was negatively correlated with body mass index ($r = -0.25$, $p < 0.05$) waist circumference (-0.26, $p < 0.05$) and fat mass ($r = -0.27$, $p < 0.05$) The relation between EF and body composition could be mediated by PAEE and physical fitness.[14]

Int J Obes Relat Metab Disord conducted a study on Body mass index in mid-life women: relative influence of menopause, hormone use, and ethnicity and concluded that the menopausal transition affects body mass index in mid-life, but the effect is small relative to other influences. Interventions to increase physical activity are highly recommended to prevent increases in adiposity common in mid-life.[15] A number of studies have mentioned that body weight and body composition changes as a result of physical training.[16, 17, 18]

Lakka TA et al suggests that adult should accumulate at least 30 minutes of moderate intensity physical activity on most, preferably all days of the week to protect against chronic diseases and to improve cardiovascular fitness.[19]

According to the results of statistical data, the important finding of this study was that 4 independent measures (BMI, WHR, PA level and Vo2 peak) demonstrated a strong response to the effects of 12weeks structured exercise protocol on physical activity in peri-menopausal women.

CONCLUSION

This study had shown a significant change in physical factors like BMI, WHR and physical activity level and functional factors like vo2 peak. Hence, it is concluded that 12weeks exercise protocol is effective in peri-menopausal women.

LIMITATIONS AND RECOMMENDATIONS

Sample size is small, studies can be done with different physical activity levels, duration of the study was short, long term effects of study can be studied further, further more studies are needed to done using this exercise protocol, Studies with longer duration are recommended with longer follow-up period to assess long term benefits, and the study can be conducted with larger sample size.

REFERENCES

1. Bobak, Lowdermilk and Jensen. Maternity Nursing. 8th ed; 1999.
2. Bennet and Brown. Myles Textbook for Midwives. 12th ed; 1993.
3. Chris Eschbach, Ph.D Exercise Recommendations for Menopause-Aged Women. American College of Sports Medicine; 2012.
4. Lindsay.H.S. Menopause naturally exploring alternatives to traditional hormone

replacement therapy. AWHONN lifelines. 1993; 3(5): 32-38.
5. Mastana SS. Age at menopause among the lobanas of North West India. J Hum Ecol. 1996; 7(2): 151-153.
6. Akanksha Singh, Shishir kumar Pradhan. Menopausal symptoms of postmenopausal women in a rural community of Delhi, India: A cross sectional study. J Mid-Life Health. 2014; 5(2): 62-67.
7. Sellmeyer, E.D., Stone, L.K., Sebastian, A. And Cummings, R.S. A high ratio of dietary animal to vegetable protein increases the rate of bone loss and the risk of fracture in post-menopausal women. American Journal of Clinical Nutrition. 2001; 73(1): 118-122.
8. Frankenfeld, L.C., Patterson, E.R., Homer, K.N., Neuhouser, L.M. Validation of a soy food frequency questionnaire and evaluation of correlates of plasma isoflavone concentrations in postmenopausal women. American Journal of Clinical Nutrition. 2003; 77(3) : 674-680
9. Paul D. Thompson. Exercise and Physical activity in the prevention and treatment of Atherosclerotic cardiovascular disease. Arterioscler Thromb Vase Biol. 2003; 23: 1319-1321.
10. Monica Rita Hendrics, A study to assess the effectiveness of soyabean on menopausal symptoms among working women (Dissertation). Bangalore. RGUHS University; 2013.
11. Nalini Mishra, V.N. Mishra, Devanshi. Exercise beyond menopause: Dos and Don'ts. J Midlife Health. 2011; 2(2): 51–56.
12. Barbara Sternfeld, PhD and Sheila Dugan, MD. Physical activity and Health during the Menopausal transition. Obstet Gynecol Clin North Am. 2001; 38(3): 537-566.
13. Physical Activity Guidelines Advisory Committee. Physical Activity Guidelines Advisory Committee Report, 2008. Washington, DC: U.S. Department of Health and Human Services; 2008.
14. Duval K, Strychar I, Josee CM. Physical activity is a confounding factor of the relation between eating frequency and body composition. American journal of clinical nutrition. 2008; 88(5): 1200-1205.
15. Moilanen MJ, Aalto MA, Raitanen J et al. Physical activity and change in quality of life during menopause- an 8 year follow up study. Health and quality of life outcome. 2012, 10(8):2-7.
16. Forbes, GB. Exercise and body composition. J Appl Physiol. 1991; 70(3): 997-997.
17. King AC, Tribble, Dl. The role of exercise in weight regulation in non-athletes. Sports Med. 1991; 11(5):331-349.
18. Akdur H, Sozen AB, Yiğit Z, et al. The effect of walking and step aerobic exercise on physical fitness parameters in obese women. J 1st Facult Med. 2007; 70(3):64-69.
19. Lakka TA et al. Sedentary lifestyle, poor cardio respiratory fitness and the metabolic syndrome. Medicine and Science in Sports and Exercise. 2003; 35(8): 1279-86.

How to cite this article:
D. Manjusha, K. Madhavi. TO STUDY THE INFLUENCE OF STRUCTURED EXERCISE PROTOCOL ON PHYSICAL ACTIVITY IN PERIMENOPAUSAL WOMEN. Int J Physiother.2014; 1(3): 152-157.