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Efficacy of High Intensity Interval Training VS Moderate Intensity Continuous Training on Cardiovascular Endurance & Quality of Life in Premenopausal Women

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Keywords
Training program, cardiovascular endurance, menopause, quality of life, health issues,ageing.

Abstract
Context: The physically inactive adults are present all over the world. The purpose of the study was to check the effects of short term high intensity interval training(HIIT) versus moderate intensity continuous training(MICT) on cardiovascular endurance & quality of life in the premenopausal women.
Aims: To study the efficacy of high intensity interval training versus moderate intensity continuous training on cardiovascular endurance & quality of life in premenopausal women.
Methods and Material: Thirty subjects physically inactive between the age group 35-50 years of age were selected for the study. They were bounded in the two groups one group is of HIIT & other is of MICT. The pre & post outcome measures was the step up test, menopausal rating scale & body fat mass test were used. The program included of the five minutes of warmup & cool down & 20 minutes of cycling session for 4 weeks.
Statistical analysis used: Statistical analysis was done by using INSTAT software, version 3.06 with paired t test.
Results: In a conducted study, the HIIT training program showed significant difference in improving cardiovascular endurance & quality of life in premenopausal women.
Conclusions: This study concludes that HIIT training program is effective in relieving the menopausal symptoms & improving the cardiovascular endurance & quality of life in premenopausal women.

1. Introduction

The female hormones play very important role in women's life. The changes in the hormones triggers the puberty & allow them to experience the motherhood. But after sometime & age that is around mid- forties almost all the women irrespective of any culture & they began to experience physical & psychological & emotional disturbances in their life. That high & low in the women's life that coincides with the progressive decline of female hormones oestrogen & progesterone, culminating to shut-down from the ovaries as they are known as the MENOPAUSE.

Menopause is natural process that any women experience in their life due to age related changes & gradual decline in the primordial ovarian follicles in the life. Menopause is the term that can easily describe any of the changes of life that you go through just before or after you stop having your period, making the end of the reproductive cycle. The menopause can be the result of surgery like their ovaries are removed in hysterectomy or damage to the ovaries, such as from the chemotherapy. The menopause is divided into 3 types pre-menopause stage, menopause stage, & post-menopause stage. The pre-menopause stage is when hormones start to decline & menstrual cycle become erratic & irregular. The menopause is the stage when you have stopped producing the hormones that cause your menstrual period for 12 months in row. The post-menopause is the period when hormone level will remain low & you will no longer have your monthly period.

The menopausal severity & effect of it very from person to person as the lifestyle factor of the person or the social status or the body composition & psychological status of the person also matters. The menopausal symptoms especially the vasomotor & the sexual symptoms are associated with the impaired quality of life in the women[1,2]. Therefore understanding the impact of the menopause on QOL

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in middle age women which somewhat between 35-45 is critically important in contemporary health care system[3]. The Menopause specific Quality of life Questionnaire (MENQOL) was first proposed by Hilditch et al. in 1996 which focuses in QOL of women in midlife[4].There four main domains covering are vasomotor, psychosocial, physical & sexual aspect that cover the severity of the menopausal symptoms from which the women's life gets affected.

TRAINING PROGRAM

The interval training (IT) has been used for many decades for the different purposes. The purpose of the interval training is used for the health parameters, performance & weight loss. There are two types of the interval training program that is High intensity interval training & Moderate intensity continuous training .

The High intensity interval training which consists of repeated bouts of the high intensity effort followed by varied recovery times is considered time efficient & safe strategy to reduce total fat mass & particularly the intra-abdominal fat mass in people with overweight[5,6]. The target intensity during HIIT is usually near the maximal or between "70 -80 %"maximal heart rate. Moderate intensity continuous training which consist if repeated bouts of moderate intensity effort. The target intensity during MICT is usually near minimal or between "60-70 %" maximal heart rate. The weight loss seems to be higher even if the calorie expenditure obtained with IT is lower than or equal to that of MICT[7,8]. There is two types of the most popular types of the training protocol that includes cardiovascular & performance adaptation equal or greater than those induced by MICT despite lower volume of exercises[9].

Thus the aim of the study was to compare the effects of the two types of training protocol & cardiorespiratory fitness in healthy women. We hypothesized the compared with the the traditional MICT & HICT program could be more efficient in reducing whole body & abdominal visceral fat mass.

2. Methodology

This was a study to find the effect of interval training program on the cardiovascular endurance & quality of life in pre-menopausal women. The study was done in Karad area. The participants were selected according to the inclusion and exclusion criteria. A total 30 subjects were taken as mentioned in the inclusion criteria. The sample size was obtained from Karad. The inclusion criteria were subjects with the age group between 35 and 50 years and subjects who are physically inactive & are in pre-menopausal period. The exclusion criteria were subjects with history of any other medical contraindication to intense physical activity for at least 3 months. Demographic data of the subjects were taken. Prior consent and patient information form was taken. The aim and procedure were explained to the subjects in their preferred language before data collection. Pre and post-assessment was done by step up test & menopausal rating scale (MRS) & body fat mass & body mass index measured. Participants received Interval training program for Group A it is 3 days per week for 45 minutes about 4 weeks & Group B perform 3 days per week for 45 minutes about 4 weeks. The effect of treatment was noted using outcome measure. The study duration was 4 week. The experimental results were statistically analysed.

- **Training program protocol**:

The exercise training protocol include three session per week for four weeks. The session were usually in the morning on Monday, Wednesday, Friday, to allow the participants for the sufficient & comfortable recovery period. Each & every session include also 5 minutes warm up & 5 minutes cool down periods, in addition to the training program.

- **High Intensity Interval Training**:

The high intensity interval training program consisted of 45 minutes in which 5 minutes warmup & 5 minutes cool down were included. The remaining minutes cycling session at the intensity of ≥80% of heart rate peak with speed of the pedal cadence is 50-70 rpm were controlled to reach the expected intensity.

- **Moderate Intensity Continuous Training**:

The Moderate Intensity continuous training program consisted of 45 minutes in which 5 minutes warmup & 5 minutes cooldown were included. The remaining minutes of cycling session at the intensity of ≥60% of heart rate peak with speed of the pedal cadence is 60 rpm were controlled to reach the expected intensity

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- **Outcome Measure:**

1. Step up test : This test is designed to check the cardiovascular endurance of the individuals. The procedure of the test is to step on & off on the box of 12" inch height for 3 mins. The individual step up with one foot & then other foot. Maintain the beat cycle "up, up, down, down. End of 3 mins remain standing than check the pulse rate for one minute.
Excellent value - <90
Good – 90-102
Above average- 105-110
Below average- 119-128
Poor- 129-140
Very poor- >140

2. Menopause Rating Scale (MRS) : This scale is used to check the menopausal symptoms in the women in menopausal period.
0 – None
1 – Mild
2 – Moderate
3 – Severe
4 – Very Severe

3. Body Fat Mass : This s to check the body fat percentage based on the people aged. For people 35-59 age women should fall between 23%-33% is the normal range

Statistical analysis

The paired *t*-test and one sample test were used for analysis of data. Statistical analysis of recorded data was done using the software INSTAT version 3.06

3. Results

Table 1 Age wise distribution

Age Group	Subject
35-40 years	9
40-45 years	13
45-50 years	8

Interpretation: Table 1represent the shows the age distribution which was included in the study.30% subjects were included in the age group between 35-40 years, 43% were included age group between 41-45 years, 27% were included between age group 45-50 years.

Table 2 Body Fat Mass Distribution

Body Fat Mass				
	Pre	**Post**	***P* Value**	**Interference**
Group A	27.2±2.2	22.3 ±1.9	<0.0001	Extremely significant
Group B	22.3±1.9	20.8±1.7	0.0294	Considered significant

Interpretation:

Table 2 in the present study of group A, pre-interventional mean and standard deviation of body fat mass was 27.2±2.2 & post interventional mean & standard deviation is 22.3±1.9, the p value is <0.0001 which is extremely significant. The Group B pre interventional mean & standard deviation is 22.3±1.9 & that if post interventional mean & standard deviation is 20.8±1.7, the p value is 0.0294 which is considered significant.

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Table 3 Result of Step up test

Step Up test				
	Pre	**Post**	***P* Value**	**Interference**
Group A	121±2.8	93±3.9	<0.0001	Extremely significant
Group B	114.4±3.06	112±4.07	0.0245	Considered significant

Interpretation:

Table 3 in the present study the group A Pre-interventional mean and SD of Step Up test was 121±2.8 whereas post-interventional mean and SD was 93±3.9 the p value is < 0.001 that concluded that interference was considered extremely significant. The group B pre-interventional mean & SD was 114±3.06 whereas post interventional mean & SD was 112±4.07 the p value is 0.0245 that concluded that interference was considered significant.

Table 4 Result of Menopause Rating Scale

Menopause Rating Scale				
	Pre	**Post**	***P* Value**	**Interference**
Group A	3.06±0.7	1.26±0.88	<0.0001	Extremely significant
Group B	3.0±0.8	2.06±0.79	0.0043	Considered significant

Interpretation:

Table 4 in the present study of group A is Pre-interventional mean and SD of MRS was 3.06±0.7, whereas post-interventional mean and SD was 1.26±0.88, the p value is < 0.0001 that concluded the interference was considered extremely Significant. The group B is pre interventional mean & SD of MRS was 3.0±0.8, whereas the post interventional mean & SD was 2.06±0.79, the p value is 0.0043 that concluded the interference was considered significant.

4. Discussion

This study was conducted to find out the effect of HIIT & MICT training effect on the functional outcome in the subject. The study was done to compare both the exercise intervention to check which is more effective.

Menopause is a natural process that every women experience in their life due to age related decline in primordial ovarian follicles[10]. The menopausal symptoms are hot flushes, blushing, sweating, uneven or missed periods, mood swings, bladder incontinence, weight gain, etc. therefore understanding the impact of menopause on QOL in middle age women which somewhat is critically important in contemporary health care system. After the ethical clearance was obtained by Krishna institute of medical sciences was conducted at Krishna college of physiotherapy. Subjects were willingly participated in the study.

In the previous study it was compared the effects of short term high intensity interval training (HIIT)

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versus moderate intensity continuous training (MICT) on heart rate availability in physically inactive adults8, the result was after eight session of HIIT & MICT program improves systolic blood pressure & time domains of HRV.

This research was undertaken with the aim to study the efficacy of high intensity interval training versus moderate intensity continuous training on cardiovascular endurance & quality of life in premenopausal women. They were selected according to inclusion & exclusion criteria were grouped by convenient random sampling method. Participants were excluded if they had any disease or disorder such as back pain or knee pain etc. Proper demographic information was taken which included name, age, height, weight, etc. Assessment was taken prior the exercise protocol & score were noted on the paper. All outcome measures were selected accordingly to reliability[11,12]. 30 subjects were selected & were grouped each containing 15 subjects in one group. Exercise protocol was given for the 4 weeks in both groups the Group A & Group B also.

The session were usually in the morning on Monday, Wednesday, Friday, to allow the participants for the sufficient & comfortable recovery period. Each & every session include also 5 minutes warm up & 5 minutes cool down periods, in addition to the training program. The high intensity interval training program consisted of 45 minutes in which 5 minutes warmup & 5 minutes cool down were included. The remaining minutes cycling session at the intensity of ≥80% of heart rate peak with speed of the pedal cadence is 50-70 rpm were controlled to reach the expected intensity. The Moderate Intensity continuous training program consisted of 45 minutes in which 5 minutes warmup & 5 minutes cooldown were included. The remaining minutes of cycling session at the intensity of ≥60% of heart rate peak with speed of the pedal cadence is 60 rpm were controlled to reach the expected intensity.

In this study the age wise distribution is 30% subjects were included in the age group between 35-40 years, 43% were included age group between 41-45 years, 27% were included between age group 45-50 years. The result of the body fat mass is of group A, pre-interventional mean and standard deviation of body fat mass was 27.2±2.2 & post interventional mean & standard deviation is 22.3±1.9, the p value is <0.0001 which is extremely significant. The Group B pre interventional mean & standard deviation is 22.3±1.9 & that if post interventional mean & standard deviation is 20.8±1.7, the p value is 0.0294 which is considered significant. In this the study concluded that the group A (p=< 0.0001) which is extremely significant than group B (p=0.0294) which is considered significant with t value 4.22. The result of step up test is the group A Pre-interventional mean and SD of Step Up test was 121±2.8 whereas post-interventional mean and SD was 93±3.9 the p value is < 0.001 that concluded that interference was considered extremely significant. The group B pre-interventional mean & SD was 114±3.06 whereas post interventional mean & SD was 112±4.07 the p value is 0.0245 that concluded that interference was considered significant. In this study concluded that group A (p=<0.0001) is extremely significant than group B (p=0.0245) which considered significant with t value 20.26. The result of menopause rating scale of group A is Pre-interventional mean and SD of MRS was 3.06±0.7, whereas post-interventional mean and SD was 1.26±0.88, the p value is < 0.0001 that concluded the interference was considered extremely Significant. The group B is pre interventional mean & SD of MRS was 3.0±0.8, whereas the post interventional mean & SD was 2.06±0.79, the p value is 0.0043 that concluded the interference was considered significant. In this study concluded that group A (p=<0.0001) which is extremely significant than group B (p=0.0043) which is considered significant with t value 3.07.

There was some limitation present as the group size was small, so the study result cannot be generalized for the entire population & also the limitation faced were because of the shorter duration of the study.

5. Conclusion

In the review, the present study concluded that 4 weeks session of HIIT & MICT program improves the menopausal symptoms & cardiovascular endurance in the premenopausal women. However the HIIT 4 weeks session is superior or it improved the quality of life of premenopausal women in more number of amount as compared to the MICT 4 weeks session. The finding of the study concluded that the exercises is effective in reliving the menopausal symptoms and

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improving the cardiovascular endurance & quality of life in premenopausal women.

Conflict of Interest

Nil

Source of funding

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References

Ethical Clearance: Study approved by Institutional Ethics Committee of Krishna Institute of Medical Sciences, Karad

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