

Effect Of Abdominal Curls OnCardiorespiratory Parameters In Postmenopausal Women: A Comparative Study

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Abstract

Background: Postmenopausal Women Have High Prevalence Of Disease Such As Decrease In Abdominal Muscle Strength, Osteoporosis And Sarcopenia Which Leads To An Increase In Deterioration Of Respiratory System As The Abdominal Muscles Are Important For Expiration And Minimizing The Secretion In Lungs. So, To Improve The Strength Of Abdominal Muscles, Abdominal Curl Exercises Are Helpful Along With Conventional Physiotherapy. But There Are Very Few Shreds Of Evidence That Suggest Abdominal Curls Are Helpful For Maintaining The Cardiorespiratory Status. So, The Current Study Aims To Assess The Effect Of Abdominal Curls Exercises On Cardiorespiratory Parameters In Postmenopausal Women And Compare This With The Conventional Physiotherapy.

Methodology: An Experimental Study Was Done On Postmenopausal Women Of Age 45-55 Years Old. Initially 58 Women Were Taken For The Study, But 6 Subjects Were Drop Out From The Study, Out Of 6 Subjects, 4 Were Not Meeting The Inclusion Criteria, And 2 Refused To Continue This Study. So, 52 Subjects Were Taken For This Study, And They Were Randomly Divided Into 2 Groups: The Control Group And Experimental Group. In The Control Group, Only Conventional Physiotherapy Has To Be Done While In The Experimental Group Abdominal Curl, Exercises Has To Be Done Along With The Conventional Physiotherapy. The Protocol Was Given For 45 Days With A Frequency Of 3 Days Per Week.

Result: The Data Were Analyzed Using Descriptive Statistics And Paired T-Test Via JASP Software. Mean Value Of Age (Years) For The Control Group Is 50.538 ± 2.642 While That Of Experimental Group Is 51.038 ± 2.236 . The Current Study Coins That For Control Group, Mean Value Of Pre- Heart Rate Is 79.154 ± 2.292 And The Post Value Is 75.962 ± 1.732 ; Similarly For The Experimental Group It Is 79.423 ± 1.901 , And 74.269 ± 1.638 Respectively. The Mean SBP Value For The Control Group Is 130.846 ± 2.541 While That Of Experimental Group Is 128.231 ± 2.355 . Mean DBP Value Of Control Group Is 77.615 ± 1.499 Whereas That Of Experimental Group Is 79.746 ± 1.87 . Mean Spo2 Value For The Control Group Is 93.885 ± 1.451 And That Of The Experimental Group Is 96.077 ± 0.796 . Similarly, In Chest Expansion, Mean Value For Control Group Is 1.585 ± 0.108 Whereas That Of Experimental Group Is 1.762 ± 0.085 . And The Mean Value For MMT Of Abdominal Muscle Of The Control Group Is 3.308 ± 0.471 And That Of Experimental Group Is 4 ± 0.693 .

Conclusion: Data Coins That Abdominal Curls Exercises Are Beneficial In Maintaining And Improving The Cardiorespiratory Parameters Of Postmenopausal Women As Compared To Conventional Physiotherapy. So, We Can Recommend Or Include The Abdominal Curls Exercises In Our Protocol For Improving The Status Of Postmenopausal Women.

Keywords: Postmenopausal Women, MMT, Abdominal Curls.

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I. Introduction

According to WHO, Menopause is a natural biological process that marks the end of a woman's reproductive life. It is defined as the permanent cessation of menstruation, which typically occurs between the ages of 45 and 55. Menopause can be a slow process, usually beginning with changes in the menstrual cycle. Menopause is usually diagnosed after a woman has gone 12 consecutive months without a menstrual period. This occurs when the ovaries stop producing eggs and the levels of estrogen and progesterone hormones decline^{1,2}.

There is an increased incidence of disorders in postmenopausal women, showing that the hormonal change prevalent is a key risk factor for morbidity and mortality. The postmenopausal period, whether early or

late, is related to various changes in the female body that influence the development of health problems and cause significant losses in body functionality³.

Menopause can cause a range of short-term side effects that can significantly impact a woman's quality of life such as vasomotor changes (hot flashes and night sweats), sleep disturbances, fatigue, aches and pains, altered cognitive function. In addition to short-term side effects, it can also lead to long-term sequelae that can have a major significant impact on a woman's health. These may include weakness of abdominal muscles, osteoporosis, sarcopenia, pathological neurological problems, and an increased risk of cardiovascular events⁴.

The weakening of the abdominal muscles can lead to a number of problems, such as poor posture, lower back pain, and increased risk of falls. It can also make it difficult to perform activities that require core strength, such as bending, twisting, and lifting⁵. Studies suggest that to prevent or alleviate abdominal weakness, there is a need to maintain a healthy lifestyle with regular exercise which will improve the person's cardiopulmonary parameters and hence Quality of Life. So, strengthening of abdominal muscles through abdominal strengthening exercises will help to improve abdominal muscle strength, and also the muscles assist in act of the forced expiration. As a result, abdominal strengthening exercises are beneficial in clearing secretions and sputum, enhancing lung compliance and general activities^{6,7}.

So, there is a dire need to evaluate the effect of Abdominal curls on the cardiorespiratory parameters in postmenopausal women. The aim of this current study is to assess the effect of abdominal curls on cardiorespiratory parameters in postmenopausal women and compare this with conventional exercises.

II. Methodology

This Experimental study was conducted on postmenopausal women in Department of Gynecology, multi-specialty hospitals of New Delhi from January 2023 to April 2023. A total of 52 women of age group 45-55 years old were taken for the study.

Study Design: Experimental Study.

Study Location: Department of Gynecology, Multi-specialty hospitals of New Delhi.

Study Duration: January 2023-April 2023.

Sample Size: 52

Subject & Selection Method: Subjects were recruited from gynecology department of multi-specialty hospitals of New Delhi of age group 45-55 years old, and were randomly divided into 2 groups.

Group A: Control Group: 26 subjects

Group B: Experimental Group: 26 Subjects

Inclusion Criteria:

1. Females in the age group of 45 to 55 years of age.
2. Females with normal physiological menopause.

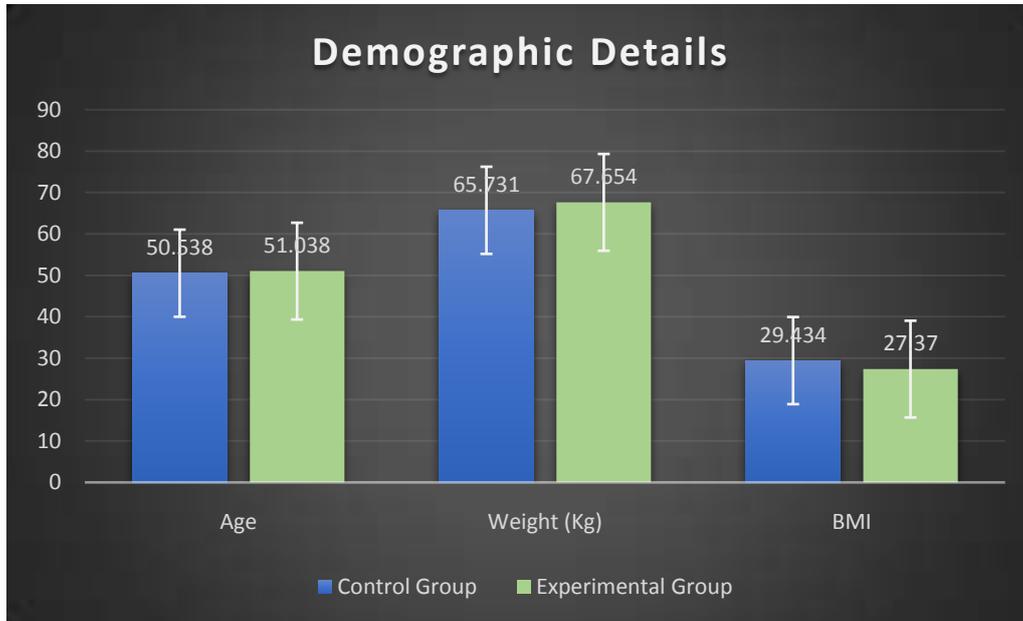
Exclusion Criteria:

1. Female with any cardiovascular disease.
2. Female having low back pain
3. Any recent surgical procedure
4. Surgical implants in the reproductive tract such as Copper-T
5. Any surgical history of the reproductive system such as Total Laparoscopic Hysterectomy (TLH) or Bilateral salpingo-oophorectomy (BSO)
6. Female with any comorbidity
7. Female having Kidney stones

Procedure & Methodology:

In control group, subject has to do only conventional physiotherapy such as Deep breathing exercises and abdominal isometrics in supine position. While in the experimental group, subjects have to do abdominal curl exercises along with the conventional physiotherapy. Exercises were performed with 5 sets of each exercise with 25 repetitions and an interval of 30 seconds rest is given in between each set. The protocol was given for 3 days per week and for the 45 days. Chest expansion via measuring tape, Heart Rate, SpO₂, Blood pressure, and MMT of Abdominal muscles were considered as outcome measures. The purpose of the study and procedure of exercises were explained to the subject. And a formal informed consent was taken from them. After that, pre- and post- intervention values of all outcome measures were taken. And the data was analyzed using JASP Software.

Graph No.1: Shows the demographic details of subjects with control group and experimental Group



Graph 2: Shows the demographic details of both control and experimental Group subjects with height (m)

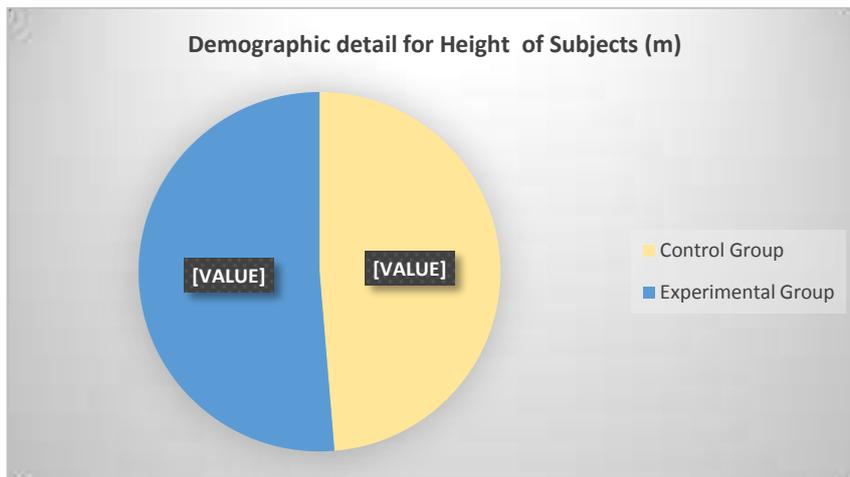


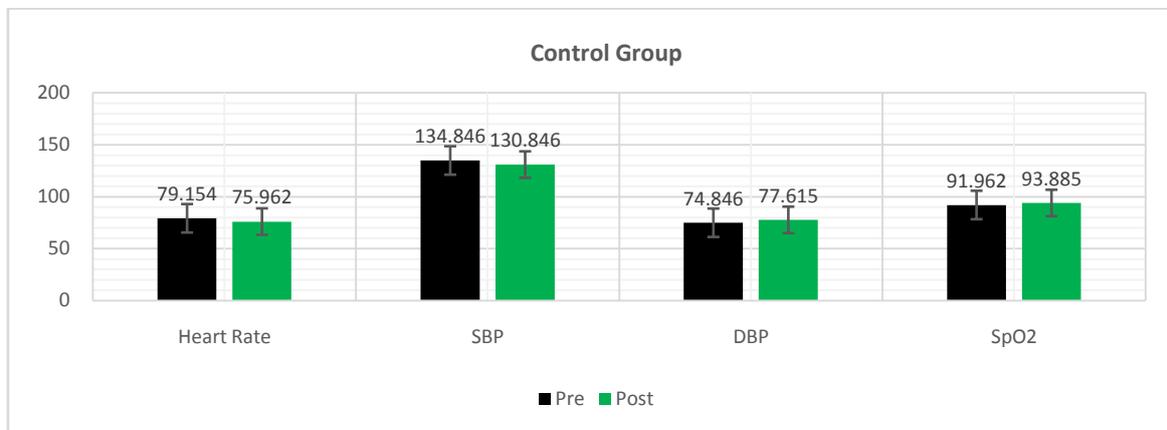
Table 2 shows The mean and standard deviation for pre-heart rate is 79.154 ± 2.292 while that of post-heart rate is 75.962 ± 1.732 ; and the t-value is 17.337 with p-value < 0.001 . Mean and the standard deviation for pre-systolic blood pressure (SBP) is 134.846 ± 2.412 and that of post SBP is 130.846 ± 2.541 . The t-value for SBP is 18.028 with p-value of < 0.001 . The mean and standard deviation for pre-DBP is 74.846 ± 1.713 while that of post-DBP is 77.615 ± 1.499 . And, t-value for DBP is -14.23 with the p-value < 0.001 . Mean and standard deviation for pre-SpO₂ is 91.962 ± 1.562 while that of post-SpO₂ is 93.885 ± 1.451 with the t-value -14.245 and p-value < 0.001 . The mean and standard deviation for pre-chest expansion is 1.458 ± 0.106 and that of post-Chest expansion is 1.585 ± 0.108 , and the t-value is -12.131 with significance value < 0.001 . The mean and standard

deviation for pre-MMT of the abdominal muscle is 3.038 ± 0.662 while that of post-MMT is 3.308 ± 0.471 . the t-value for MMT is -3.035 with the significance value 0.006.

Table no. 2: Shows the Descriptive statistics, t-value, and p-value of pre- and post-values of various parameters for Control Group

		Mean \pm SD	t-Value	df	p-value
Heart Rate	Pre	79.154 \pm 2.292	17.337	25	< .001
	Post	75.962 \pm 1.732			
SBP	Pre	134.846 \pm 2.412	18.028	25	< .001
	Post	130.846 \pm 2.541			
DBP	Pre	74.846 \pm 1.713	-14.23	25	< .001
	Post	77.615 \pm 1.499			
SpO ₂	Pre	91.962 \pm 1.562	-14.245	25	< .001
	Post	93.885 \pm 1.451			
Chest expansion	Pre	1.458 \pm 0.106	-12.131	25	< .001
	Post	1.585 \pm 0.108			
MMT	Pre	3.038 \pm 0.662	-3.035	25	0.006
	Post	3.308 \pm 0.471			

Graph 3: Shows the pre and post values of various parameters of Control Group



Graph 4: shows the Pre and post values of chest expansion and MMT for control group

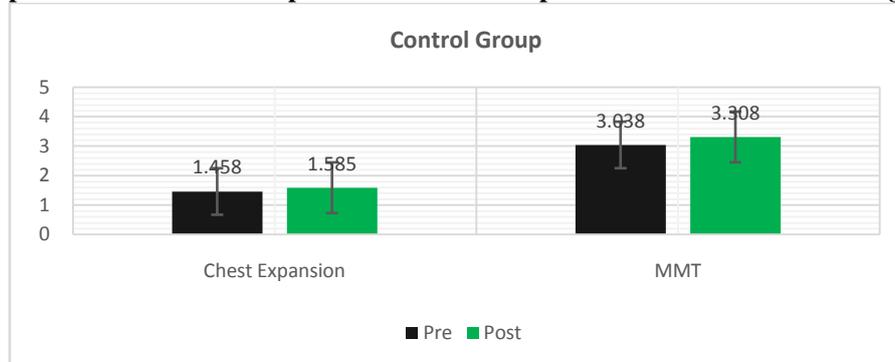


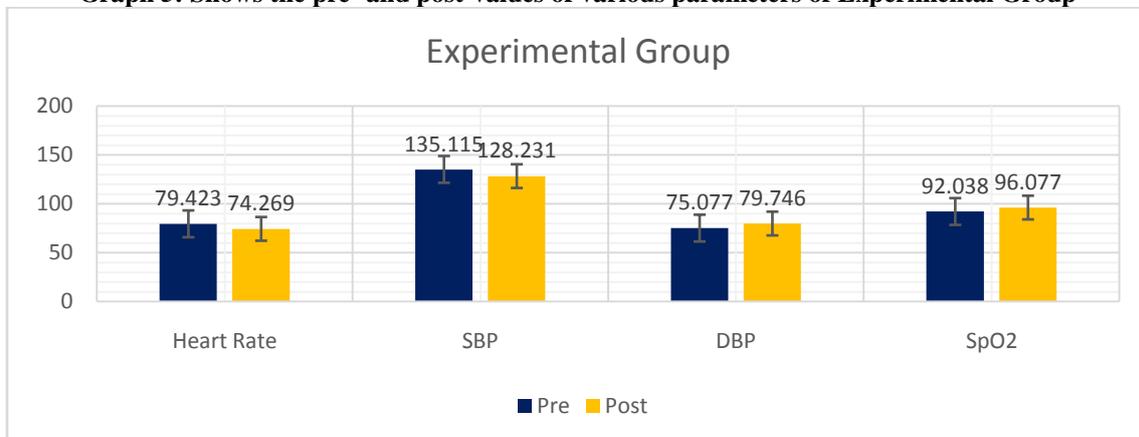
Table no. 3 shows Mean and standard deviation for pre- Heart rate is 79.423 ± 1.901 and that of Post-Heart rate is 74.269 ± 1.638 ; and the t-value is 19.504 with p-value <0.001. Mean and Standard deviation of SBP for pre- and post- values are as follows: 135.115 ± 2.197 and 128.231 ± 2.355 , respectively. And the t-value for SBP is 21.184 with p-value <0.001. The mean and standard deviation for pre-DBP is 75.077 ± 1.978 while that of post DBP is 79.746 ± 1.87 ; and the t-value is -14.269 with the significance value is <0.001. The mean and standard deviation of SpO₂ for pre- value is 92.038 ± 1.399 while that of post-value is 96.077 ± 0.796 . And, the t-

value is -19.829 and the significance value is <0.001. The mean and standard deviation of Chest expansion for pre- and post- values is as follows: 1.454±0.121, and 1.762±0.085 respectively. The t-value for the same is -17.609 and p-value is <0.001. Mean and the standard deviation of MMT for the pre value is 2.808±0.567 while that of post value is 4±0.693. And t-value of this is -12.37 and the p-value is <0.001.

Table no. 3: Shows the Descriptive statistics, t-value, and p-value of pre and post values of various parameters for Experimental Group

		Mean ± SD	t-Value	df	p-value
Heart Rate	Pre	79.423±1.901	19.504	25	< .001
	Post	74.269±1.638			
SBP	Pre	135.115±2.197	21.184	25	< .001
	Post	128.231±2.355			
DBP	Pre	75.077±1.978	-14.269	25	< .001
	Post	79.746±1.87			
SpO ₂	Pre	92.038±1.399	-19.829	25	< .001
	Post	96.077±0.796			
Chest expansion	Pre	1.454±0.121	-17.609	25	< .001
	Post	1.762±0.085			
MMT	Pre	2.808±0.567	-12.37	25	< .001
	Post	4±0.693			

Graph 5: Shows the pre- and post-values of various parameters of Experimental Group



Graph 6: Shows the pre and post value of chest expansion and MMT for experimental Group

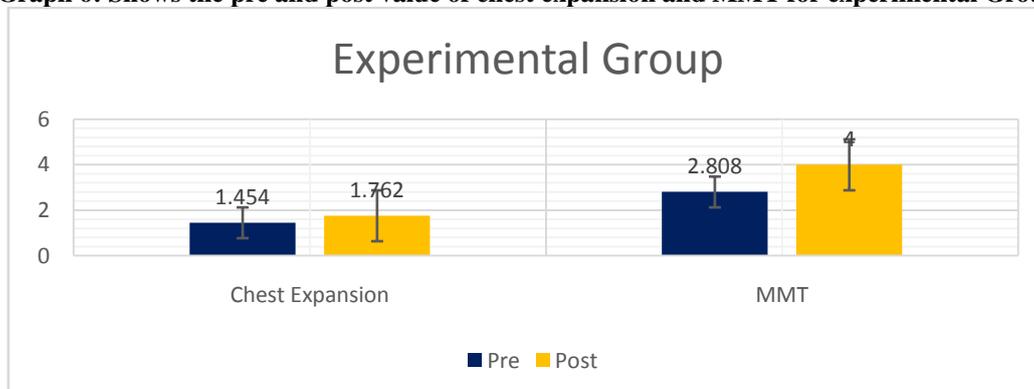


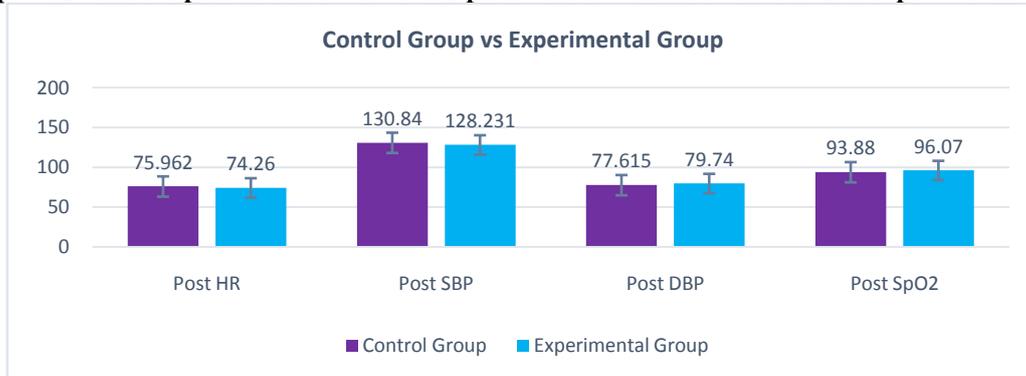
Table no. 4: The mean and standard deviation for Post Heart rate in control group is 75.962±1.732 whereas in the experimental group is 74.269±1.638 and the t-value is 4.838 with the p-value is <0.001. The mean and standard deviation for post SBP (Systolic Blood Pressure) for control group is 130.846±2.541 and that for experimental group is 128.231±2.355; with the t-value is 4.057 and p-value is <0.001. The mean and

standard deviation for post DBP (Diastolic Blood Pressure) for control group is 77.615 ± 1.499 and that for experimental group is 79.746 ± 1.87 ; with the t-value is -3.996 and p-value is <0.001 . The mean and standard deviation for post SpO₂ in control group is 93.885 ± 1.451 while that for the experimental group is 96.077 ± 0.796 ; the t-value for SpO₂ is -6.679 with the p-value <0.001 . Mean and standard deviation of Chest expansion for the control group and experimental group are 1.585 ± 0.108 and 1.762 ± 0.085 respectively. And the t-value for the same is -7.667 with p-value <0.001 . Mean and standard deviation for MMT in control group and experimental group is as follows: 3.308 ± 0.471 and 4 ± 0.693 ; and the t-value for this is -3.803 with p-value <0.001 .

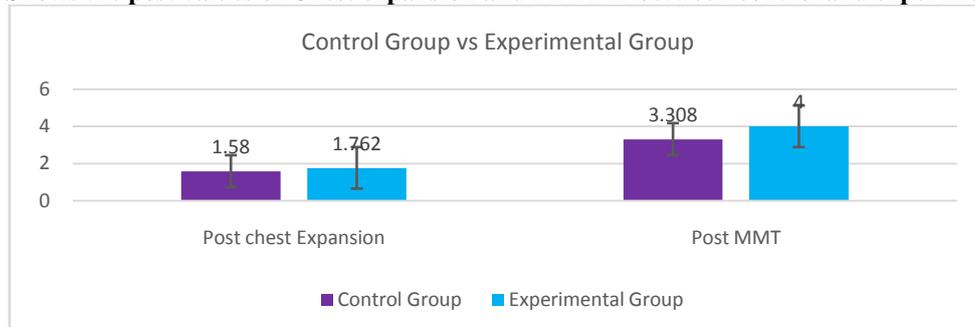
Table no. 4 shows the descriptive statistics of various parameters of post values for Control Group vs Experimental Group

	Paired Samples T-Test				
		Mean±SD	t-Value	df	p-value
Heart Rate	Control	75.962±1.732	4.838	25	< .001
	Experimental	74.269±1.638			
SBP	Control	130.846±2.541	4.057	25	< .001
	Experimental	128.231±2.355			
DBP	Control	77.615±1.499	-3.996	25	< .001
	Experimental	79.746±1.87			
SpO ₂	Control	93.885±1.451	-6.679	25	< .001
	Experimental	96.077±0.796			
Chest expansion	Control	1.585±0.108	-7.667	25	< .001
	Experimental	1.762±0.085			
MMT	Control	3.308±0.471	-3.803	25	< .001
	Experimental	4±0.693			

Graph 7: Shows the post values of numerous parameters in between control and experimental group



Graph 8: Shows the post values of Chest expansion and MMT in between control and experimental group



III. Discussion

The present study aims to find out the effect of abdominal curls on the cardiorespiratory parameters in postmenopausal women and to compare its effect with conventional physiotherapy. This is an experimental study which divided into 2 groups: 1 is control group and other is experimental group. Control group subjects

has to do only conventional physiotherapy while in experimental group, subjects have to do abdominal curls along with conventional physiotherapy.

In the current census, Heart rate shows significant improvement in experimental group as the mean value of post HR in experimental group is 74.269 ± 1.638 while that of control group is 75.962 ± 1.732 and the p-value for this is <0.001 , which shows that there is significant improvement in HR.

As per the current study, mean value of SBP for the experimental group is 128.231 ± 2.355 and that of control group is 130.846 ± 2.541 , and the p-value is <0.001 which shows that there is significant improvement in SBP value. This may be due to the reason that exercises. According to this study, the mean value of DBP of the experimental group 79.746 ± 1.87 while that of control group is 77.615 ± 1.499 and the significance value is <0.001 which shows significant improvement in Diastolic Blood pressure.

According to a study by *Elizabeth Carpio-Rivera*, A significant inverse relationship was observed between age and BP ES (effect size), BMI and SBP ES, exercise session duration and SBP ES, and the number of sets done in the resistance exercise program and SBP, ES. Regardless of participant characteristics or exercise, there was a drop in blood pressure in the hours following an exercise session⁸.

In the current study, the mean value of SpO₂ for the control group is 93.885 ± 1.451 while that of the experimental group is 96.077 ± 0.796 and the p-value is <0.001 . This suggests that there is significant changes in SpO₂ values by doing abdominal curls along with conventional physiotherapy as compared to conventional physiotherapy alone.

The mean value of Chest expansion for the control group is 1.585 ± 0.108 and that of the experimental group is 1.762 ± 0.085 and the significance value is <0.001 . This shows that there is significant increase in chest expansion due to abdominal curls.

In this present study, the Mean value of MMT for the control group is 3.308 ± 0.471 while that of the experimental group is 4 ± 0.693 , and the p-value is <0.001 . This quantifies that there is a significant improvement in muscle power of abdominal muscles by abdominal curls and conventional physiotherapy as compared to conventional physiotherapy alone.

According to a previous study, Core stabilization exercises based on breathing and global stretching postures are more effective than conventional abdominal exercises in enhancing pulmonary function and abdominal fitness⁶.

There are few limitations such as small sample size, and usage of few outcome measures. More outcome measures can be used for investigating the effect of abdominal curls for further studies.

IV. Conclusion

Data coins that Abdominal Curls exercises are beneficial in maintaining and improving the cardiorespiratory parameters of postmenopausal women as compared to conventional physiotherapy. So, we can recommend or include the abdominal curls exercises in our protocol for improving the status of postmenopausal women.

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