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EFFECT OF GRADED CONDITIONING ON SELECTED PHYSIOLOGICAL VARIABLES AND BODY COMPOSITION OF CHILDREN WITH CEREBRAL PALSY

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Abstract: *Cerebral palsy is one of the known and famous types of neurological impairment among children across the globe. The study aimed to see the effect of graded conditioning and exercises over some of the physiological variables of children with cerebral palsy. For the purpose of the study 20 children with cerebral palsy were selected and were divided into two groups of ten each the experimental group were given the treatment and the other was the kept as control group for twelve weeks. To obtain the results the analysis of co-variance was applied and it was seen that resting heart rate (.006), triceps girth (.002), suprailliac girth (.002), abdominal umbilicus (.001), sub-scapular girth (.009), positive breath holding capacity (.007) and cardio-respiratory endurance (.001) showed positive significance at .005 level. As after twelve weeks of graded conditioning it can be seen that most of the physiological variables and variables of body composition showed great signs of improvement and showed positive significance, so it can be concluded that with good graded training (according to their need and capability) the positive physiological improvement can be made among children with cerebral palsy.*

Keywords: *cerebral palsy, graded conditioning, neurological impairment, cardio-respiratory endurance*

1. Introduction

Cerebral palsy is one of the dreaded types of neurological impairments among children, as it affects normal body movement, muscle tone and also to the motor skills [16]. The impairment is so lethal that one in every 345 kids has cerebral palsy and about 80% of the children diagnosed with this kind of impairment have spastic cerebral palsy as it causes a rapid increase in muscle tone it affects more than 500000 people in the United States [6]. It has been proved in many studies that some or other kind of physical therapy is often considered as the first step to treat cerebral palsy as their still no cure available [15], [21]. Children affected with cerebral palsy are about to have a reduced cardio-respiratory

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endurance and weakness of muscles and many other health related issues at par [1], [13]. The studies have also shown that spending too much time over sedentary behaviour the body become prone to bad cardio-metabolic health, so physicians always recommend for indulge the children impaired to cerebral palsy into physical activities [4], [9], [14]. Physical activities are very important to improve the condition of children suffering from cerebral palsy as physical activity can be defined as any bodily movement done by our skeletal muscles which results in expenditure of energy [2]. We live in a society and we consider the children suffering from cerebral palsy as abnormal and people find it very hard to accept them, with result they become unsocial and they are deprived of their normal physical activities what they could have done with other kid, studies have also shown that because of this negligence and discriminated behaviour they develop attentional and perceptual problems which are relative to controls of their body [8]. There were many related studies done which emphasised participation in physical activities, facilitators and barriers to physical activity and also regarding keeping them physically active in their adolescents and childhood [3], [11], [18]. The present study emphasised mainly on physiological changes and changes over the body composition that occurs after giving the children a twelve-week graded conditioning.

Aim of the study

The main aim of the study was to see the effect of graded conditioning and exercises on children with cerebral palsy over their physiological variables and body composition. So, a twelve-week training module was prepared with different types of physical activities which focused on enhancing a certain physiological aspect of the children.

2. Material and Methods

For the purpose of the study a total of twenty neurologically impaired children were taken who had cerebral palsy, the subjects were taken from R.O.S.H.N.I (Rehabilitation Opportunities Services & Health for the Neurologically Impaired) Gwalior, Madhya Pradesh, India. The subjects were between the age of 10-17 years, all the subjects were divided into two groups of 10 members each. Group 1 was considered as the experimental group and the other was control group. A random group design was used for the experimental study and a total of 12 weeks of training were given to the children who were there in the experimental group thrice a week and the control group was allowed to carry out their normal daily routine.

Variables chosen for the purpose of study were:

***Physiological variables*:**

1. Resting heart rate
2. Cardio-respiratory endurance
3. Breadth holding capacity
   a. Positive breadth holding capacity
   b. Negative breadth holding capacity

Body compositions (muscular girth at various sites)

a. Triceps girth
b. Suprailliac girth
c. sub scapular girth
d. Abdominal umbilicus girth

For the above physiological variables following graded exercises were taken:

1. shuttle run (10*4)
2. trunk rotation
3. alternate toe touching
4. sideways lunging
5. step up (30 seconds)
6. sideways bending
7. bent- knee sit-ups
8. Hala asana (plough pose)

9. Bhujunga asana(cobra pose)
10. forward and backward bending

Procedure

All the subjects in the experimental group were made to do 10-minutes of warm up which included slow jog, brisk stretching, and some small play with balls to keep them interested. The subjects were made to do the graded exercises one by one with personal assistance. Every exercise was repeated for three times before they were called up for cooling down. It took some time as it was very hard to control them and make them do the exercises. The duration of exercises was kept between 35-45 minutes thrice a week for continuously twelve weeks [5], [17], [20].

3. Statistical analysis

For the analysis of data, the analysis of covariance was used (ANCOVA) by SPSS 23 to see the effect of graded conditioning over the experimental group after keeping a control group.

4. Results

Descriptive, p-value and F value of resting heart rate Table 1

groups	mean	Standard deviation	df	Mean square	F -value	sig
experimental	70.20	10.78	1	116.991	9.924	.006
Control	80.60	11.00				

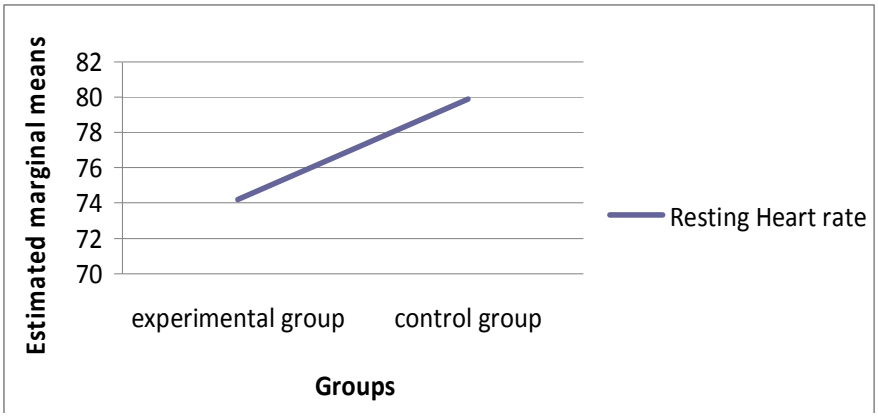

Fig.1. *Estimated marginal means of post test*

Covariates appearing in the model are evaluated at the following values: pre test= 75.50.

Descriptive, p-value and F value of triceps girth Table 2

groups	mean	Standard deviation	df	Mean square	F -value	sig
experimental	11.50	1.48	1	.061	13.068	.002
Control	11.55	1.54				

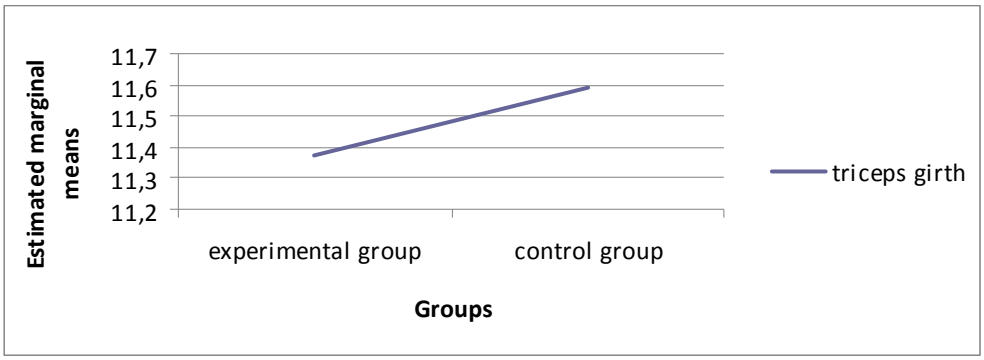

Fig.2. *Estimated marginal means of post test*

Covariates appearing in the model are evaluated at the following values: pre test= 11.4870.

Descriptive, p-value and F value of suprailliac girth Table 3

groups	mean	Standard deviation	df	Mean square	F -value	sig
experimental	14.62	1.49	1	3.432	12.875	.002
Control	14.76	1.41				

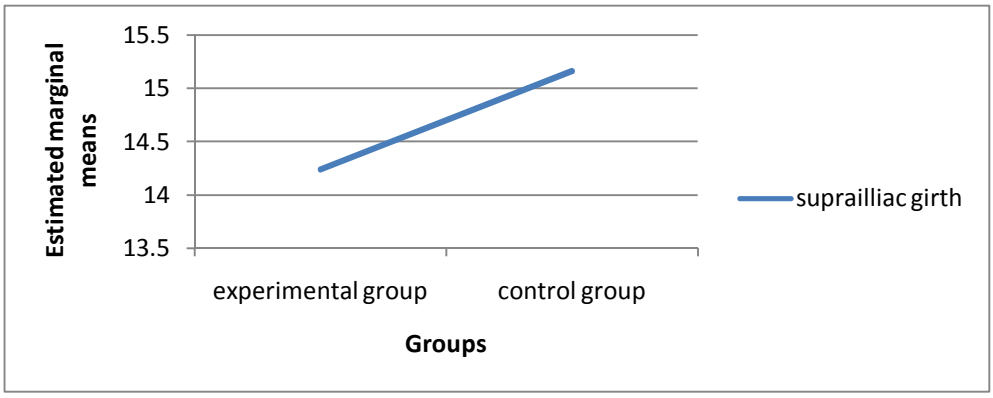

Fig.3. *Estimated marginal means of post test*

Covariates appearing in the model are evaluated at the following values: pre test= 14.8650.

Descriptive, p-value and F value of sub-scapular girth Table 4

groups	mean	Standard deviation	df	Mean square	F -value	sig
experimental	13.85	.827	1	.609	8.574	.009
Control	14.29	.929				

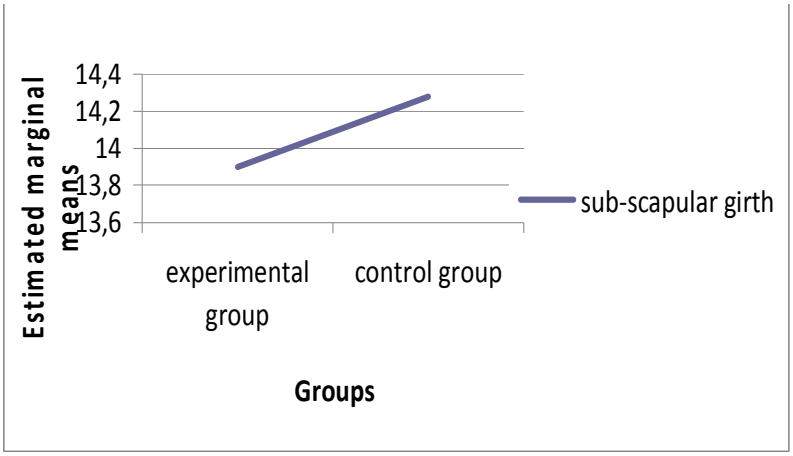

Fig. 4. *Estimated marginal means of post test*

Covariates appearing in the model are evaluated at the following values: pre test= 14.1590.

Descriptive, p-value and F value of abdominal umbilicus girth Table 5

groups	mean	Standard deviation	df	Mean square	F -value	sig
experimental	14.26	1.47	1	7.513	18.104	.001
Control	15.13	1.41				

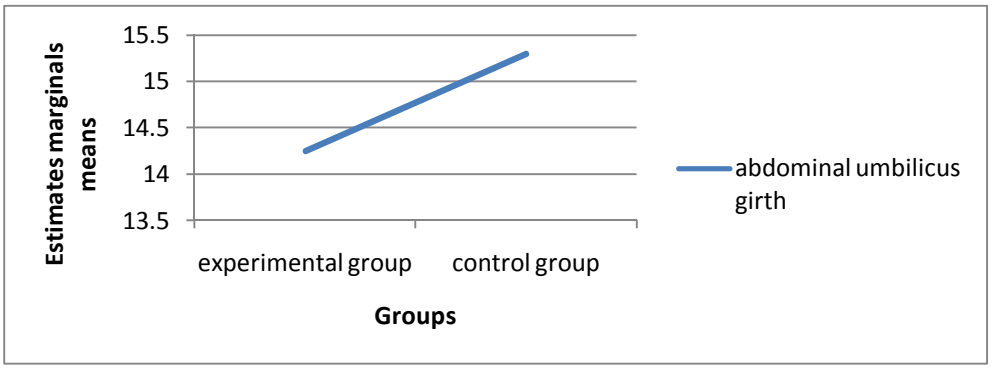

Fig. 5. *Estimated marginal means of post test*

Covariates appearing in the model are evaluated at the following values: pre test= 14.9530

Descriptive, p-value and F value of positive breath holding capacity Table 6

groups	mean	Standard deviation	df	Mean square	F -value	sig
experimental	32.74	1.62	1	6.343	9.584	.007
Control	29.59	2.60				

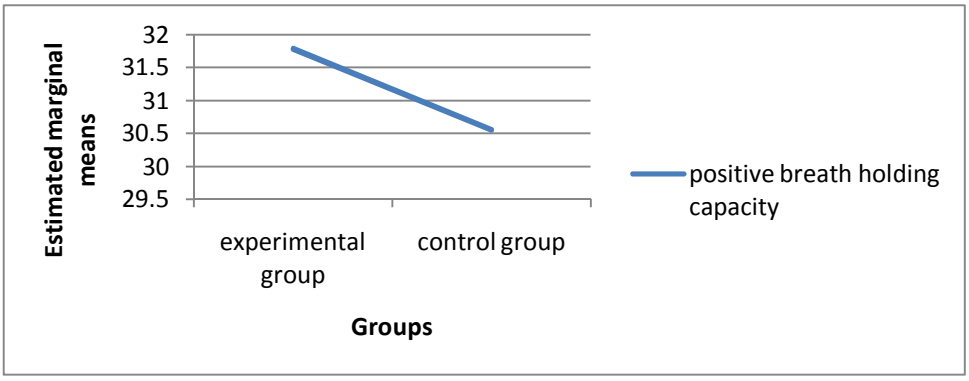

Fig. 6. *Estimated marginal means of post test*

Covariates appearing in the model are evaluated at the following values: pre test= 30.2510

Descriptive, p-value and F value of negative breath holding capacity Table 7

groups	mean	Standard deviation	df	Mean square	F -value	sig
experimental	14.46	2.19	1	.002	.484	.496
Control	20.05	2.94				

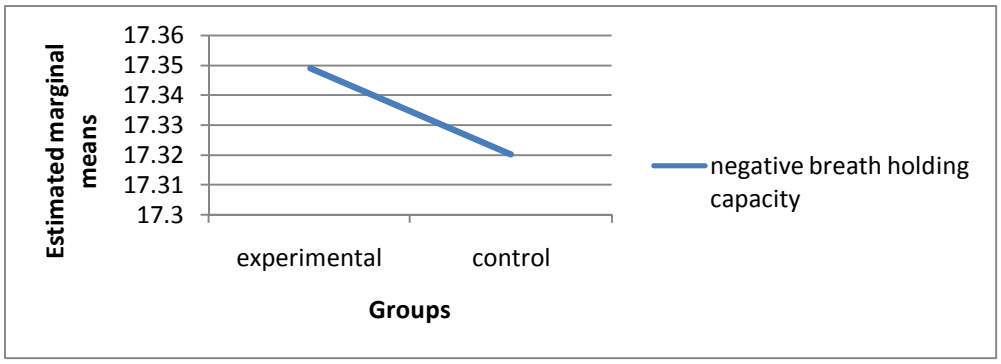

Fig. 7. *Estimated marginal means of post test*

Covariates appearing in the model are evaluated at the following values: pre test= 17.2735

Table 8

Descriptive, p-value and F value of cardio-respiratory endurance

groups	mean	Standard deviation	df	Mean square	F -value	sig
experimental	3.08	.812	1	.648	14.41	.001
Control	3.53	.703				

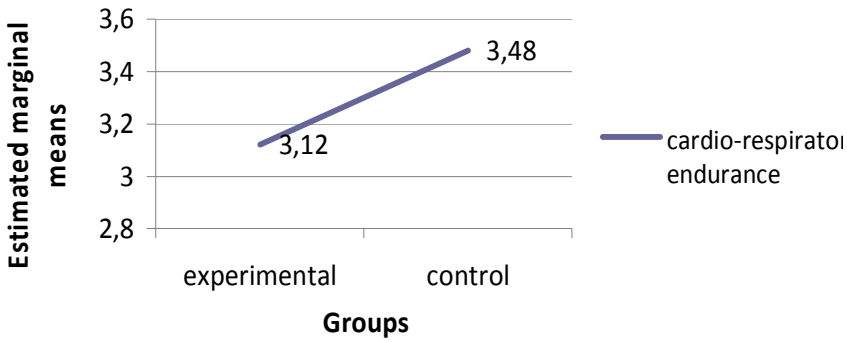

Fig. 8. *Estimated marginal means of post test*

Covariates appearing in the model are evaluated at the following values: pre test= 3.3590

5. Discussion

With the above finding of the study it can be seen that the p values of resting heart rate (.006) [20], triceps girth (.002) [10], suprailliac girth (.002)[10], abdominal umbilicus (.001) [10], sub-scapular girth (.009) [10], positive breath holding capacity (.007) [7] and cardio-respiratory endurance (.001) [12] showed significant relationship when tested at 0.05 level of significance. But in the case of negative breath holding capacity the value was more than 0.05 level of significance i.e. (.496) [7]. The post test data gathered also showed significant improvement in the physiological and body composition profile of the children with cerebral palsy. Resting heart rate also improved significantly and went on a lower side as it was before twelve weeks of training, the girth size of triceps, suprailliac, abdominal umbilicus, and sub-scapular also got reduced significantly. There was also a positive increase in the positive breath holding capacity but in the case of negative breath holding capacity there was no sign of improvement among the experimental group after giving them the treatment for twelve weeks.

6. Conclusions

Hence, from the above finding it can be concluded that there is a significant positive effect of selected graded exercises on the selected physiological and body composition of children with cerebral palsy when treated for 12 weeks. As all the variables chosen in the study showed positive significance except negative breath holding capacity.

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