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RESEARCH ARTICLE

EFFECT OF EXERCISE ON PSYCHOMOTOR VARIABLES IN MENTALLY CHALLEGED CHILDREN

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ABSTRACT

Introduction: Significant limitations in intellectual functioning and in adaptive behavior are been observed in people with Mental retardation, which are expressed in their conceptual, social, and practical adaptive skills. This disability originates before the age of 18. The purpose of the present study was to determine the effect of 10-weeks exercise program on Psychomotor ability (reaction ability and speed of movement time) of mentally challenged (MC) children.

Method: Total 30 trainable mentally challenged children (15) experimental group and (15) control group without multiple disabilities were selected for the present study. The mean age of the groups was 12.33±0.84 years. Experimental and control groups were tested for reaction time and speed of movement time and back word target throw before and after physical education training program for 10 weeks. All the participants selected were the children without previous physical activity experience.

Results: comparative statistics showed significant difference in pre and post test measurements in all studied variables in the experimental group under study ($p<0.05$). It is concluded that participation in Physical Education training program improved psychomotor ability in MR children.

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INTRODUCTION

Mental retardation is a heterogeneous neurodevelopmental disorder characterized by arrested or incomplete psychological development. Reduced physical fitness among MC children is most probably due to voluntary hypo activity and lack of exercise. The studies conducted are in general agreement that the MC are able to improve their psychophysical abilities when given a program with specific objectives in mind and by satisfying their primary needs and enhancing their motivation to live (Podgorski *et al.*, 2004; Svendsen, 1982). It should be understood that just like any other child; those with mental retardation need to develop their skill to the best of their abilities. It is important especially for people with disability to participate in physical exercise and fitness (Dykens *et al.*, 1998; Fernhall, 1993; Heller, 2004, Roberts, 2001). Coordinative abilities are important for all the activities and is optimally developed in childhood (Bös, 2001). Coordination can be defined as the ability of fast and exact control and regulation of movements, it denotes body mind relationship. Participation in physical activitie is very important to increase the coordinative abilities. Coordination is often used as an indicator of objective motor behaviour, since it contributes strongly to the explanation of total motor performance (Mechling, 1999).

Reaction time is defined as the shortest moment between the signal and the beginning of the voluntary reaction. Speed of movement is the quality which enables one to carry out either a movement or identical movement as quickly as possible. It is well recognized that mental abilities of retarded children lag significantly behind the normal child, but they seem to maintain there average physical growth ratio, in long term the problem of retardation is not metabolic, it is lack of activity, that is a secondary effect of a social phenomenon which inhibits the child to participate in physical activities by limited opportunities for instruction and participation (Nakken *et al.*, 1997). The educable and trainable mentally retarded children have the needs, wants and desires as other children and can benefit from adapted Physical Education. Mental deviancy is the conditions extending between both ends of the intellectual continuum the mentally retarded and the mentally gifted. The existing system of education and physical education have found to neglect both the extremes due to ignorance of condition and ability of these children and due to lack of knowledge ie how to approach these children and to manage them. It has been demonstrated that participation in regular physical activities positively helps to improve quality of life , limited number of MC Children specially in India are taking part in physical activities and sports, and there is a lack of information about the relationship between the effectiveness of exercise on reaction time and other coordinative abilities, hence the scholar thought of undertaking this study.

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MATERIAL AND METHODS

Subjects

Total 30 trainable mentally challenged children (15) experimental group and (15) control group without multiple disabilities were selected for the present study. The mean age of the groups was 12.33±0.84 years. Experimental and control groups were tested for reaction time, speed of movement time and back word target throw before and after physical education training program for 10 weeks. All the participants selected were the children without previous physical activity experience.

Measurements

For the present study, data were collected on three variables as pre and post test measurements to determine the effects of a 10 - week physical education training program. Variables measured were as follows:-
Reaction time
Speed of movement time
Backward target throw

Reaction time (seconds)

Electronic Chronoscope measures the disjunctive reaction time of sportsmen, which measures visual reaction times. It consists of one type of lights for visual reaction time. It is very sophisticated apparatus, which measures reaction time up to 1/100 of a second. Time taken by the subject in giving response to the stimulus recorded with a digital timer in seconds. Three trials were given in order to make them acquainted with the working of the apparatus. When it was ensured that the subject has understood the whole procedure, ten trials for visual reaction time were given. The time as recorded on the digital timer was noted down for each trial, the average of ten trials was considered as the reaction time of the subject.

Equipments

- Electronic Chronoscope
- Pencil, paper and pad

Speed of movement time (seconds and cm)

This test is used to measure response time of the hands and arm. The subject sat facing the table with hands resting on the edge of the table palms facing each other with the inside edge of the little fingers 12 inches apart. The tester held the scale time near the top so that it hanged midway the subject's palms with the "base line" of the scale time positioned evenly with the upper edges of the performer's index fingers. After a preparatory command "ready" was given, the timer was released and the performer attempted with a horizontal movement, to stop it as quickly as possible by clapping the hands together, twenty trials were given. The score for the response movement was read from the timer at the point just above the upper edge of the hand after the catch. The average of the middle ten trials was recorded after discarding the five slowest and five fastest trials.

Equipments

1. Meter Scale
2. Table and Chair
3. Measuring Tap
4. Chalk/Marker
5. Pencil, Paper

Backward basket ball throw (0 to 4 points)

A gymnastic mat was placed two meters away from the throwing line in a circle with a radius of 4 cm, drawn in the centre of the mat. A basket ball was placed in centre of this circle as shown in the floor pattern. The subject was made to stand behind the throwing line facing the opposite direction i.e. with the back towards the gymnastic mat, at a distance of two meters. The subject was then made to make five overhead throws with both the hands throwing one basket ball each time in an attempt to target the other basket ball lying in the middle of the circle drawn in the centre of the gymnastic mat.

Scoring

The scoring of points consisted of the below given procedure.

- Basket ball not touching the gymnastic mat = Zero point
- Basket ball touching the gymnastic mat = One point
- Basket ball touching the circle = Two points
- Basket ball falling inside the drawn circle = Three points
- Basket ball touching the basket ball placed in the circle
- Four points.

Equipments

1. Two basket balls
2. A Gymnastic Mat (Size 5'x 6')
3. Pencil, paper and pad

Procedure and Description of the Training Program

A physical education program was constructed after a pilot study. The subjects participated - in training program for 10 weeks. A Physical education training program of 01:00 h 6 days /week for eight weeks was prepared. Each session was subdivided in to four sections warm-up, calisthenics exercises, recreational game and cool down. Warming-up period of 5 to 10 minutes consisted of slow stretching movements, which prepared the body for more vigorous activity. The duration of calisthenics exercise was 25-30 minute in which the exercise routines progressively demanded more endurance from the participants. The recreational game consists of 10-15 minute. The session was concluded with a 5 minute cool-down designed to lower the heart rate and relax the muscles. All students participated in regular physical education program. The activities were selected on the basis of physical and physiological changes. Exercises were designed to develop cardio respiratory strength, endurance, coordination, flexibility, and motor ability. The systematically planned program was developed and special consideration was given to individual subject. Training program followed a continuum, which gradually increased as the fitness level of subject improved. Pre and post treatment tests were conducted in both groups at the beginning and end of 10 week of training program. Training sessions were organized under the supervision of teachers of the institution.

Statistical Analysis

Data was analyzed with the help of software, and Analysis Tool Pack (Microsoft Excel). Descriptive analysis (Mean+SE) and SD was done and, comparative statistics *t*-test was used to observe difference in pre and post measurements.

RESULT

Results of the present study are presented in Table 1 and Figure 1-3

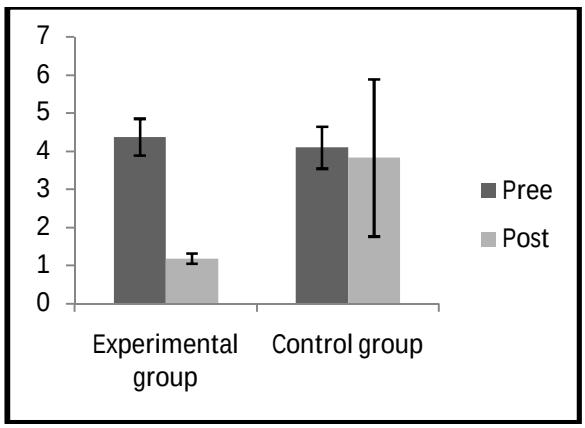

Figure 1. Mean reaction time in experimental & control groups

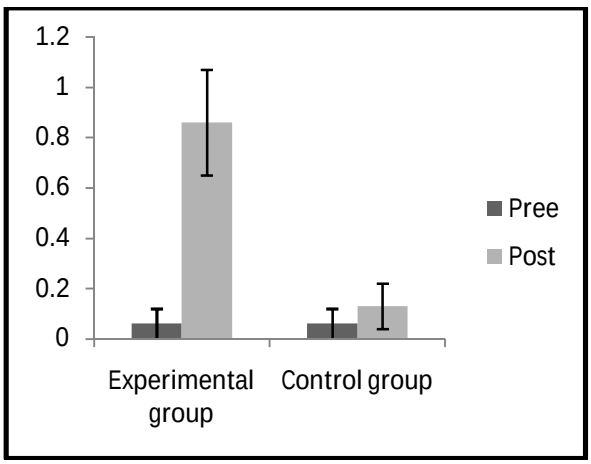

Figure 2. Mean backward target throw in experimental & control groups

Table 1. Comparison between pre test and post test scores of psychomotor variables on experimental group and control group.

Total	14 to 17	Experimental group						Control group					
S.No.	Variable	Pre		Post		t-value	p-value	Pre		Post		t-value	p-value
		Mean±SE	SD	Mean±SE	SD			Mean±SE	SD	Mean±SE	SD		
1	Reaction time	4.37±0.48	1.86	1.18±0.14	0.54	5.47	0.00	4.09±0.55	2.16	3.82±2.06	0.53	1.84	0.07
2	Backward target throw	0.06±0.66	0.25	0.86±0.21	0.83	3.83	0.00	0.06±0.06	0.25	0.13±0.09	0.35	1.41	0.16
3	Speed of movement T.	55.3±1.79	6.95	51.63±2.03	7.86	3.58	0.00	55.46±1.30	5.06	54.9±2.20	8.52	0.83	0.41
4	Time	1.94±0.17	0.68	1.46±0.14	0.55	6.42	0.00	1.80±0.16	0.65	1.56±0.19	0.75	1.81	0.07

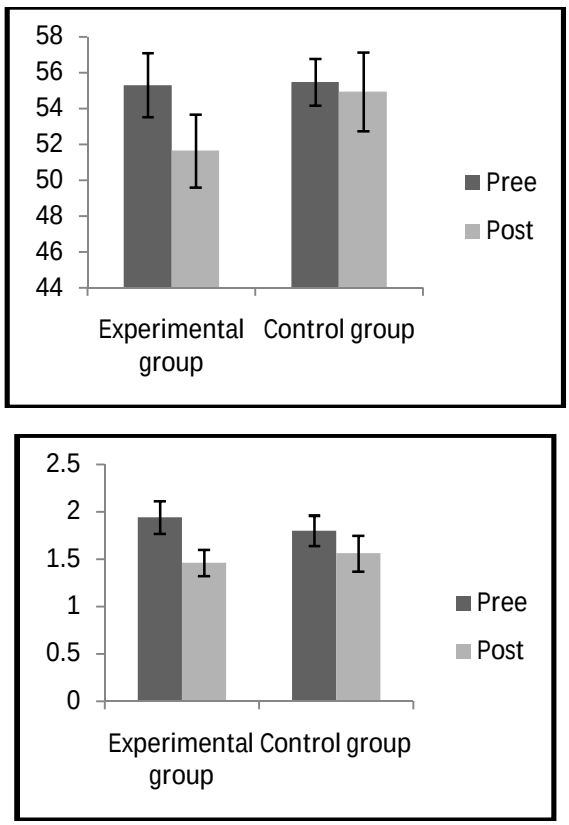

Figure 3. Mean physical speed of movement and time in experimental & control groups.

The result of the present study illustrated that experimental group improve in all four psychomotor variable. The reaction time test result showed that experimental group improved significantly ($p<0.05$). The pre and post Mean±SE recorded were 4.37±0.48, 1.18±0.14 and 4.09±0.55, 3.82±0.53 in experimental and control groups respectively. This can be explained as positive effect of training on reaction time on experimental groups. Significant improvement in reaction time in intellectual disabled children and adolescents is reported who participated in 12 weeks physical fitness program (Necmiye *et al*., 2010). Backward target throw assessed to determine the orientation ability of mentally challenged children. The result showed significant improvement in experimental group in this variable after training ($p<0.05$). The pre and post Mean±SE recorded were 0.06±0.66, 0.06±0.21 and 0.06±0.06, 0.13±0.09 in experimental and control groups respectively. The speed of movement time result documented significant improvement in experimental group ($p<0.05$). The pre and post Mean±SE recorded were 55.3±1.79, 51.63±2.03 and 52.99±2.48, 52.5±2.97 and time 1.94±0.17, 1.46±0.14 and 1.80±0.16, 1.56±0.19 in experimental and control groups respectively.

DISCUSSION

Mental disorders are of major public health concern. It has been claimed that vigorous physical activity has positive effects on mental health in both clinical and non clinical populations. Proper exercise procedures provide encouragement as it is useful in reaction and response time in mentally challenged children. Jones *et al*., (2007) in his study concluded that participation in exercise program was associated with decrease of frequency of challenging behaviors and increase in quality of life and alertness. In the present study it was concluded that physical training causes positive effect on reaction time, movement time, and orientation ability of mentally challenged children. The result of the present study is supported by McMorris *et al*., (2005) who reported that exercise affects whole body task differently from purely cognitive task central factor are probably more important than peripheral factor. Systematic exercise is a safe and effective intervention to delay or even reverse the physical and neuromotor decline. Physical education program with this kind of activity can help to improve mental alertness. Mentally challenged children need a continuing physical education program. It is important that the findings reported in the present study be considered, however many principles of physical activity promotion are widely applicable and so long as the realities of a country's structure, traditions, and culture are considered, effective strategies can be developed.

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