ISSN: 2349 - 4891

International
Journal of Recent Research and Applied Studies
*(Multidisciplinary Open Access Refereed e-Journal )*

# Effect of Adapted Physical Activities on Selected Psychomotor Variables of Children with Intellectual Disability

**Dr. M. Srinivasan[1], R. Giridharan[2]**

[1]*Assistant Professor, Faculty of General & Adapted Physical Education and Yoga, Ramakrishna Mission Vivekananda University, Coimbatore, Tamilnadu, India.*
[2]*Assistant Professor, Faculty of General & Adapted Physical Education and Yoga, Ramakrishna Mission Vivekananda University, Coimbatore, Tamilnadu, India.*

Received 10th December 2014, Accepted 5th February 2015

**Abstract**

*The purpose of this study was to find out the effect of of adapted physical activities on selected psychomotor variables of children with intellectual disability.Thirty mild intellectual disabled (IQ=50-70) students who were attending the Special Education at Special Education Unit, Faculty of Disability Management, Coimbatore, were selected for this study. Participants were randomly assigned to physical training and yogic practices (N=15) and control (N=15) groups. Their age ranged from 14 to 21 years. The participants had not taken part in any regular exercise program before entering to this study. The experimental group has undergone 6 weeks of Adapted Physical Activities, whereas control group maintained their daily routine activities and no special training was given. Training program for individuals with intellectual disabilities was 60 minutes in length and met 3 days a week. Supervised exercise training is an important issue in increasing physical activity in people with intellectual disability. The training was executed by adapting progressive method as slower pace and frequent repetition to aid in the maintenance of acquired skills. The following tests were performed: Psychomotor variables: Finger dexterity, hand eye coordination and reaction time. The analysis of covariance revealed that the adapted physical activities had significantly improved all the selected variables namely Finger dexterity, hand eye coordination and reaction time. Therefore the findings suggest that adapted physical activities are important for individuals with intellectual disability to increase their psychomotor components.*

**Keywords:** Adapted Physical Activities, Psychomotor, Intellectual Disability.



## Introduction

Disabled do not need pity but they need encouragement in their efforts to overcome their handicaps so that they become assets to the society instead of liabilities. They also have the right to grow-up in the world which sets them apart which looks at them not with a scorn or pity or ridicule but which welcomes them exactly as it welcomes everyone, which offers them identical privilege and identical responsibilities. Nowadays awareness about the problems and uniqueness of the differently abled has included in all the areas of education including research. Every disabled person should have a right to live in the world that does not see him or her as handicapped but as a person with a unique set of abilities and life potentials. The World Health Organization estimates that nearly 3% of the world's population has some form of Intellectual Disability (World Health Statistics Annuals, 1997). According to the Census of India 2011, the total provisional population is 1,21,01,93,422 (both males and females), the second world largest population in the world. Thereby, 3% of Indian Population (3,63,05,802) have some form of Intellectual Disability. People with intellectual disability have more often sedentary lifestyles than people in general. A sedentary lifestyle that results from inadequate levels of physical fitness can contribute to a number of health problems (Rubin et al., 1998). The ill effect of sedentary life of the average individual has shown that there is a need to place an emphasis on physical fitness. Often special education children do not receive physical education daily or the quality of the program offered to them is low.

Adapted Physical Activity (APA) as an umbrella term used worldwide to encompass such areas as physical education, recreation, dance, sport, fitness & rehabilitation for individuals with impairments across the lifespan. APA can also be defined as "an interdisciplinary body of knowledge directed towards the identification and solution of psychomotor problems throughout the total life span ... advocacy of sport and exercise for all persons ... attitudes, skills and habits that will facilitate social integration of persons with disability with family members and significant others, or as "service delivery, pedagogy, coaching, rehabilitation, therapy, training, or empowerment conducted by qualified professionals to enhance physical activity goal achievement of individuals of all ages with movement limitations and/or

**Correspondence**
Dr.M.Srinivasan,
E-mail: msrinivasan_05@yahoo.com, Ph. +9191713 09224

societal restrictions. The psychomotor domain is to learn fundamental motor skills and patterns in order to control active daily living including self-care, school, work and pleasure time activities. Psychomotor domain also aims in physical and motor fitness to achieve the benefits of physical activity, such as good posture, endurance, flexibility and muscle strength (Sherrill, 1986).

Exercise programming for people with an intellectual disability (ID) has been a popularresearch topic in recent years (Fernhall 1993; Reid et al. 1990; Pitetti et al. 1993;Rimmer 1992). but not much available from local studies. Therefore, the present studybeen carried out to determine the physical fitness among student with ID and normalindividual.Exploration of the relation between adapted physical activities and psychomotor abilities, will aid in understanding the mechanisms of how this APA training improve ID children's quality of life and finding a better way to evaluate the effects of APA training. The purpose of the present investigation is to examine the effect of adapted physical activities on selected psychomotor variables of children with intellectual disability.

**Methodology**

Thirty students with mild intellectual disability (n=30, males, IQ=50-70)who were attending the SpecialEducation Unit 6 hours a day, 5days per week, were included in this study. All participants were eligible for inclusion in this study on the basis of their teacher's recommendation, as indicated by their diagnosis in their medical record and by their IQ score, and determined that they could co-operate with the assessment and exercise procedures and that they could undertake exercise safely. Their age ranged from 14 to 21 years. The participants were randomly placedinto experimental (N=15) and control (N=15) groups.Additionally, inform consent was obtained from the participants and their parents.

**Intervention program**

The 6-week adapted physical activities module was designed and implemented by following the principles of sports training namely consistency, progression and overload during the entire training phase of the study. The well structured training programme was implemented five days per week for 6 weeks on Mondays, Tuesdays, Wednesdays, Thursdays and Fridays within the school hours. Supervised exercise training is an important issue in developing physical fitness components and psychomotor variables among people with intellectual disability. In order to train the individuals with intellectual disabilities, the individualized education programme was adopted for better result.

A weekly training program is planned to be effective and interesting especially to the individual with intellectual disabilities. Due to the intellectual disability, commencement of an activity is occasionally hard and does not have long concentration that gives challenge to the instruction of physical activities. The program is diversified, including activities performed inside and outside and from playing games to active relaxation.Two physical educators trained in adapted physical activities for individuals with intellectual disability, were assisting the scholar during the entire training program. The training was executed by adopting progressive method at a slower pace and increased frequency to aid in the development and maintenance of the acquired skills.

**Table I.** Study Protocol

| Dimension | Test | Test Item |
|---|---|---|
| Psychomotor abilities | Finger dexterity | O'Connor finger dexterity |
| | Hand eye coordination | Mirror drawing trace board |
| | Reaction time | Reaction Timer |

**Table II.** Training Schedule for Six weeks

<table>
<tr><th>TWO WEEKS</th><th colspan="12">SIX WEEKS</th><th>ONE WEEK</th></tr>
<tr><th>Pre-test (5 days)</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>9</th><th>10</th><th>11</th><th>12</th><th>Post-test (3 days)</th></tr>
<tr><td rowspan="7">Famililarizing the testing procedure and conducted pre-test</td><td colspan="5">MONDAY</td><td colspan="4">WEDNESDAY</td><td colspan="4">FRIDAY</td><td rowspan="7">Administered Post-test</td></tr>
<tr><td colspan="13">STRETCHING & WARMING UP (7mins)</td></tr>
<tr><td colspan="13">Physical Activities</td></tr>
<tr><td colspan="13">General Coordination</td></tr>
<tr><td colspan="13">Sensory Motor Activities</td></tr>
<tr><td colspan="13">Fine Motor Activities</td></tr>
<tr><td colspan="13">Recreational Activities</td></tr>
</table>

**Statistical analysis**

The analysis of data was performed by using 16.0 Statistical Package for the Social Sciences (SPSS).Descriptive statistics were used to generate means and standard deviations foreach participant on all the dependent variables. Analysis of covariance (ANCOVA) was computed on the pretestand theposttest values for both experimental group and control group to find out the influence of the treatment on Finger dexterity, Hand eye coordination and Reaction timein each group.The significance of the changes observed was ascertained at level of $p<0.05$.

**Results**

Thirty students were recruited and underwent familiarisation and baseline testing. All participants completed pre-test measurements, undergone the training intervention and post-intervention measurement after 6 weeks. Exercise sessions and outcomes were supervised and measured by the scholar along with two qualified physical educators who had five years of experience including three years of working specifically with people with disabilities. After the analysis of the data the obtained results are presented in the following table III.

**Table III.** Changes in psychomotor Variables for children with intellectual disability:

| | Adapted Physical Activities Group | Control Group | Source of Variance | Df | Sum of squares | Mean Square | F-Ratio |
|---|---|---|---|---|---|---|---|
| **Finger dexterity** | | | | | | | |
| Pr T M | 14.86 | 14.80 | B | 1 | 0.033 | 0.033 | 0.004 |
| | | | W | 28 | 224.13 | 8.00 | |
| Po T M | 17.00 | 14.86 | B | 1 | 34.13 | 34.13 | 5.20* |
| | | | W | 28 | 183.73 | 6.56 | |
| APo T M | 16.97 | 14.89 | B | 1 | 32.29 | 32.29 | 66.89* |
| | | | W | 27 | 13.03 | 0.483 | |
| **Eye hand coordination** | | | | | | | |
| Pr T M | 0.47 | 0.47 | B | 1 | 0.00 | 0.00 | 0.29 |
| | | | W | 28 | 0.08 | 0.003 | |
| Po T M | 0.41 | 0.47 | B | 1 | 0.03 | 0.031 | 11.84* |
| | | | W | 28 | 0.07 | 0.003 | |
| APo T M | 0.413 | 0.475 | B | 1 | 0.029 | 0.029 | 59.15* |
| | | | W | 27 | 0.013 | 0.000 | |
| **Reaction time** | | | | | | | |
| Pr T M | 0.523 | 0.524 | B | 1 | 0.00 | 0.00 | 0.001 |
| | | | W | 28 | 0.33 | 0.01 | |
| Po T M | 0.444 | 0.523 | B | 1 | 0.047 | 0.04 | 5.41* |
| | | | W | 28 | 0.24 | 0.009 | |
| APo T M | 0.445 | 0.523 | B | 1 | 0.046 | 0.046 | 52.42* |
| | | | W | 27 | 0.024 | 0.001 | |

BG-Between group means *Significant
WG- Within Group Means (Table value for 0.05 Level for df 1 & 28 = 4.196 )
df- Degrees of Freedom (Table value for 0.05 Level for df 1 & 27 = 4.210 )

An examination of table III indicates that the results of ANCOVA for pre-test scores of the adapted physical activities and control group. The obtained F-ratio for the pre-test on finger dexterity, hand eye coordination and reaction time are 0.004, 0.29 and 0.001 ($P>0.05$) indicating that the random sampling is successful and the table F-ratio is 4.196. Hence the pre-test mean F-ratio is insignificant at 0.05 level of confidence for the degree of freedom 1 and 28.The obtained F-ratio for the post-test on finger dexterity, hand eye coordination and reaction time are 5.20, 11.84 and 5.41 ($P>0.05$) and the table F-ratio is 4.196. Hence the post-test mean F-ratio is significant at 0.05 level of confidence for the degree of freedom 1 and 28. The obtained F-ratio for the adjusted post-test means on finger dexterity, hand eye coordination and reaction time are 66.89, 59.15 and 52.42 ($P<0.05$) and the table F-ratio is 4.210. Hence the adjusted post-test mean reaction time F-ratio is significant at 0.05 level of confidence for the degree of freedom 1 and 27.

**Discussion**

Children with intellectual disability are sedentary and inactive in beginning course of their life. So their motor abilities and overall functioning level are low (Horvat M & Franklin C,. 2001 and Seagraves F, Horvat M, Franklin C, et al. 2004). Regardless of the reasons for predominant sedentary lifestyle, additional training programs are needed to investigate the ways and means to improve their psychomotor abilities. In the present study, the reaction time, finger dexterity and eye hand coordination has increased significantly in the

experimental group after 6 weeks of adapted physical activities. It can be explained that as both groups had similar conditions at the beginning of the study, adapted physical activities caused the increase among the experimental group. Thus an association between training programs and improvement of psychomotor was supported by our data.

The results derived from the effect of adapted physical activities on their influence on finger dexterity of children with intellectual disability are discussed by using similar empirical constructs. Telles et al. (2012) studied that kapalabahati and breath awareness has improved fine motor skills and visual discrimination, with a greater magnitude of change after kapalabhati. According to Lynton et al. (2007) 12 weeks of kundalini yoga practice had produced significant improvement in aphasia as well as in fine motor coordination in stroke patients. Muller et al. (2010) studied that finger dexterity has developed due to interval versus continuous exercise in the cold. Raghuraj and Telles (1997) found out that dexterity skill and visual perception in community home girls trained through yoga or sports intervention program.

The results derived from the effect of adapted physical activities on their influence on hand eye coordination of children with intellectual disability are discussed by using similar empirical constructs. Mohan et al. (2001) examined that effect of interference during performance of the dual task was significantly greater in individuals with Intellectual Disabilities. Subjects with Intellectual Disabilities were found to perform better with their non-preferred than with their preferred hand. A within-group comparison revealed that right-handed performance was more affected by interference than left in these subjects. Welsh and Klavora (2003) reported that special adaptations of visual information in the working environment for a person with developmental disabilities may not be necessary. According to Case-Smith J. (1996) weekly occupational therapy services showed significant improvement on hand eye coordination of preschoolers. The correlations of the motor skill tests with the functional performance scales using year-end data revealed significant correlations for in-hand manipulation, eye-hand coordination, and grasping strength with self-care function and mobility. The results demonstrate the level of change that occurs in fine motor skill and self-care, mobility, and social function during the course of the school year for preschoolers with moderate fine motor delays. Samuel (2010) emphasized that the mobility and the participation in special game improved the co-ordination (eye-hand) as well as the reaction time among the intellectually challenged children.

The results derived from the effect of adapted physical activities on their influence on reaction time of children with intellectual disability are discussed by using similar empirical constructs. According to Yildirim et al. (2010) 12 weeks of structured physical fitness program showed significant improvement on reaction time of persons with intellectual disabilities. Pastula et al. (2012) reported that 8 weeks of moderate-intensity exercise training showed significant improvement on cognitive function of young adults with IDs. Giagazoglou et al. (2013) studied that the effects of movement reaction time and muscle activation due to a 14-week hippotherapy exercise program on in adolescents with intellectual disability (ID). According to Bhavanani and Ramanathan (2012) mukhabhastrika (a bellows type of pranayama) showed significant improvement on reaction time in mentally challenged adolescents. They suggested that yogic breathing techniques like mukhabhastrika be used as an effective means of improving neuromuscular abilities in special children.

**Conclusion**

Based on the results of the study the following conclusions were drawn.

1. Within the limitations and on the basis of the findings of the study, it was very clear that six weeks of adapted physical activities produced significant changes in psychomotor variables (reaction time, finger dexterity and eye hand coordination) of children with intellectual disability.
2. It was also concluded that the control group did not show any significant difference in psychomotor variables (reaction time, finger dexterity and eye hand coordination) of children with intellectual disability.
3. Further, it was inferred that adapted physical activities training programme appears to be a safe and practical intervention tool for improving psychomotor variables of children with intellectual disability in an institutional setting.

**Reference**

1. Amemiya M. (1982) An analysis of simple reaction time in mentally retarded and nonretarded children matched on mental age: examination using inter trial interval as a variable, ShinrigakuKenkyu. 1982 Oct;53(4):193-9.
2. Auxter, D., Pyfer J. &Huetting C. (2001) Principles and methods of adapted physical education and recreation.9th edition. Boston: Graw-Hill.
3. Bergen, A.M.E., & Mosley, J.L. (1994). Attention and attentional-shift efficiency of individuals with and without mental retardation. American Journal of Mental Retardation, 98(4), 688-743.
4. Blair, S. N., Kohl, H. W. III, Barlow, C. E., Paffenbarger, R. S., Jr., Gibbons, L. W., &Macera, C. A. (1995). Changes in physical fitness and all-cause mortality. A prospective study of health and unhealthy men. Journal of the American Medical Association, 273, 1093-1098.
5. Burkart, J.E., Fox, R.A., & Rotatori, A.F (1985). Obesity of mentally retarded individuals: Prevalence, characteristics, and intervention. American Journal of Mental Deficiency, 90, 303-312.

6. Croce, R.V. (1990). Effects of exercise and diet on body composition and cardiovascular fitness in adults with mental retardation. Education and Training in Mental Retardation, 25, 176-187.
7. Eichstaedt, C.B. and B.W. Lavay, 1992. Physical activity for individuals with mental retardation, (pp: 146-205). Human Kinetics Books, Illinois.
8. Eichstaedt, C.B., &Kalakian, L.H. (1993). Developmental/Adapted Physical Education: Making Ability Count. "Mental Retardation," Chapter 12. (3rd ed.). Macmillan Publishing: New York, NY.
9. Fernhall, B., Pitetti, K. H., Vukovich, M.D., Stubbs, N., Hensen, T., Winnick. J. P. &Short, F. X. (1998). Validation of cardiovascular fitness field tests in children withmental retardation. American Journal on Mental Retardation, 102(6), 602-612.
10. Fotiadou, EG, Neofotistou, KH, Sidiropoulou, MP, Tsimaras, VK, Mandroukas, AK, and Angelopoulou, NA. The effect of a rhythmic gymnastics program on the dynamic balance ability of individuals with intellectual disability. J Strength Cond Res 23(7): 2102-2106, 2009
11. Hayakawa K, Kobayashi K. (2011). Physical and motor skill training for children with intellectual disabilities.Perceptual Motor Skills. 2011 Apr;112(2):573-80.
12. Horvat M, Franklin C. The effects of the environment on physical activity patterns of children with mental retardation.Res Q Exerc Sport. 2001;72:189-195.
13. Horvat, M.A., &Kalakian, L.H. (1995).Assessment in adapted physical education and therapeutic recreation. Dubuque, IW. Wm. C. Brown, Publishers
14. http://www.who.int/entity/disabilities/publications/dar_action_plan_2006to2011.pdf.
15. Kioumourtzoglou E1, Batsiou S, Theodorakis Y, Mauromatis G. Selected motor skills of mentally retarded and nonretarded individuals. Percept Mot Skills. 1994 Jun;78(3 Pt 1):1011-5.
16. Merrill, E.C. (1990). Attention resource allocation and mental retardation. In N.W. Bray (Ed.), International Review of Research in Menatal Retardation, 16, 51-88. Academic Press, New York, NY.
17. Pitetti, K. H., Rimmer, J. H., &Fernhall, B. (1993). Physical fitness and adults withmental retardation: an overview of current research and future directions. Journal ofSports Medicine, 16,23-56
18. Rimmer, J. H., Braddock, D., &Fujiura, C. (1993). Prevalence of obesity in adults withmental retardation: Implications for health promotion and disease prevention. MentalRetardation, 31, 105-110.
19. Seagraves F, Horvat M, Franklin C, et al. Effects of a school-based program on physical function and work productivity in individuals with mental retardation.ClinKinesiol. 2004;58:18.
20. Sherrill, C. (1998). Adapted Physical Activity, Recreation and Sport (5th ed.). Madison, WI: WCB/McGraw-Hill.
21. Sherrill, C. (2004). Adapted physical education & recreation.A multidisciplinary approach. (6th ed.). Boston, MA: McGraw-Hill
22. Steadward, R.D., Wheeler, G.D. & Watkinson, E.J. (2003).Adapted physical activity. Edmonton: The University of Alberta Press.
23. Stopka C, Morely K, Siders R, Schuett J, Houck A, Gilmet Y. Stretching techniques to improve flexibility in Special Olympics athletes and their coaches. J Sport Rehabil 2002;11:22-34.
24. Tsimaras, V.K. &Fotiadou, E.G. 2004.Effect of training on the muscle strength and dynamic balance ability of adults with DS. Journal of Strength and Conditioning Research, 18, 343-347.
25. Un N and Erbahçeci F. The evaluation of reaction time on mentally retarded children.PediatrRehabil. 2001 Jan-Mar;4(1):17-20.
26. Winnick, J. P. (2005). Introduction to the Brockport physical fitness test technical manual. Adapted Physical Activity Quarterly, 22(4), 315-322.
27. World Health Organization (WHO).World Health Statistics Annuals. Vols. 1990-1996. Geneva; United Nations, 1997.