

## The Assessment of Motor Performance Using Two Coordination Tests on Students with Cerebral Palsy- A Preliminary Study

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**Abstract** A regular physical activity has benefits on motor performance among student with cerebral palsy. In this study were investigating the assessment of motor performance on eye-hand coordination and lower-body coordination between cerebral palsy. A total of 21 male and female students (n = 21) were involved from Penang Spastic Center. The anthropometrics were measured height and weight and two motor performance test were conducted namely target Throwing with Ball in Basket and AAHPERD ball-changing Zigzag Run Test. All the data were analyzed using SPSS and presented as mean of ( $\pm$  SEM). The mean age of all subjects were  $18.00 \pm 3.61$  years old ranging from 12 - 24 years old. The majority of the subjects were Chinese 53%, followed by Malays 33.3% and 14% Indian. The mean value height and weight of all subjects were  $150.1 \pm 32.4$  m and  $59.9 \pm 15.51$  kg. The mean value for Target Throwing with Ball in Basket  $0.90 \pm 0.436$  and AAHPERD Ball-changing Zigzag Run Test  $0:01:22.19 \pm 0:00:24.836$  minutes. The test shows they are not much difference in upper and lower body coordination. However, on this studies are found people with cerebral palsy were low level on motor performance. Thus, more study on the designing and implementation of physical on motor performance program for people with cerebral palsy should be conducted in order to increase their physical performance level.

**Keywords:** Two Coordination Tests; Cerebral Palsy- A Preliminary Study

**Abstrak** Aktivitas fisik secara teratur mempunyai manfaat pada penampilan siswa dengan cerebral palsy. Pada penelitian ini dilakukan penilaian penampilan gerak pada koordinasi mata-tangan dan koordinasi tubuh bagian bawah pada cerebral palsy. Sebanyak 21 Siswa dari Penang Spastic Center baik laki-laki dan perempuan berpartisipasi. Anthropometri diukur dengan tinggi badan dan berat badan. Penampilan gerak diukur melalui dua tes yaitu Melempar dengan Bola kedalam keranjang dan AAHPERD ball- Lari ZigZag tes. Semua data dianalisis menggunakan SPSS dan menggambarkan

rata-rata dari subjek. Rerata usia subjek  $18.00 \pm 3.61$  tahun dari usia 12-24 tahun. Mayoritas subjek dari Chinese 53% , kemudian diikuti oleh Malaysia 33.3% dan 14% India. Rerata tinggi dan berat badan subjek adalah  $150.1 \pm 32.4$  m dan  $59.9 \pm 15.51$  kg. Rerata nilai dari target melempar bola kedalam keranjang  $0.90 \pm 0.436$  dan AAHPERD Ball-changing Zigzag Run Test  $0:01:22.19 \pm 0:00:24.836$  menit. Hasil test menunjukkan tidak banyak perbedaan pada koordinasi tubuh bagian atas dan tubuh bagian bawah. Meskipun demikian pada penelitian ditemukan pada orang dengan cerebral palsy yang memiliki level rendah pada penampilan gerak. Dengan demikian perlunya lebih banyak penelitian baik dari design dan implementasi dari fisik pada program penampilan gerak untuk orang dengan cerebral palsy harus dilakukan untuk meningkatkan penampilan gerak mereka.

**Kata Kunci:** koordinasi test, Lemparan Bola, AAHPERD Ball-Changing Zigzag run test

### INTRODUCTION

Physical fitness and sport participation are important for children and adults. Positive benefits can be seen in the following areas: (a) physical and psychological health; (b) self-concept; (c) body awareness; (d) motor development; (e) sportsmanship; (f) competition; and (g) social interaction [1]. Physical benefits include factors that will improve cardiovascular functions, muscular strength and endurance as well as assisting in normal range of motion.

The physical, mental and emotional needs of the disabled are being explores with a new awareness of the potential development of the physically disabled. In terms of physical capacity, current research is now investigating training techniques, fitness assessment and the performance of disabled athletes.

Physical fitness is really important for any type of group of people. The term of physical fitness should already be well known in a sport education among sport person or sport students. Physical fitness is defined as the capacity without excessive fatigue or as the capa-

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city to perform everyday activities with reserve energy for emergency situations [2].

Cerebral palsy (CP) is a term that describes a variety of disorders of movement or posture. These movement problems are due to brain abnormalities that occur early in development. CP affects motion, muscle strength, balance, and coordination.

CP been describes as "a group of permanent disorders of the development of movement and posture, causing activity limitation, that are attributed to nonprogressive disturbances that occurred in the developing fetal or infant brain" [3]. CP with a prevalence of 2-3 per 1000 children is the most common motor disability in paediatric rehabilitation. Because of their motor problems, children and adolescents with CP experience participation restrictions and limitations in physical activities. Based on [4] define physical activities (PA) as all body movements resulting in an increased energy output from the resting position. Children and adolescents with CP show lower levels of PA compared to their healthy peers. Lower levels of PA contribute to a reduced physical fitness, which may increase the risk of developing secondary health problems such as pain and fatigue, cardiovascular disease and diabetes mellitus later in life. Moreover, PA is assumed to have a positive relation with health related quality of life and psychosocial functioning [4].

CP is the commonest physical disability in childhood yet in many cases the cause remains unknown. The form "Cerebral palsy" describes a group of disorders of movement and posture due to a defect or lesion of the immature brain [5]. CP is a symptom complex, with various types and degrees of motor impairment. These disorders become manifest early in life and are permanent and non-progressive conditions [6,7].

Since physical fitness is important, sport participation by people with CP is increasing to improve their performance. Normal children in deed also try to enhance their motor development. Sport participation by people with CP is increasing worldwide. Since physical fitness is important in the performance of most physical activities and sports, it is necessary to better understand the needs of fitness of students with cerebral palsy. Children who participate in physical fitness programs are reported to have higher self-concepts that those who are inactive [7].

According to [8] the disability in cereb-

ral palsy is also a problem of perception. Much perceptual information cannot be received or processes by the child with CP or else it may be analyzed in an excessive or distorted way. In certain children, depth and distance may be overestimated to the point of creating an overwhelming fear of falling or they may be underestimated to the point of creating an overwhelming fear of falling; or they may be underestimated to the point where the children cannot perceive how their balance is compromised, leading to continual loss of control of their postures. Phrases like "I'm falling and "Straighten up" soon become familiar to the cerebral palsy child and the family. Rehabilitation in cerebral palsy therefore cannot be limited to the motor aspect alone, but must also include promotion of perceptual functions.

Not too many years ago, if an individual with cerebral palsy was involved with an elite sports team for athletes with disabilities, it was as manager, statistician or other assistant to the athletes. A number of factors combined to prevent most people with cerebral palsy from actually competing. Not the least of these was the commonly held belief that individuals with cerebral palsy were particularly fragile and prone to injury [9].

In 1993 the U.S. Department of Education funded Project Target, a research study primarily designed to develop a health-related, criterion-referenced physical fitness test for youngsters (aged 10-17) with disabilities. Specifically, the purpose was to recommend test items and standards for youngsters with mental retardation, spinal cord injuries, cerebral palsy, blindness, congenital anomalies, and amputations. The project was centered at the State University of New York, college at Brockport. A total of 1,542 youngsters with and without disabilities were tested and data associated with several projects analyzed as a part of the comprehensive Project Target. The Brockport Physical Fitness Test (BPFT) includes a number of unique features. First, in an effort to personalize testing and assessment, the battery includes 27 different test items. However, a complete battery for one individual or category of disability generally includes four to six items. Second, it applies a health related, criterion-referenced fitness approach to youngsters with disabilities. Third, it provides an approach based on health related needs and a desired fitness profile. Finally, many of the test items are new (or at least nontraditional) and include a larger number of youngsters

with disabilities in physical fitness testing program than previously reported in the literature [10].

Children with CP can participated in physical activity even though they are relatively weaker [11;12;13;14;15;16] have less endurance [17; 18] and exhibit reduced physical activity levels compared with children without CP. These past studies exposure are of concern because of the benefits of physical activity and exercises to overall health are well known especially to people with disabilities who are less likely to engage in physically healthy lifestyles compared with people without disabilities. Additionally, inactive adults with disabilities exhibit increased severity of disease and reduced overall health and well-being [19]. Impairments such as weakness [20], muscle spasticity [21] and deficient balance [22] make it difficult for children with CP to participate in sport and play activities at a level of intensity sufficient to develop and maintain normal physical fitness levels. More study is needed to identify safe and effective methods to improve physical fitness in this population.

There is strong scientific evidence that youth with low physical activity and fitness levels and high body fat levels are more likely to display additional risk factors for cardiovascular disease such as elevated blood pressure and serum cholesterol levels [23; 24; 25]. Additionally, an expert panel recently convened by the Centers for Disease Control and Prevention (CDC) concluded that daily participation in developmentally appropriate, moderate to vigorous physical activity lasting 60 minutes or longer can reduce body fat, encourage weight loss, and improve aerobic fitness in youth aged 6 to 18 years without disabilities [26]. The few studies available also suggest that some degree of positive association may exist between physical activity and various indexes of mental health, including anxiety, depressive symptoms, and physical self-concept [26].

Limited study has also indicated that children with CP display low levels of cardio-respiratory fitness, as evidenced by a reduced peak  $\text{VO}_2$  max or a higher submaximal energy demand of walking [18,27]. These findings are alarming because reduced cardiorespiratory fitness may contribute to poor general health. From a functional perspective, children with CP have difficulty performing purposeful and efficient physical movements for many reasons, including weakness, abnormal muscle co activation, involuntary movement,

poor selective voluntary motor control, spasticity, contractures, and decreased balance [18, 20, 28]. These impairments can limit a child's ability to play and exercise at certain intensity levels necessary to develop cardiorespiratory fitness. Fatigue, commonly reported by people with CP, is thought to be a result of using an abnormally high percentage of their peak energy resources during physical activities [18, 29]. For children with CP who are able to walk, the locomotor energy demands increase with age, making it difficult to sustain their walking endurance as they transition into adolescence and adulthood. Therefore the aim of the study is to assess on motor performance among students with cerebral palsy based on the selected fitness components.

## METHODOLOGY

### Sample

Total of 20 subjects (male = 14; female =6) were participated in the study. Their age is between 18-24 years old. The subjects are students with CP from a spastic center in Penang. For the selection of the subjects were choosing randomly but only 20 students will be selected according to the name list that given by the teachers. The entire test was carried out at spastic centre for CP in Penang. All participants were informed of the study procedure, purposes and all gave their inform consent.

For this study, all the subjects were choosing from class 5-8. This is because the tests that are been selected for the study are suitable for them. People with cerebral palsy have been selected according to their medical classification classes based on the Cerebral Palsy-International Sports and Recreation Association (CP-ISRA, 2000). People with Cerebral palsy have been divided into 8 medical classes. Classes 1 to 4 are classes for people with CP who are using the wheelchair, and for class 5 to 8 is ambulatory cerebral palsy. C1 includes individuals with the most severe involvement (e.g., those who depend on an electric wheelchair or assistance for mobility), while C8, the highest class, and includes those who are minimally affected (e.g., those who can run and jump freely).

### Instrumentation

Target throwing with ball in basket (eye-hand coordination) is to assess their ability of hands coordination to move the ball with eye focus. Lines are place 7 feet with marking tape. Subjects need stand at the starting

point. Subjects are required to throw the ball into the basket with use eye-hand focus. Three trials are given. The best score are recorded.

### The second test would be AAHPER Ball

changing zigzag run test (for lower limb coordination). The test is to assess the lower body coordination with use leg and body movement. Five chairs are placed in a line and the others 5 feet apart. The subject stands behind the starting line, holding the football with the foot. On the signal, "GO" the subject run to the right of the first chair, and runs to the left for the second chair with the ball. The run is continued in and out of the chairs. The ball must be go straight with the movement which uses the leg coordination and eye also to move the ball. The subject is not permitted to touch the chairs. Two trials are given for each subject.

### Data collections

Two tests were conducted. Before start the test, subject was given the explanation from the test instructor about this test. After explanations subject start with the warming up about 5 minutes which conducted by the test instructor.

After warm up and stretching, briefing were conducted them on how the procedures of the test. Subjects were separated by two groups male and female.

First part, the male subjects were doing the upper body coordination test, and female subjects were performing the lower body test. All the subjects were given 3 trials for each of the test. After finish first section, the male subjects will perform the lower body coordination test and the female subjects will perform the upper body coordination test. The session will be concluded with the cooling down.

### Analysis of data

For the purpose of this study statistical package for social science (SPSS) was used to interpret and analyze the data. This study only used T-test, which observe the two test arm-body coordination test and lower-body coordination test.

## RESULTS

**Table 1.** Demographic data of the subjects

	<i>n</i>	MEAN ± SEM
AGE	21	18.00 ± 3.61
HEIGHT (m)	21	150.1 ± 32.4
WEIGHT (kg)	21	59.9 ± 15.51

This study consisted of 21 male and female Student's that voluntarily selected. The mean age of the subjects from were 18.00 ± 3.61years old. The mean of height and weight for the subject were 150.1 ± 32.4 m and 59.9 ± 15.51kg respectively.

**Table 2.** Number of classification of the subjects

CLASS	MALE	FEMALE
5	3	1
6	3	2
7	4	1
8	5	2
TOTAL	15	6

Table above shows the classification of the subject. All of the subjects are ambulatory-meaning that they can stand and work by their own. Majority of them from class 8 were 5 male and 2 female The second higher is from class 7 (4 male and 1 for female). For class 6 (3 male and 2 female) and for class 5 (3 male and 1 female).

**Table 3.** The coordination test data

TEST	MEAN ± SEM
AAHPER Ball-Changing Zigzag Run Test (minutes)	0:01:22.19 ± 0:00:24.83
Target Throwing With Ball in Basket	0.90 ± 0.43

The overall mean value of the AAHPERD Ball-changing zigzag run test was 0:01:22.19 ± 0:00:24.836 minutes respectively. The overall mean values of Target Throwing with Ball in Basket were 0.90 ± 0.436.

**Table 4.** Percentage of AAHPER Ball-Changing Zigzag Run Test Result

SCORE (minutes)	MALE		FEMALE	
	<i>n</i>	%	<i>n</i>	%
1:31 - 2:0	7	46.67	3	50
1:01 - 1:30	2	13.33	-	-
0:31 - 1:00	6	40	3	50
0:00 - 0:30	0	-	-	-
TOTAL	15	100	6	100

Table 4 shows the percentage of score on the AAHPERD Ball-changing Zigzag Run Test

for upper body coordination test. The higher score from male subjects were 1:31 minutes until 2:0 minutes which 46.67% with 7 subjects from 15 subjects. With this minute also to show about 50% female score with 3 subjects from 6 subjects were performing the test. Only 13.3% from male score with 2 subjects from 15 subjects' scores range from 1:01 until 1:30 minutes. No score from female subjects for this test. About 40% score from male subjects with 0:31 minutes to 1:0 minutes and 50% score from female subjects.

**Table 5.** Percentage of Target Throwing With Ball in Basket

SCORE	MALE		FEMALE	
	n	%	n	%
2 - 3	3	20	-	-
1 - 2	5	33.3	1	16.7
0-1	7	46.7	5	83.3
<b>TOTAL</b>	<b>15</b>	<b>100</b>	<b>6</b>	<b>100</b>

Table 5 shows the percentage of score on the Target Throwing with Ball in Basket for lower body coordination test. The higher score from male subjects were 46.7% for score level 0 until 1 with 7 subjects from 15 subjects. With this level also to show about 83.3% female score with 5 subjects from 6 subjects were doing this test. For level 1 until 2 to show were about 33.3% from male score with 5 subjects from 15 subjects. For female shows about 16.7% score for this level with 1 subject from 5 subjects. Only 20% score from male subjects at 2 - 3 level and no score for female at this level.

**DISCUSSION**

Based on the result, from the Target Throwing with Ball in Basket and AHHPERD Ball-changing Zigzag Run Test for students with CP exposed that they exhibit very lower performance and development level between them. They cannot perform the test probably cause have evidence lower self concepts and poor peer acceptance rating than students without disabilities [30, 31]. Apart from that, they also have difficulty acquiring and performing motor skill. There is high incidence of developmental learning disabilities in children with minimal dysfunction, dyslexia, dysgraphia and dyscalculia being the most frequent problems.

So, the development funds mental movement and sports skill are important to children

disabilities. The development and intimate interplay between declarative knowledge (factual information) and physical skill have been at the heart of the study of knowledge about action [31] As funds mental movement skills become well established, they form the basics for the more complex skills that children use in their recreational activities and daily living. Individuals with poorly developed motor skills often do not participate in physical activity either by choice or because they are include by their more adept peers. Motor performance is important in the performance of most activity.

Objective measures have been used to quantify motor control of the upper extremities in patients with CP [32] and the lower extremities in able-bodied older adults [32]. It is necessary to better understand the motor performance of individual with cerebral palsy. The more they are motivated to participate, the more likely children with physical and/or cognitive disabilities are two improve their motor development [33].

From the test eye-hand coordination test and lower body test show that students with CP have a lower coordination performance for upper body and lower body. They have some of problem to perform the test probably because students with cerebral palsy are variety of disorders of movement or posture. Apart from that, they also cannot move directly, so this is difficult for them to perform the test perfectly.

Physical education is important for them to enhance their coordination of the body. [34] also study the effect of physical training on children with severe motor handicaps. The children were divide into two groups, cerebral palsied and paraplegics Physical training is important from a child because it is can help them to practice move the body probably. Coordinating services between the two disciplines and finding consensus on instructional methods and strategies regarding motor development for student with disabilities have been strongly encouraged [33].

People with CP need to give more attention about the physical education because they have a lower mental and physical performance. Regular therapeutic intervention, including both physical and occupational therapy, is common for Young Children with cerebral [35].

**CONCLUSION**

The good performance on motor development can increase awareness to promote a

good physical performance in activity. Physical activity participation is a part of the individual enjoys taking part and it is essential for healthy life style. Motor performances have been established to sure as screening instruments, to help identify individuals with motor deficiencies and these need special education. Motor performance also use to assess the motor performance among people with CP and to know level of performance among them. Present studies found that students with CP are not maintaining performance healthy for physical activity level. Less inactivity or having sedentary lifestyle will only brings more health problem compare to normal children.

Quality life for children with CP is always dependence on health and physical performance status. These children are born with lack of opportunities for, limited expectation, low mental performance, lack of movement and physical activity. Therefore, as a conclusion, though there are some indications of the subjects were not fit and less involved in physical activity, it is better to promote health and physical activity in school to increase performance among children. Including children's with disability in motor development contributes to a high quality of life by empowering them to achieve maximum independence in activities of their daily living.

## RECOMMENDATIONS

Based on this study the results show the lower motor performance among students with CP. There are several recommendations in order to get a better result and enhance the level of motor performance among them. students need more support and attention from us, especially educate parents about the abilities of the children with disability. knowledge of the importance of appropriate physical activities and a commitment to provide them are essential for improving the fitness and quality of life among disabled children.

Physical Education teachers should create more effective program especially on physical education. These students need more physical practice for moving. So they can arrange some community program for cerebral palsy student such as health talk, fitness program to highlight the importance on physical activity on health.

Teach children at an early age how they can do in the area of physical movement and mental education. Require involvement in early intervention movement programs. There-

fore, appropriate activities need to be taught young children who are disable to establish healthy patterns early on. These activities must be of adequate duration and intensity to improve motor performance, and engage them in independently or with minimal assistance or supervision.

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