

Authors' opinions

Physical activity as a prescription for the children with cerebral palsy

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Abstract: After so many years devoted to practicing medicine as children physiotherapists, the therapists finally found the importance of balance training exercises in children who suffer from cerebral palsy. It is only through controlling balance that we can achieve improvement in body movement and position that will culminate into performance independence in a child. Formerly, working over controlling balance in cerebral palsy children has been very difficult, because contracture and spasticity did not let us to have an effective balance training exercise. In this respect, we have summarized the results of previous authors that specify the level of effectiveness of exercise therapy. The results of different studies showed that level of effectiveness of exercise therapy on alleviating the symptoms of spastic cerebral palsy is average in accordance with Cohen's effect size Interpretation table.

Keywords: physical therapy, spastic cerebral palsy, children

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Introduction

Cerebral palsy (CP) is the nervous-muscle system disorder that seems to occur following damage or failure in the cerebrospinal nerve fibers segment, before or after pregnancy in early years [1]. CP is a result of non-progressive damage to the developing brain that includes heterogeneous epilepsy which is a neuro-physiological sign of this disease [2]. CP is also a neurological-motor disorder with a range of underlying common causes in childhood [3]. In another definition, cerebral palsy can be defined as a series of permanent and non-progressive motor disorders that cause stiffness in motion or mentally. Motor disorders of cerebral palsy are often associated with sensory - perceptual - cognitive, communication and behavior disorders, epilepsy and secondary musculoskeletal problems [3].

Movement disability is the original problem in cerebral palsy and clinical cerebral palsy is classified as spastic, atetoid and hypokinetic which all of them arose from impaired growth and development of the motor center of the brain [4]. The limitation of motor center performance in children with cerebral palsy is the most common physical disability in them [5, 6]. Occupational therapy in children with cerebral palsy is done to prevent muscle tissue stiffness, treat muscle disorders and reduce motor and sensory deficits of their body [3]. Currently, several methods are used to treat children with cerebral palsy that show hopeful effects in improving motor center and physical and application activities, that in this regard, treatment of neural development method [7] and method of sensory-motor integration therapy [8] pioneered in serving and treatment of CP children in the field of occupational therapy [9].

Rate of this disease outbreak is 2 in 100 births [10]. Nearly half of the patients with cerebral palsy are spastic patients [2]. Patients with spastic cerebral palsy due to lack of physical activity and mobility limitation during exercise and occupational therapy must absorb more oxygen, but nevertheless have lower motor efficiency, mobility and physical capacity compared with healthy subjects. Research showed that the maximum amount of energy consumption for walking on a treadmill in children with spastic CP is three times of the normal children [11, 12]. Some researches also showed that exercise and physical therapy and rehabilitation in a clinical-physical course, leads to improvement in physical and physiological parameters [13]. It can be effective on the secretion of endocrine hormones [14], and also it can be effective for these patients [9].

Since cerebral palsy is known with reduced physical performance and capabilities, delayed in motor site development (in the brain), and impairment in the ability of the body's form and strength of muscles and movement patterns [12, 15] in children with CP, to facilitate improvement in motor skills, and also enhance their mobility, self-care, play and do fun activities, leisure time, physical and occupational therapy are needed [8]. Aki et al. assessed occupational therapy for children with CP and provided this point that doing occupational therapy, a significant improvement in motor function and also in their social relationships was received [10]. Tieman and colleagues have studied physical ability and motor function in children with CP and provided documented evidence of the differences between this and motor function in children with CP capabilities similar to those of healthy children before and after the treatment [16].

Table 1. Table of discriminating examining variables used in the study

Research	Independent 1	Independent 2	Dependent 1
1	Before exercise therapy	After exercise therapy	The balance in function of children with spastic CP
2	Regular rehabilitation and exercise program		Motor efficiency and increase aerobic exercise capacity in children with CP
3	Aimed exercises (sit - walk)		Strength in motor function in children with spastic CP
4	Exercise therapy in children with cerebral palsy		Distribution of body weight on the toe and heel
5	Therapeutic effects of exercise		Improve dynamic balance in children with spastic CP
6	Exercise therapy		Energy consumption and metabolic effects in children with spastic CP

Table 2. Meta-analysis results of the effectiveness of exercise therapy on children with spastic cerebral palsy

Number of research	r	d Cohen	Z	P
1	0.97	7.98	3.090	0.001
2	0.42	0.93	1.645	<0.05
3	0.83	2.98	3.719	<0.001
4	0.52	1.22	1.645	<0.05
5	0.42	0.93	1.645	<0.05
6	0.42	0.93	1.645	<0.05

Jansen and colleagues investigated the involvement of parents of children with CP when therapy and showed that if children who have no ability to have a physical or mental disability do occupational therapy by their parent could make better progress in their daily performance [9]. Due to the discrepancy in the results of the investigation into the effectiveness of exercise therapy on children with CP, it seems that conducting a previous authors' opinions method of making a real impact of physical therapy help to children with spastic cerebral palsy and the effectiveness of exercise therapy on reducing children with spastic cerebral palsy will be determined.

In fact, this study, sought to answer the question of whether exercise therapy is effective on children with spastic cerebral palsy? We investigate on the combined effect size of various researches rather than a specific hypothesis.

Material and Methods

In this study, meta-analytic methods are used based on the purpose of research. The basic tenet of meta-analysis is calculating effect sizes for individual studies and turning them into a common (generic) matrix and then combining them to achieve the mean effect [17]. Population of study were thesis, essays and sketches research that has been done on the effects of exercise therapy on children with spastic cerebral palsy and have a good sample size and in terms of methodology (theory building, research method, population, sample size, sampling methods, measuring instrument, the validity and reliability of the measuring instruments, statistical theory, statistical analysis and being correct statistical calculation) mentioned researches have qualified. In this study, 22 articles that fit inclusion criteria have been used.

In other words, the fit inclusion criteria for the meta-analysis were:

- i) To qualify in terms of methodology (theory building, research method, sample size, sampling, measurement instruments, reliability and validity of measurement

instrument, statistical theory, statistical analysis and being correct statistical calculation);

- ii) The subject of research should be treatment of children with spastic cerebral palsy;
- iii) Investigations were carried out on an experimental basis;
- iv) Investigation was done in a group study (it was not base on case or single test).

Exclusion criteria were studies that had not methodological conditions or have been doing in case review, correlation and descriptive method.

Check list of analysis content

This checklist is used for choosing thesis and research papers for list of inclusion criteria and extracting the necessary information to conduct a meta-analysis and check list included the following factors: "title of conducted research on the effect of exercise therapy on children with spastic cerebral palsy", "complete characteristics of anchors", "year of conducting the study", means hypothesis "validity" and "reliability" of means of the statistical data collection, sample size and significance level of used test in this study. *Table 1* has been discussed to separate investigating the mentioned variable.

Research Findings

In this section, based on provided data in the report of each research, calculating the effect size of exercise therapy on children with spastic cerebral palsy is discussed. Therefore, we must individually calculate what is called an effect size for each study. Effect sizes represent standardized difference between the means of the control and experimental groups [18] and in order to calculate it, the mean difference ratio between the experimental and control groups on the merger's variance of the total scores should be obtained.

Computational methods of meta-analysis is performed based on the meta-Cohen [19]. In this meta-analysis four basic steps should be taken: Identification, selection, abstraction and analysis (*Table 2*). Results shows the size effect of exercise therapy on children with spastic cerebral palsy is obtained 59/0 that based on the table Cohen d is at the intermediate level. According to information of conducted studies, each one considered a different treatment pattern or patterns as the independent variable and a separate concept is considered as the dependent variable.

Discussion

By putting together the results of a study conducted on a sample of a community, the different subjects are examined, such as findings in the communities like our society that is more

diverse, is more important, because this diverse is combined with many more differences. Inevitably we should have many details information about different examples of this community to by consolidate this information gain the similarities and can properly treat with differences [20]. Given that the effect sizes in this meta-analysis obtained 59/0, we can say that the effect of exercise therapy for CP spastic symptoms in children with spastic cerebral palsy is moderate. Based on the findings of this meta-analysis therapists can choose appropriate treatment to decrease CP symptoms to obtain better and more reliable results [11, 21, 22]. It is proposed that treatment method of nerve development and sensory-motor integration therapy be included in daily programs of these children from practitioners because of being pioneer in serve and treatment of children [11, 23, 24].

According to the previous researches in this area, it is estimated that effects of a rehabilitation and exercise therapy with high standards and effectiveness for 3 times a week for 3 months maybe is in order to enhancing motor performance and increasing the ability of aerobic exercise and registering body- cardiovascular changes in children CP comparing with healthy children [25, 26].

Conclusion

These studies typically consider that future developments in increasing during birth care minimize the effects and damages of this stage of birth on the baby's brain and incidence of CP; and researches should be performed in order to development and biological progress and detection of CP causes in infants [27, 28].

As a practical suggestion for further researches, it is suggested to examine the effects of specific kinds of training on stability [29] of this population and also assess the effectiveness of new methods of therapy such as Poetry therapy and music therapy [30].

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