Lengkana Anggi Setia, Tangkudung James, Asmawi. The Effect Of Core Stability Exercise (CSE) On Balance In Primary School Students. Journal of Education, Health and Sport. 2019;9(4):160-167. eISNN 2391-8306. DOI http://dx.doi.org/10.5281/zenodo.2628341
http://ojs.ukw.edu.pl/index.php/johs/article/view/6772

The journal has had 7 points in Ministry of Science and Higher Education parametric evaluation. Part B item 1223 (26/01/2017).
1223 Journal of Education, Health and Sport eISSN 2391-8306 7

The authors declare that there is no conflict of interests regarding the publication of this paper.

Received: 01.03.2019. Revised: 15.03.2019. Accepted: 04.04.2019.

THE EFFECT OF CORE STABILITY EXERCISE (CSE) ON BALANCE IN PRIMARY SCHOOL STUDENTS

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Abstract:

There are many forms of exercise that can improve the quality of balance, either static or dynamic Core Stability Exercise (CSE) is one of them. Based on the explanation, this research intends to apply various forms of balance training to children who participate in various sports in primary school-age. The purpose of this research is to find out the effectiveness of CSE in supporting good body balance in children. This research employed an experimental research design. The population was the students of a primary school in Sumedang Regency, West Java. Random cluster sampling was used to select 60 primary school students with an average age of 10-11 years as the participants in this research. Moreover, Standing Stork Test – Blind was used as the measuring instrument to obtain objective data. The results showed that CSE significantly affected the balance of primary school students.

Keywords: Core Stability Exercise (CSE); Balance; Primary School Students

Introduction

The weak physical conditions of young athletes will affect negatively their achievements in the future. For example, athletes at their young age are very vulnerable to injuries because they are suffering from fatigue. In other words, it indicates that they do not have a good balance, thus they fall, and might suffer from serious injuries. The results of this research showed that someone's body balance was influenced by fatigue factors. A research conducted on young and adult people stated that people who were fatigue had poor body balance. Furthermore, after doing heavy exercise or during a match in the last minute, athletes will have a poor balance that makes them fall easily, and vulnerable to injuries.

Balance is an important ability in daily activities, such as walking and running, and mostly in sports and games. Coordinative abilities (dexterity) rely on the movement control and regulation processes, and they are fundamental in sports, as they allow athletes to easily control their own motor actions and learn complex movements in a relatively rapid way. One of the main components of coordinative abilities is balance [1]. Balance is very necessary for children to support their activities, and avoid injury when exercising. This is in accordance with the statement of [2] stating that injuries to the knee and ankle are common in today's athletes, especially in cutting and jumping sports such as volleyball and football. Injuries to the ankle and knee are occurred in gliding joint, hinge joint, and also body balance, thus it is vulnerable to injuries.

There are two types of balance, namely static balance and dynamic balance. Static balance is an ability of the body to maintain its body balance in the stationary positions for a certain amount of times, such as in a static position and standing. Meanwhile, dynamic balance is an ability of the body to maintain its body balance in the moving positions, such as walking, running, getting up from a sitting position, and doing agility movement. In addition, data in the United States claimed that the incidents of sports injuries in adults and children were very high. The number of adults injured was 1.5 million times per year, and half of them were suffering from serious injuries. Meanwhile, the number of children and adolescents injured was higher than adults, which was 3-4 million times per year. The number experienced by men and women was equal, but the injuries were twice as high as in contact sports compared to non-contact sports. The part of the body that is often injured is the knee [3]. Therefore, it is very clear that balance really needs to be considered in children's physical condition; hence, they are ready to do any movement or physical activities without fear, because their physical

foundation and condition have been trained from the early age. With this consideration, this research seeks to conduct CSE in primary school students.

Core stability is an important component to provide local strengths and balance in order to effectively maximize activities. Core muscles activities are an integration work before a movement is integrated with one or many joints in order to maintain the stabilization and motion. In athletic setting, core stability is defined as the optimum production, which can transfer and control the force from the center of the body to the limbs, through stabilization of the position and motion of torso [4]. It also described as central motor control of the lumbar-pelvic-thigh to maintain the stability of the core region against different postural and external forces [5]. Core stability describes the ability to control the position and movement of parts of the middle body. Core stability is caught on the abdominal muscles that connect the pelvis, spine, and shoulders that support good posture maintenance, and provides the basis for all arm and leg movements [6].

Materials and Methods

Referring to the aforementioned objective, the experimental research method was chosen. It was used to look for differences in certain treatments against others in controlled conditions. The controlled conditions in the intent were the results of the research converted into numbers, for the analysis used by using statistical analysis [7]. The experimental research was implemented by providing training programs to primary school students in Sumedang Regency, with a “Pre Test and Post Test Design” as the design used. The subjects of this research were 60 primary school students with the average age of 10-11 year. Standing Stork Test – Blind was used to evaluate postural static balance [8], [9].

Table 1. Static Balance Norms, Standing Stork Test [10]

No	Male	Categories	Female
1	51 – Above	Strongly Good	28 – Above
2	37 – 50	Good	23 – 27
3	15 – 36	Moder	8 – 22

	ate

Results

Balance is defined as the ability to keep the gravitational line (vertical line center of mass) of a body within minimal postural sway [11]. Sway is the horizontal movement from the center of gravity when someone was in a stationary standing. Certain sways are very important and inevitable due to small changes in the movement inside the body (e.g. breathing, moving weight body from one foot to the other or forefoot to rear foot).

Static balance is an ability of the body to maintain body balance in a stationary position for a certain amount of times, such as in static position and standing. Its movement was called as CSE, which was a movement to improve and maintain good posture. According to [4], CSE would help to maintain good posture in the movement, and also become the basis of all movements in arms and legs. This indicated that if postural stability was optimal, the mobility in extremities could be conducted efficiently. The distribution of the standing stork test could be seen in Table 1 as follows.

Table 1. The distribution of initial score and final score of the standing stork test on the respondents

No	Characteristics	Right Leg	Left Leg
1	Initial Score of Standing Stork Test		
	Mean	11.22	8.71
	SD	5.15	4.68
2	Final Score of Standing Stork Test		
	Mean	15.01	14.30
	SD	1.05	1.16

Table 1 presents that the mean score on the standing stork test of right leg before conducting test was 11.22 with the SD of 5.15, and after conducting the test, the mean score was 15.01 the SD was 1.05. Meanwhile, the mean score on the standing stork test of left leg before conducting test was 8.71 with the SD of 4.68, and after conducting the test, the mean score was 14.30 with the SD was 1.16. Balance changes were measured using the standing stork test in which the results were continuum data

Results of Data Normality Test

Data normality test used in this research was the statistical Lilliefors test. Each data from the test results was informed in Table 2 below:

Table 2. Results of Data Normality Test of the Standing Stork Test

Test Group	L_{count}	L_{table}	Result
Initial Test	0.075	0.220	Normal
Final Test	0.195	0.220	Normal

Table 2 above shows that L_{count} (L_0) was smaller than L_{table} with the significant level of 0.05 in which it indicated that the data was normally distributed.

Results of Hypothesis Testing using t-test

According to data of each test that was normally distributed, hypothesis testing was conducted using one sample test (t-test). In this hypothesis testing, the criteria for t values were determined based on the distribution table of the value of t. The results could be seen in Table 3 below:

Table 3. Results of Hypothesis Testing using t-test

Group Test	t_{count}	t_{table}	Result
Initial Test	27.235	1.761	Significant

Table 3 above shows that the value of t_{count} group in the significant value of 0.05 was outside the interval of t_{table} ($t_{count} > t_{table}$ = 27.235 > 1.761). Therefore, from the data, there were significant differences of the sample group after conducting CSE.

Discussion

The description above showed that balance greatly supported human needs, even in terms of sports achievements. It was important to achieve optimal results from each exercise, thus it was expected to get even better achievements. According to Johnson and Nelson and based on the standing stork test table, the greater the value of the standing stork test (standing for a long time), the better the static balance of the individuals [12]. CSE was a dynamic concept that kept changing in fulfilling posture adjustments and external body weight. This showed

that the training by simulating the movement patterns in sports could improve the core stability [13]. The results showed that Core Stability Exercise (CSE) significantly improved the parameters of static and dynamic balance [14].

Conclusions

Based on data on the results of improvement in this research, Core Stability Exercise (CSE) significantly affected the improvement of balance in primary school students. This was indicated by an increase in the mean score and the improvement of the initial test and final test. Therefore, this research proved that in addition to helping to avoid injuries, CSE also could improve static and dynamic balance in primary school students.

Acknowledgements

We are grateful for all participants who contributed their time and experiences.

Conflicts of interest

Balance is the most essential things in daily life. The ability to stand on one leg must be easily done by everyone. Lack of this ability may cause the greater potential for falls. If we cannot control our stationary body position, we cannot control our body when moving fast. Balance depends on the core stability, the control of pelvis muscle and bottom leg, and vestibular and visual systems. In addition to the high probability of injury, sport performance generally deteriorates due to a decline in stability. Muscle strength, joint control, and skill accuracy will deteriorate when muscle does not work steadily. Therefore, lack of balance should be improved quickly, and it can be done through core stability exercise (CSE) training. CSE is one form of the core strength exercises to support a good balance. Students need the development of the core strength. The stronger the core means the better the students' fitness base. If students have poor core strength, they tend to have an unstable base, thus, they find it difficult to control fine and gross motor skills. The core strength also helps to avoid injuries due to bad posture, decrease injury risks for children who exercise, and improve balance. Therefore, the researcher is interested to obtain the data and fact regarding balance improvement. Based on the combinations of games and some core stability exercise (CSE) programs, students are required to have a healthier life.

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