



Flexibility and Game Actions' Effects on Lower Extremity Joint Range of Motion in Cerebral Palsied Children (Spastic Type)

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ABSTRACT This study considers impact of game actions and flexibility on lower extremity joint-gap. Conventional approach to physical training and sports applications, game and flexibility methods is used. The researchers had district Kocaeli Province, Izmit Fizomer Physics Treatment and Rehabilitation Medical Center for Spastic type stored in diagnosing cerebral palsy with 10 children for 16 weeks, treatment centre was perfect for the training days and families with permission came out of treatment sessions. A physiotherapist had a session of 20 minutes, 30 minutes flexibility with each individual, moving from one child to the other, using a conventional approach and lower extremity games. The joint width measurement data collection tool, with Universal Goniometer Kendall McCreary rating system was used. Wilcoxon test was used to assess data. In conclusion, ($p > 0.05$) significance was found in right hip flexion and extension, left hip flexion and extension and left knee flexion and extension. However, there was no significance found in the right knee flexion and extension ($p > 0.05$). Positive effects were seen as a result of applying the program on joint range of motion. Therefore, in addition to physical treatment given to the children, special rehabilitation education and game lesson module in rehabilitation institutions are recommended.

INTRODUCTION

Cerebral Palsy (CP) is a neuromuscular dysfunction, which occurs as a result of a lesion during birth, pre-birth or after birth (Sade and Otman 1991). In a non-developed brain, it is a clinical issue caused by any reason that comes with pre-birth, birth order or after birth, with non-progressive motor and stability disorder that cause cognitive, sensitive and intellectual disorder (Verschuren et al. 2007). Cerebral Palsy is most common in children with physical conditions (Dimitrijevic et al. 2007). Although motor function disorder is the main object, often, sensory shortcomings, behavior disorders, learn-

ing integratif misfire, sensory function, speech and language disorders and oral-tooth disorders are added to the table (Yilmaz 2005). In a study in Turkey, CP appearance rate is estimated to be 4.4 in 1000 live births. If a greater rate of CP during pregnancy is caused by lack of maintenance and conditions which were not met, the first childhood disease prevalence rate for infants in excess of reasons such as lack of nutrition and connected to CP and which is generally classified by type of motor disorder, may affect the body part and impact level (Akinoglu 2010). The researchers have studied some children with cerebral palsy quadriplegic types. Three-quarters of CP subjects are spastic. Type spastic is the increase of physiological resistance that extremity shows against passive movement (Yalçın et al. 2000). Spasticity in lower extremity mostly affects hip flexors and sometimes evertors and at other times, invertors. In these muscles' antagonists, secondary weakness grows and posture dysfunctions occur (Uygur et al. 2013).

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In Cerebral Palsy evaluation, prenatal, natal and postnatal information is to be considered as a wide story. Also, the CP when assessing the measurement tools to find a person as it is in supine, prone, sitting, standing and walking, is important that it is located in observations. During evaluation, the children are to be evaluated from all aspects. The one who evaluates is to know normal development steps, detect abnormal actions for preparing a treatment schedule easily (Akinoglu 2010). It is an important thing to diagnose early and to carry on the treatment constantly. It requires many specialists around this multidimensional, multi-function treatment. As it is often mentioned in the world, Sp treatment is to be carried on by a team. This team should consist of children's doctor, children's 12th specialist, physiotherapist, special education specialist, ortopedist, a speech therapist, business-occupation therapist, psychologist, social service specialist, nurse, ear-nose-throat specialist, physician, mental health professional, and diseases physical education and sports teacher, dentist and professional rehabilitation specialist (Berker and Yalçın 2001).

In Cerebral Palsy, one is faced with many tables of results but because only slight healings can be seen, various treatments are developed and are still being developed on this issue (Sade and Otman 1991). One of these is known as the conventional approach. Conventional exercise programs for joint opening on active and passive exercises, strengthening exercise programs, and capacity building and strengthening exercises carried out with supervised cardiovascular equipment are all necessary in the life of such a challenged child. Also, it helps improve the health of the patient after surgical intervention. These exercises should also be taught to the family of the child and applied to them (Dormans et al. 2000). It is seen that various exercises are applied to children with CP to develop their motor skills. Among these are, stretching, static loading, muscle strengthening exercises and strength training programs, the physical conformity exercise programs, Component Video out Progressive Resistance Exercise (PRE), aerobics, and functional exercises to enhance capacity anerobic are counted (Verschuren et al. 2008; Pate 2005). When Cerebral Palsy is classified, it is upon clinical findings and extremity divisioning. In this work, the researchers studied with spastic type quadriplegic chil-

dren. Spastic quadriplegia is the most serious form of Sp and nine to forty-three percent of symptoms are observed. There is a serious and significant motor dysfunction in four extremities (Özcan 1976). Spasticity is described as the rich muscle tonus when muscle is tensed passively (Kokino et al. 1998). Since applying passive action to muscle is to tense the muscle, the muscle will respond to this tension with tensing (Yaltkaya 1998). Muscle's respond to passive tension and muscle's over-resistance is characterized with the finding records of electromiographic (Sade and Otman 1991).

It takes an important role in education of children who lack physical skills. These children who lack physical skills learn to interact, communicate, form bonds with friends, work together and complete weak and strong aspects of themselves with the games provided during education. Beside these social skills, some particular terms and skills can also be taught to the children who find it difficult to cope on playgrounds (Sevinç 2004). Playing has an important role in child's motoral (motional), physical, cognitive and personal progress. The problem with games in the development of children and its attendant problems in fighting anti-social situations are rooted in lack of consistency. An important precondition needs to be met in order to be able to complete the development of cognitive and academic programs as a full game, and also to have motor for development skill and physical competency. The most sufficient way to gain these features is through sport and fun purposed activities (MEB 2013). This would help gain a self-decision state for children who find it difficult to cope, and also help them have the feeling of being independent. It would develop their social environment and communication skills. It would work on their self-confidence, making them believe in their own skills and abilities. It also has an important role to play in helping them overcome psychological tension and social problems, it protects them from being alienated in the society and helps them be content with life. As a result of sport actions, disabled individuals feel relaxed and can also have a good time and fun. Sport provided by mental and physical capacity development and the engine, balance, hand-eye coordination, as well as training provided by engellinin results in an improvement in the process of rehabilitation with positive effects (MEB 2013). Children show their true

identities and natural talents in games and this provide their families and teachers with a better understanding of themselves. If one observes their behaviors in games, one can understand the progressive features in them (Mengütay 1997). As soon as a child can take care of her/his things personally, she/he feels happier and more sufficient, and this trust leads to independence. On the other hand, a child whose actions are limited and who relies more on adults for help feels more insecure and petulant (Güven 2005). Sport offers individuals with CP the opportunity for self-perception and self-actualization, and it helps give them identity (Groof et al. 2009).

Flexibility is defined as protraction skill of a muscle. Loss of flexibility is an increasing systole skill, which is manifested through a decrease in joint mobility. For the individual, gaining appropriate flexibility may prevent hurting and enhance sportive performance and may help prevent the joint skeleton from hurting after rehabilitation. The purpose of flexibility program with change in the stimulability of muscles that create motion is to develop joint mobility on a particular joint. Exercises that tense these muscles in a particular period of time also increase the joint mobility around the particular joint (Baltaci et al. 2003). Passive method of tension loading is done by external force with the purpose of increasing tension application. Even this method is generally applied with the help of a partner and can also be applied by using weight (Bompa 2003).

METHODOLOGY

For this study, the researchers used the conventional approach to cerebral palsy treatment methods, games and flexibility of physical education and sports applications. The researchers involved district Kocaeli Province, Izmit Fizyoterapi and Rehabilitation Medical Centre for Spastic type stored in diagnosing cerebral palsy on 10 children for 16 weeks. The treatment centre was perfect for the training days, and families came out of treatment sessions with permission, a physiotherapy session was accompanied by flexibility 20 minutes, 30 minutes, using conventional approach and lower extremity games and by moving from one child to another. Children's age, height and weight were not taken into consideration in this work. First and last test were applied to the chil-

dren. Measured joint range of motion were specified as right hip flexion, extension, left hip flexion, extension, right knee flexion and extension, left knee flexion and extension. The joint width measurement data collection tool, with Universal Goniometer Kendall McCreary rating system was used. The researchers sincerely appreciate the contributions of the physiotherapists' institution Pzt. Ümit Yılmaz and Elif Can Dogan for their help.

Data Collection Tool

Joint range of motion was done by Universal Goniometer and measured by Kendall McCreary rating system. Goniometric measuring is a method that is used to evaluate normal joint mobility (N.J.M) objectively in clinic. In addition to evaluation of joint range of motion, and detecting functional capacity, it is also used to determine treatment schedule and to define the impact of treatment. Goniometer is a tool that is simple, enduring, easy to carry, comfortable and usable on every joint (Otman et al. 2003). It is claimed that if passive joint mobility is to be evaluated by goniometer, it can be used as an objective measuring method (Twist 1985).

FINDINGS

According to Wilcoxon statistics indications (see Table 1), the last measuring results of right hip flexion (average=118.40) is significantly higher than the first measuring (average=112.30) results, $z = -2.812$, $p < .05$. The last measuring results of left hip flexion (average=109.10) is significantly higher than the first measuring (average=101.80) results, $z = -1.185$, $p < .05$. The last measuring results of right hip extension (average=6.50) is significantly higher than the first measuring (average=5.20) results, $z = -2.032$, $p < .05$. The last measuring results of left hip extension (average=7.40) is significantly higher than the first measuring (average=6.40) results, $z = 2.060$, $p < .05$. The last measuring results of right knee flexion (average=120.20) are lower than the first results (average=126.70) and there is no significant differentiation, $z = -1.85$, $p = .236$. The last measuring results of right knee extension (average=114.50) are lower than the first results (average=121.70) and there is no significant differentiation, $z = -0.674$, $p = .500$. The last measuring results of left knee flexion (average=130.90) are

Table 1: Lower extremity goniometric first and last measuring

<i>Wilcoxon Test Statistics</i>		
	<i>Z</i>	<i>P</i>
Right Hip Flexion (Last) - Right Hip Flexion (First)	-2.812	.005*
Left Hip Flexion (Last) - Left Hip Flexion (First)	-2.673	.008*
Right Hip Extension (Last) - Right Hip Extension (First)	-2.032	.042*
Left Hip Extension (Last) - Left Hip Extension (First)	-2.060	.39*
Right Knee Flexion (Last) - Right Knee Flexion (First)	-1.185	.236
Right Knee Extension (Last)- Right Knee Extension (First)	-0.674	.500
Left Knee Flexion (Last) - Left Knee Flexion (First)	-2.207	.27*
Left Knee Extension (Last) - Left Knee Extension (First)	-2.232	.26*

lower than the first results (average=128.00) and there is no significant differentiation, $z = -2.207$, $p < .05$. The last measuring results of left knee extension (average=124.00) are significantly higher than the first results (average=121.40), $z = -2.232$, $p < .05$.

DISCUSSION

With this work, flexibility and games' impact on joint range of motion in spastic typed cerebral palsied children is evaluated. Likewise, Çalik and Tan (2006) did flexibility and games work on left and right shoulder joint range of motion of 13 cerebral palsied children, which consisted of 5 females and 8 males. First measuring was done in the beginning and last measuring was done after 16 weeks with goniometer. In 16 weeks, the children, which were taken into courses, made use of 50 minutes individually and were made to do passive stretching and games work. When the measurings are compared, in right shoulder flexion, the first measurement average was 52.00, standard deviation was 36.83 while after 16 weeks, average was 160.07 and standard deviation was 30.41. In left shoulder flexion, the first measurement average was 53.61 and standard deviation was 32.75 while after 16 weeks, average was 162.23 and standard deviation was 27.19. Even when a statistical significance was not found within the scope of averages and standard deviations, it was clearly seen that the applied schedule's impact was positive (Çalik and Tan 2006). In this work, the researchers applied joint range of motion on children, and the first and last measurings showed significant differentiation. Özandac's (2011) to a Bobath NGT (Neuro developmental treatment), an additional sports activities enhanced multi-model home work out program, the SP's rehabilitation of children with survey results for how to handle 44

out of the twenty-two percent of people who have electric resistance welding (ERW) were shared into two groups. Both groups had 2 days a week of 40 minutes, which was based on Bobath method where physical therapy program was used. They also had ÇG during the week, which took 5 days of the week and 50 minutes of a multi-model home exercise program was implemented on a regular basis. Patient demographic characteristics and Family Impact Scale (AEO), two, Independent Sample t-test, and the gender distributions and the rough engine function Classification System (GMFCS), so that the rough engine square test and measurement function (GMFM), 1-minute walking test, right-hand on one leg and the left-hand time, Joint motion width measurements well maintained and mixed measurements for two factors were done with Anova method analysis. Analysis significance level $p < 0.05$ has been accepted. After eight weeks on the two parameters there was no significance difference when compared to the AEO ($P > 0.05$). Both were similar to that shown by the AEO. ÇG and KG, mean VAS score when analyzed, including the meaningful difference ($P = 0.003 < 0.05$). In this regard, after 8 weeks of ÇG, it was been in favor of an average VAS score. Both the GMFM ($P = 0.098 > 0.05$), 1-minute walk test ($P = 0.078 > 0.05$), the right-hand one foot on standing time ($P = 0.725 > 0.05$), left-hand single foot on standing time ($P = 0.927 > 0.05$) and NEH start and 8-week end of measurement parameters, which were viewed at statistically meaningful angle have not been validated. But both the 1-minute walk test GMFM assessment of both ÇG has been in favor of an increase in a number. 8 weeks of multi-model home exercise program between 4-12 years, the CP functions for patients with pain and to develop that was said to put patients at ease (Özandac 2011). The researchers

have differences in the study as a result of this aspect of the CP. After the treatment of children with physical education, the researchers recommend children to participate in physical and game applications.

Akyüz et al. (2014) organized 12-week exercise programs for children who have cerebral palsy on static and functional balance in order to examine the effects of early adopters. The work was classified with Rough Engine Operation Function Classification System (GMFCS - I,II,III), it was organized for children between 4 to 11 years so that it falls between 3 diplegic quadriplegic type 5, efforts were made in diagnosing cerebral palsy placed in 12 weeks with each week for 60 to 70 minutes for strength, balance, and coordination. The force of static and the functional balance of an evaluated first and last measurement results were in a positive balance on the parameters provided by contribution and physics. Also, the fact that treating long-term sports and exercise programs can be a positive addition was spoken about (Akyüz et al. 2014). Akyalçin (2012) in his work examined the effects of Cerebral Palsy on children between the ages of 8-12 as compared to older and healthier children with more activity participation and more activity preferences and better life quality. 30 children were classified into a group and in all, 60 healthy children were involved in the work as a research group for the diagnosis. Assessment scales for the participation activity in CAPE (Children's Assessment of Participation and Enjoyment), activity preferences (PAC for Preferences for Activity of Children), and quality of life were used to KIDKINDL. As a result, the Sp assessments of children with activities of a number of smaller, less frequently and more transactions were defined in the home ($p \leq 0.05$). Sp's participation in total activity of children with fun and healthy children were high ($p \leq 0.05$), but where it concerned social activity preference. The sp in terms of children with social activities to more healthy children have been found with their preferred ($p \leq 0.05$). However, the Sp in terms of quality of life of children with kindness, and family and friends have been forfeited because of its lower than rate. As regards total activity participation and quality of life, it was observed and the fact was noted that the relationship, Sp in children with diversity, frequency, the who and where it is between values and quality of life is not a meaningful relationship. As regards total activity only in degree of freedom and quality of life between a relationship that makes

sense, as it is, increase in the quality of life have been established to be ($r = 0.370$) as the sp in children with higher degree of freedom. It has been observed that it is healthy for children's total activity when the participation between them and the quality of life they live blossoms into a meaningful relationship. Activity preference relationship between quality of life, as seen in children with sp, total activity preference points and social activities to increase their score have led to an increase in quality of life ($r = 0.536$). Children had fun with the Sp and the fact that social activities have positive effects on quality of life was recognized (Akyalçin 2012). During physics treatment sessions taken outside of gaming applications, seems like the children were having fun and the researchers also noticed that the children were willing to participate.

CONCLUSION

Games and flexibility works' impact on lower extremity in cerebral palsied children is evaluated in the work. In the group that the researchers applied games and flexibility works to, and beside physical treatment sessions, lower extremity joint range of motion, right hip flexion's first measuring average was 112.30, while the last measuring average was 118.40, therefore, an increase could be seen. Right hip extension's first measuring average was 5.20, while the last measuring average was 6.50, so an increase was seen. Left hip flexion's first measuring average was 101.80, while the last measuring average was 109.10, so an increase was seen. Left hip extension's first measuring average was 6.40, while the last measuring average was 7.40, so an increase was seen. Left knee flexion's first measuring average was 128.00, while the last measuring average was 130.90, so an increase was seen. Left knee extension's first measuring average was 121.40, while the last measuring average was 124.00, so an increase was seen. But in right knee flexion and extension, there was no statistical and average significance on joint range of motion.

RECOMMENDATIONS

Within the scope of these consequences,

1. Physical education and game applications should be applied regularly and on a long-term basis on CP children.

2. The games that fit daily life activities should be played with children.
3. Special training and rehabilitation institutions according to their levels of physical education and development of modules for gaming applications are required.
4. When working with children who are physically insufficient, the help of a physiotherapist regarding measurements and applications should be considered as one of the facilitators of the work.
5. In further works, it may be useful to apply a questionnaire technique to determine the pleasure level of children and families.

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