

Effects of Yoga on Sleep Quality, Depression in Children with Cerebral Palsy

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Abstract

Cerebral palsy [CP] which occurs in the developing brain as a result of injury in the fetal or perinatal period, is the most common developmental movement and motor impairment in childhood. The aim of the study was to investigate the effects of physiotherapy yoga on sleep quality, depression in children with cerebral palsy. 40 patients who were in the walking period [walking independently or with assistive device], with diagnosed CP and age between 5-17 were included in the study. Individual's demographic data were recorded and normal motor development was assessed with Gross Motor Function Measure [GMFMM], postural analysis with New York Posture Rating Test, sleep quality with Pittsburgh Sleep Quality Index and depression status with Childhood Depression Inventory. Timed Up and Go Test and Stair Ascending and Descending Test were applied. Yoga techniques which were breathing techniques, warm-up exercises [warming up in standing position], Surya Namaskar, Asanas, were performed for a total of 10 sessions, on alternate days and once a day for 45 minutes. 32.5% of the individuals were female, 67.5% were male and their mean age was 10,77 ± 3,49.

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It was seen that after yoga there was a significant improvement in posture [$p = 0.003$], Timed Up and Go Test [$p = 0,003$], Stair Ascending and Descending Test [$p = 0.001$], depression [$p = 0.001$] and sleep quality [$p=0,012$]. Yoga improved psychological condition, pain, sleep quality, posture in the child with CP. Also an improvement was found in exercise tests. As a consequence we believe that yoga should be applied safely and funly in children with SP.

Keywords: Cerebral Palsy, Physiotherapy yoga, Sleep Quality, Depression

1. Introduction

Cerebral palsy [CP] is a descriptive term which involves different etiologies and neurological disorders and points out to non-progressive motor function loss [1,2]. Motor delay is frequently accompanied by sensory, cognitive, speech and behavioral problems, orthopedical disorders, decrease in hearing, oral motor failure, sleep disorders and convulsions [3]. In CP, although the primary damage is non-progressive, due to its being accompanied by muscular tonus, posture disorders and insufficiency in movement and in general sensory, cognitive, communication, perception and behavioral disorders and fits, the intensity of functional insufficiencies and the defect is progressive [4,5]. In addition, children with CP generally display poor postural control [6].

In CP, problems are observed in the capacity of interpreting sensory and/or cognitive information and joining these. Due to limitation in activity, experiences about learning and understanding are also limited. It can display behavioral disorders characterized with psychiatric disorders such as autism, attention deficit and hyperactivity syndrome, mood and anxiety disorders. In addition, fear and anxiety, specific phobia, separation anxiety and common anxiety, unhappiness, depressive disorder and tension may also be observed. Studies have shown that learning difficulty and bad concentration are evident much more than normal population [7].

Sleep forms a basis in strengthening growth and academic performance. Sufficient amount of sleep is important in terms of children's succeeding in their developmental functions. Sleep deprivation has been seen to increase day time sleepiness and careless behavior of children and teenagers. In addition, it is stated that sleep inefficiency affects children's behavioral problems as well [8]. Although about 5% sleep disorder has been observed in children who display normal growth and development, studies have shown that there is a much higher rate of sleep problem in children with CP [9]. In children with CP, insufficiency in starting and sustaining sleep, irregular sleep-wakefulness transitions, respiratory difficulties related to sleep and increased day time sleepiness have been reported [10].

There are numerous treatments and concepts applied for cerebral palsy. Oral medication, intramuscular botulinum toxin injection, multi-level orthopedical surgery, intratecal baclofen application, selective dorsal rhizotomy, physiotherapy applications, orthosis approaches and many alternative treatment methods are among these [11].

Yoga, which is among the alternative therapy methods which aim at improving health and well-being, has recently become quite popular. Studies related to yoga show that there are significant physiological benefits within alternative therapeutic applications [12]. In addition, yoga applications contribute to improving muscle strength and flexibility, blood circulation, oxygen consumption and hormonal functions [13]. Studies have shown that, yoga has been used in an efficient manner in respiratory problems, cancer, rheumatoid arthritis, autism, depression, obesity, diabetes, kidney diseases, hemophilia and gastrointestinal disorders [14, 15]. The effect of yoga on motor function, emotional state and cognitive function has been shown on adults along with children [16, 17].

When we take a look at literature, we see that studies carried out with yoga for healthy individuals and patient groups are increasing. In particular, there are studies which analyze the efficiency of Yoga application for children in different disease groups. However, no studies were found on the effect of Yoga on children with CP. Within this scope, the purpose of our study is to analyze the effects of physiotherapy yoga application on sleep quality and depression in children with CP.

2.Method

40 children, who were diagnosed with Cerebral Palsy with an age average of $10,77 \pm 3,49$ years [min:5-max:17] were included in the study. The subjects were chosen among children without heavy mental retardation and visual and hearing loss, which do not have epileptic seizures and are in their walking stage in the normal motor development [independently or with a walking aid].

The individuals' demographic information, CP type and its stage were recorded. For the evaluation of their functional state, Gross Motor Function Test [GMFT], stand-up and walk test, walking up and down the stairs tests were applied. The respiration type and frequency of children for whom the New York Posture Test was used for posture analysis were recorded. In the evaluation of sleep quality, Pittsburgh sleep quality scale and depression scale for Turkish children whose validity and reliability has been established was used to evaluate depression states.

2.1.Depression Scale for Children:

The Beck Depression Scale for CDM developed by Kovacs was used. However, questions such as school condition and relationship with friends in terms of depression were added. It is a 27 item self-report scale which can be applied for children between 5-18 ages old. Each item is given a score of '0', '1' or '2'. The highest score is 54. Higher scores indicate depression level or intensity. Its validity and reliability study has been carried out by OY and the breakpoint has been calculated as 19 points [18].

2.2.Pittsburgh Sleep Quality Index

Pittsburgh Sleep Quality Index [PSQI] is a 19 item self-report scale which evaluates sleep quality and disorder within a month. 18 questions of the scale which are scored consist of 7 components. Subjective Sleep Quality, Sleep Latency, Sleep Duration, Customary Sleep Activity, Sleep Disorder, Use of Sleeping Pills and Daytime Function Disorder. Each component is evaluated over 0-3 points. The total score of the 7 components show the total scale score. The total score ranges between 0-21. The scoring is done as 0 if it has not happened in the last one month; as 1 if it was less than once a week; as 2 if it was once, or twice a week and as 3 if it was three or more times a week. The scoring of sleep quality asked in the survey is evaluated as extremely good 0, very good 1, very bad 2 and extremely bad 3. The achieved total score ranges between 0-21 and the higher scores indicate that sleep quality is bad and that the level of sleep disorder is high. The total score being 5 and over indicates that sleep quality is clinically bad [19].

PSQI has been developed by Buysse et. al and adapted to Turkish by Agargun et. al. Its diagnostic sensitivity is 89.6% and specificity is 86.5% [20].

2.3. Timed Stand-up and Walk Test

Walking speed measures various components such as postural control, functional mobility and balance [21,22]. The participants are asked to sit on a Standard chair [43cm height] with their backs leaning against the chair and then stand up; they walk for 3 meters, turn, come back and sit again. Time determines the score. Recently, a secondary movement has been added to the Standard Times Stand-up and Walk test [TSWT] and modified. In the Timed Stand-up and Walk Test, a random number is chosen between 80-100 in the cognitive part and the test is completed by counting down from that number. Completing the Timed Stand-up and Walk Test standard over 13,5 seconds, the Timed Stand-up and Walk Test cognitive over 15 seconds and Timed Stand-up and Walk Test manual over 14,5 seconds shows the risk of falling down [23].

2.4. Timed Climbing Up and Down the Stairs Test

In this test which was developed to measure functional mobility, a stairs with 8 steps that are 15 cm in height and 27,5 cm in width with rails on both sides is used. The participant stands at the bottom of the stairs and after hearing the start signal, he starts climbing the stairs in the fastest manner possible without running. While climbing, he can hold the rails or use an aid device if there is need. The climbing the stairs test begins by raising one foot in the first step and ends by having two feet on the last step. The duration is measured with a chronometer and recorded. After the person rests, he is asked to climb down in the same manner. The climbing down the stairs test begins by lowering one foot on the step below, completed when both feet touch the ground and the duration is once again recorded. These measured values are used to evaluate the person's performance of climbing up and down a stairs [24].

3. Findings

A total of 40 individuals [10.77±3.49 years] were included in the study, 27 of whom were male and 13 of whom were female.

Table 1: Individuals' Demographic Information and Clinical Findings

		n	%
Gender	Male	27	67,5
	Female	13	32,5
CP Type	Quadripedal	6	15
	Bipedal	34	85

In comparison to prior to the study, it was seen that the number of individuals having a good posture statistically as a result of the New York Posture Analysis after the study [p=0.003] and the number of individuals who are not depressive according to the Depression Scale increased [p=0.001]. In the Pittsburgh Sleep Quality Scale, it was seen that sleep quality was better and that this was statistically significant [p=0.012].

Table 2: Results of the New York Posture Analysis, Depression and Pittsburg Sleep Quality Results Prior to and After the Treatment

Variable		Prior to the treatment		After the treatment		P
		N	%	n	%	
New York Posture Analysis	Very good	20	50	20	50	0.003
	Good	8	20	11	27,5	
	Average	10	25	7	17,5	
	Bad	2	5	2	5	
Depression	Not depressive	35	87,5	40	100	0.001
	Depressive	5	12,5	0	0	
Pittsburg Sleep Quality	Bad	32	80	20	50	0.012
	Good	8	20	20	50	

Wilcoxon Signed Rank Test

A significant difference was found between the children's climbing up and down the stairs [p=0.001] and stand-up and walk test [p=0.003] in terms of timed performance. It was seen that the duration of climbing up and down the stairs and the stand-up and walk tests decreased. No significant difference was seen in the gross motor function test [p>0.05].

Table 3: Evaluation of the Climbing Up and Down the Stairs and Timed Stand-up and Walk Tests Prior to and After the Application of Yoga

	Prior to the treatment	After the treatment	P
	X ± SS	X ± SS	
Climbing Up and Down the Stairs	15,275±9,176	14,425±9,038	0.001
Timed Stand-up and Walk	14,525±11,09	13,70±10,513	0.003
GMFM	76.25±12.53	75.25±15.67	0.74

Wilcoxon Test

4. Discussion

Cerebral palsy [CP] is a group permanent movement and posture disorder which limits actions, is not progressive and emerges in the developing or infant brain [25]. There has been an increase in the interest shown to new treatment methods for CP, in particular to alternative treatments. In this respect, one of the alternative approaches used in the treatment of motor dysfunction related to CP is yoga [25].

The purpose of yoga is to use body mechanics, respiration techniques, control of the mind, meditation and thought application and creating balance in the emotional, mental, physical and spiritual levels [26]. In this study, it was seen that the yoga application had a statistically positive effect on posture. Distasio, in his study in which he analyzed the effects of anxiety, depression, sleeplessness and fatigue which appear after cancer, has reached the conclusion that yoga which has been used for thousands of years by the Eastern culture as a part of the philosophy of life can allow patients with cancer to realize the connection between the body and the mind, prevent potential risks and contribute to the treatment process by giving psychological support [27].

In our study, it was seen that there was no depression problem after the treatment and that yoga's effect on depression is statically significant. In the study of Rocha et. al, in which 36 healthy men between the ages of 20-40 were included, the differences in the physiological and psychological parameters were analyzed. The yoga group participated in the yoga program for 6 months, two times a week and an exercise program for two times a week additionally. Whereas the control group was only given an exercise program for 4 times a week. When the groups were compared at the end of the study, significant differences were seen in the scores of Beck Depression Scale, Beck Anxiety Scale and Lipp Stress Syndrome Scale and the decrease in the symptoms of the yoga group was found in line with our study [28,29].

Newman et. al have applied a yoga program for 4 months to 76 children with CP who were aged 4-14 years. As a result of the study, it was observed that the gross motor functions developed and the independence levels in daily life increased [30]. In our study, it was seen in line with literature that the gross motor function state developed; however, a statistically significant difference was not found. In studies which evaluate gross motor functions of children who receive classic treatment and alternative treatment, it is stated that alternative treatments have a positive effect on gross motor functions [31].

Although 5% sleep disorder was seen in children who display normal growth and development, it has been shown that much higher rates of sleep problems were experienced in children with CP [32]. It is known that there are difficulties in beginning and sustaining sleep, irregular sleep and wakefulness transitions, respiratory problems related to sleep and an increased state of sleepiness in children with CP [33]. Kilic et. al have underlined that, yoga affect the alpha waves in EEG and causes relaxation, affects neurotransmitters and thus decreases depression and creates a positive effect on sleep quality. In our study, while the quality of sleep prior to the treatment was bad in the rate of 80%, it was seen that this rate decreased to 50% after the treatment and yoga's positive effect on sleep was determined in line with literature and found statistically significant [34].

In our study, it was seen that durations of climbing up and down the stairs in which functional state and performance were evaluated after the yoga treatment decreased. In parallel to this, an improvement was observed in the stand-up and walk test as well. Culos Reed et. al in their study involving 38 cancer patients for 7 weeks which was a randomized controlled study applied Hatha yoga for 75 minutes a week. After the program, they have observed that the patients in the yoga group could walk longer distances in the 6 minute walking test in comparison to the control group [35]. Kelley et. al [2014] in their study in which they applied 60 minutes of yoga for 12 weeks on 13 elderly individuals have found statistical significance in the timed stand-up and walk test in line with our study [36].

After this study, we believe that the physiotherapy yoga application is an alternative approach which should be included in rehabilitation programs and that it will add a different point of view to rehabilitation. In addition, this study is quite significant since there are very few studies similar to this one in literature and there is an increasing interest in alternative treatments.

References

- [1] Badawi N, Watson L, Petterson B, Blair E, Slee J, Haan E, Stanley F. What constitutes cerebral palsy? *Dev Med Child Neurol* 1998; 40: 520-7.
- [2] Mutch L, Alberman E, Hagberg B, Kodama K, Perat MV. Cerebral palsy epidemiology: where are we now and where are we going? *Dev Med Child Neurol* 1992; 34: 547-551.
- [3] Jan MMS. Cerebral palsy: comprehensive review and update. *Ann Saudi Med* 2006;26[2]:123-32.
- [4] Sankar C, Mundkur N. Cerebral Palsy- Definition, Classification, Etiology and Early Diagnosis. *Indian Journal of Pediatrics* 2005; 72 [10]: 865-868.
- [5] Yakut A. Serebral Palsi. In: Aysun S Eds. *Cocuk Noroloji*. 1. Baskı, Ankara: Alp Ofset MatbaacılıkMakine Sanayi ve Ticaret Ltd. ğti, 2006: 420-465.
- [6] Bourelle S, Berge B, Gautheron V, et al. Computerized static posturographic assessment after treatment of equinus deformity in children with cerebral palsy. *J Pediatr Orthop B*. 2010;19:211-220..
- [7] Bax MC, Flodmark O, Tydeman C. Definition and classification of cerebral palsy. From syndrome toward disease. *Dev Med Child Neurol Suppl* 2007; 109:39-41.
- [8] Koulouglioti C, Cole R, Kitzman H. Inadequate Sleep and Unintentional Injuries in Young Children. *Public Health Nursing* 2008; 25[2]: 106–14.
- [9] Newman CJ, O’Regan M, Hensey O. Sleep disorders in children with cerebral palsy. *Dev Med Child Neurol* 2006; 48: 564- 568. <http://dx.doi.org/10.1017/S0012162206001198>
- [10] Wayte S, McCaughey E, Holley S, et al. Sleep problems in children with cerebral palsy and their relationship with maternal sleep and depression. *Acta Paediatrica* 2012; 101: 618-623.
- [11] McLaughlin JF, Bjornson KF, Astley SJ, et al. Selective dorsal rhizotomy: efficacy and safety in an investigatormaskedclinical trial. *Dev Med Child Neurol*. 1998;40: 220-232.
- [12] P. E. Jeter, J. Slutsky, N. Singh, and S. B. S. Khalsa, “Yoga as a therapeutic intervention: a bibliometric analysis of published research studies from 1967 to 2013,” *Journal of Alternative and Complementary Medicine*, vol. 21, no. 10, pp. 586–592, 2015.
- [13] O. Parshad, “Role of yoga in stress management,” *West Indian Medical Journal*, vol. 53, no. 3, pp. 191–194, 2004.
- [14] S. Holtzman and R. T. Beggs, “Yoga for chronic low back pain: a meta-analysis of randomized controlled trials,” *Pain Research and Management*, vol. 18, no. 5, pp. 267–272, 2013.

- [15] J. J. Kortering, L. E. Ockeloen, M. Hilbink, M. A. Benninga, and J. M. Deckers-kocken, "Yoga therapy for abdominal pain related-functional gastrointestinal disorders in children. A randomized controlled trial," *Journal of Pediatric Gastroenterology and Nutrition*, vol. 63, no. 5, pp. 481–487, 2016.
- [16] Galantino, M. L., Galbavy, R., and Quinn, L. [2008]. Therapeutic effects of yoga for children: a systematic review of the literature. *Pediatr. Phys. Ther.* 20, 66–80. doi: 10.1097/PEP.0b013e31815f1208
- [17] Balasubramaniam, M., Telles, S., and Doraiswamy, P. M. [2013]. Yoga on our minds: a systematic review of yoga for neuropsychiatric disorders. *Front. Psychiatry* 3:117. doi: 10.3389/fpsy.2012. 00117
- [18] Oy B. Çocuklar için depresyon ölçeği: Gecerlik ve güvenilirlik çalışması. *Türk Psikiyatri Dergisi*, 1991; 2: 132-136.
- [19] Ozyurt G, Bayram E, Karaoglu P, Hiz-Kurul S, Yis U Dusunen Adam *The Journal of Psychiatry and Neurological Sciences*, Volume 28, Number 4, December 2015].
- [20] Agargun, M.Y., Kara,H., Anlar,O. [1996] Pittsburg Uyku Kalitesi İndeksi'nin Gecerliliği ve Güvenirligi. *Türk Psikiyatri Dergisi*, 7, 107-111.
- [21] 12. Liu JM, Li S, Lin Q, Li Z. Prevalence of cerebral palsy in China. *Int J Epidemiol* 1999;28: 949-54.
- [22] Pharoah PO, Cooke T, Johnson MA, King R, Mutch L. Epidemiology of cerebral palsy in England and Scotland,1984 – 9. *Arch Dis Child Fetal Neonatal Ed* 1998;79:21-5.
- [23] Mancini M. Horak FB. The relevance of balance assessment tools to differentiate balance deficits. *Eur J Phys Rehabil Med.* 2010; 46[2]: 239-48.
- [24] Butler AA, Menant JC, Tiedemann AC, Lord SR. Age and gender differences in seven tests of functional mobility. *J Neuroeng Rehabil.* 2009; 6: 31
- [25] Rosenbaum P, Paneth N, Leviton A, et al. A report: the definition and classification of cerebral palsy April 2006. *Dev Med Child Neurol Suppl* 2007;109:8-14
- [26] Curits K, Weinrib A, Katz J. Systematic Review of Yoga for Pregnant Women: Current Status and Future Directions. *Evidence-Based Complementary and Alternative Medicine*, Volume 2012, pages 13
- [27] Distasio SA. Integrating yoga into cancer care. *Clin J Oncol Nurs* 2008;12[1]:125–30./ Effects of yoga on the quality of life in cancer patients Ozlem Ulger*, Naciye Vardar Yagli *Complementary Therapies in Clinical Practice* 16 [2010] 60–63
- [28] Rocha KKF., Ribeiro AM, Rocha KCF et al. Improvement in physiological and psychological parameters after 6 months of Yoga practice. *Conscious Cogn.* 2012;21:843-850
- [29] Sağlıklı kadınlarda Yoga temelli egzersizlerin esneklik, yaşam kalitesi, fiziksel aktivite ve depresyon üzerine etkilerinin araştırılması Esra ATILGAN, Devrim TARAKCI, Basak POLAT, Z Candan ALGUN *Journal of Exercise Therapy and Rehabilitation.* 2015;2[2]:41-46
- [30] J. Halpern, PhD; M. Cohen, PhD; G. Kennedy, PhD; J. Reece, PhD; K. Cahan, MD; A. Baharav, Md *Alternative Therapies In Health And Medicine* April 2014.

- [31] Hurvitz E, Leonard C, Ayyangar R, Nelson VS. Complementary and alternative medicine use in families of children with cerebral palsy. *Developmental Medicine & Child Neurology* 2003, 45: 364–370
- [32] Newman CJ, O'Regan M, Hensey O. Sleep disorders in children with cerebral palsy. *Dev Med Child Neurol* 2006; 48: 564- 568. <http://dx.doi.org/10.1017/S0012162206001198>
- [33] Wayte S, McCaughey E, Holley S, et al. Sleep problems in children with cerebral palsy and their relationship with maternal sleep and depression. *Acta Paediatrica* 2012; 101: 618-623
- [34] Kılıc Z, Senturk A, Goris S. Use of complementary and alternative therapies among sleep problems in individuals with chronic diseases [Review]. *Spatula DD*. 2015; 5[2]: 69-77
- [35] Campbell, A. Mutrie, N., White, F., McGuire, F., Kearney, N. A pilot study of a supervised group exercise programme as a rehabilitation treatment for women with breast cancer receiving adjuvant treatment. *Eur J Oncol Nurs*, . 2005, 9 [1], 56-63.
- [36] Kelley KK, Aaron D, Hynds K, Machado E, Wolff M. The Effects of a Therapeutic Yoga Program on Postural Control, Mobility, and Gait Speed in Community-Dwelling Older Adults. *J Altern Complement Med*. 2014, 20[12]: 949–954