The Effects of Osteopathic Treatment on Constipation in Children With Cerebral Palsy: A Pilot Study

Tülay Tarsuslu, PT, PhD,[a] Hüseyin Bol, PT,[b] İbrahim Engin Şimşek, PT, PhD,[a] İmran Erkanat Toylan, PT, MSc,[b] and Sabahat Çam, MD[c]

Abstract

Objective: This pilot study was designed to investigate the effectiveness of osteopathic treatment in children with cerebral palsy and chronic constipation.

Methods: This study included 13 children with cerebral palsy diagnosed as having chronic constipation by a gastroenterologist. The subjects were separated into 2 groups. Group 1 was treated with osteopathic methods and group 2 underwent both medical and exactly the same osteopathic treatments of group 1. Osteopathic treatments included fascial release, iliopsoas muscle release, sphincter release, and bowel mobilizations. Gross Motor Functional Classification System, Functional Independence Measure for Children, and Modified Ashworth Scale were used to determine the level of disability, functional independence, and muscle tonus, respectively. In addition, Constipation Assessment Scale was administered to the subjects to determine the severity of constipation. The satisfaction from the treatment was measured using a Visual Analogue Scale at 3 and 6 months.

Results: Most of the children included in this study were determined as level IV or V according to Gross Motor Functional Classification System. The satisfaction of the subjects or the families with the treatments was not different when the groups were compared ($P > .05$). Constipation Assessment Scale scores decreased significantly in both groups ($P < .05$). Pretreatment (initial evaluation) and posttreatment (follow-ups at 3 and 6 months) results revealed no difference between the groups in either aspects ($P > .05$). However, both groups showed significant improvements compared with baseline evaluations ($P < .05$).

Conclusion: Osteopathic methods were as effective as osteopathic methods in addition to medical care for both treatment groups. The results of this study suggest that osteopathic methods may be helpful as an alternative treatment in constipation. Additional advanced studies should be conducted. (J Manipulative Physiol Ther 2009;32:648-653)

Key Indexing Terms: *Osteopathic Medicine; Constipation; Cerebral Palsy; Abdominal Pain*

Cerebral palsy (CP) is a nonprogressive condition manifesting itself with several impairments in musculoskeletal system due to early developmental disorders of the central nervous system.[1,2] Recent studies indicated that the incidence of CP is 2.5/1000 live births.[2]

In children with chronic disabilities due to neurodevelopmental disorders, gastrointestinal system impairments are common depending on the severity of the disorder.[1,3,4] Thus, children with CP, spina bifida, and spinal cord lesions are usually the most frequent candidates for bladder and bowel problems. Constipation is one of the most frequent problems in CP because of several reasons such as insufficient nutrition, malnutrition, increased muscle tone, decreased defecation, and immobilization. Moreover, it may worsen with the increase in severity of the disorder, presence of mental retardation, and the decrease in physical activity level.[3,5-9] Numerous studies indicate that in children with intellectual and neurologic problems, the percentage of constipation is much greater than healthy ones.[2,3,10,11] In a study, Giudice et al[1] found that in children with CP, the percentage that had constipation was 74%.

[a] Associate Professor, University of Abant İzzet Baysal, KD School of Physical Therapy and Rehabilitation, Bolu, Turkey.

[b] Physical Therapist, Metin Sabanci Rehabilitation, Education and Productivity Center for Children with Cerebral Palsy, Istanbul, Turkey.

[c] Medical Doctor, Göztepe Hospital for Research and Education, Istanbul, Turkey.

Submit requests for reprints to: İbrahim Engin Şimşek, PT, PhD, Abant İzzet Baysal Üniversitesi KD Fizik Tedavi ve Rehabilitasyon Yüksekokulu, Gölköy Kampusu, Bolu, Turkey
(e-mail: *iengin.simsek@gmail.com*).

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In healthy children with regular intestinal movements, evacuation of feces is usually achieved 3 or 4 times per week.[12,13] However, as stated by Park et al[14] and Staiano and Del Giudice,[15] children with CP have lower frequency of defecation (1 per week or 1/10 days) and longer colonic transit passage compared with healthy children.

As well as the children, bowel and bladder problems and abdominal pain also negatively affect the families, causing anxiety.[2,4,16] As a result, combined with other problems, constipation may lead to a decrease in quality of life of both children and their families.[4,16,17]

Along with laxative drug regimens and diets including fibrous food, there are also some alternative approaches in trial for the treatment of constipation. Probiotics, hypnotherapy, chiropractic methods, and abdominal massage may be considered as alternative treatments.[18-20] Osteopathy is used as one of the alternative treatment methods in the recent years.[20-23] Although several studies have been published concerning the use of osteopathic methods in adults, the use in children is less well known.

Osteopathy depends on manual methods aiming to correct and regulate structural and functional systems. In osteopathy, unrestricted motion between tissues is accepted as important for maintaining health and healing processes. Relevant tonus and tissue texture changes are carefully investigated to understand the cause of restrictions and alterations in normal movement. To attain the desired effects, we applied stretches, mobilizations and manipulations to the musculoskeletal and visceral systems.[20,24,25]

For constipation, the osteopathic treatment of the abdominal organs is theorized to be effective because peritoneal structures surrounding the viscera may have lost their normal resilience. The goal of osteopathic treatment in constipation is to restore movement within the environment of the abdominal organs or within the organ itself. This is a holistic approach so the whole person is treated, not just the symptoms, and therefore, individualized treatment is required.[20,25]

This relatively small sample size pilot study was designed to investigate potential effects of osteopathic treatment on constipation in children with CP to evaluate if further studies are warranted to evaluate if osteopathy may be used as an alternative and/or an adjunct treatment approach.

Methods

This study included 13 children with CP, 5 (38.5%) girls and 8 boys (61.5%), between the ages of 2 and 16 years. Inclusion criteria were having a diagnosis of constipation, not having received any form of therapy before the study and no congenital malformation of the gastrointestinal system.

Study Protocol

The subjects diagnosed as having chronic constipation were separated into 2 groups. Group 1 was treated with osteopathic methods and included 3 girls and 4 boys with an average age of 7 ± 5.09 years. Group 2 included 2 girls and 4 boys with an average age of 7.33 ± 5.24 years and underwent both medication (lactulose) and exactly the same osteopathic treatments of group 1. Medication was initiated with 10 mL/d for children younger than 6 years and 15 mL/d for children older. After 1 week, doses were halved. No medication was prescribed to group 1 throughout the study period. Initial assessment was conducted before the study, and follow-up evaluations were conducted at 3 and 6 months.

Osteopathic treatments included fascial release, iliopsoas muscle release, sphincter release, and bowel mobilizations and were conducted in the given order during 30 minutes of session. A single treatment session was conducted as follows: the child was positioned supine with knees and hips at 90° to decrease the abdominal tension. In this position, friction massage around the abdominal fascia and sphincter release (90 seconds of mild pressure application on sphincter with 5 repetitions) were performed. After that, iliopsoas muscle release was performed by increasing the flexion angle of the other hip and applying mild pressure on the target iliopsoas (5 repetitions). This was followed by clockwise mobilization of descendant, transverse, and ascendant colons separately. Sessions were carried out 3 times a week for 6 months. All treatments were conducted by an experienced osteopath. This study was approved by University of Abant Izzet Baysal Faculty of Health Sciences Commission on Ethics (2008/100-91) (Bolu, Turkey).

Evaluation Parameters

Assessments were conducted before intervention, at 3 months and at 6 months. The following tools were used as outcome measures: defecation frequency (times/wk), Gross Motor Functional Classification System (GMFCS),[26] Modified Ashworth Scale (MAS),[27] Functional Independence Measure for Children (WeeFIM),[28] Constipation Assessment Scale (CAS),[29] and Visual Analogue Scale (VAS).[30]

Gross Motor Functional Classification System. Gross Motor Functional Classification System is a tool specifically designed to classify children with disabilities according to their functional status, which is indicated by a given level ranging between I (minimal or no disability) and V (totally dependent).[26] The GMFCS has been rapidly accepted into clinical practice and research and has been shown to be related directly to restrictions in activity and participation.

Modified Ashworth Scale. Modified Ashworth Scale is a subjective measurement tool used for the assessment of level of spasticity within a range of 0 (no increase in muscle tone) to 5 (normal joint movement is totally restricted).[27] Modified Ashworth Scale values were calculated for the hip flexors, adductors, internal rotators, knee flexors, and ankle plantar-flexors in the lower extremities, and the shoulder

Table 1. *Demographics of the subjects including the type of CP according to extremity involvement*

	Group 1 (n = 7) Mean ± SD	Group 2 (n = 6) Mean ± SD
Age (y)	7.0 ± 5.09	7.33 ± 5.24
Height (cm)	114.8 ± 22.99	107.2 ± 28.04
Weight (kg)	20.21 ± 8.95	20.91 ± 14.29
	n (%)	n (%)
Sex		
Female	3 (42.9)	2 (33.3)
Male	4 (57.1)	4 (66.7)
Extremity involvement		
Quadriparesis	6 (85.7)	5 (83.3)
Diparesis	1 (14.3)	1 (16.7)

flexors, adductors, internal rotators, elbow flexors, hand flexors, and finger flexors in the upper extremities. Then, a total spasticity value was calculated by summing these separate MAS scores to determine a spasticity level for the whole body.

Functional Independence Measure for Children. Functional Independence Measure for Children is an 18-item tool used to evaluate the level of functional independence of a child in 6 domains related to the activities of daily living. The subsets include self-care (6 items), sphincter control (2 items), transfers (3 items), locomotion (3 items), communication (2 items), and social cognition (3 items). Scoring for each item ranges between 1 (total dependence) and 7 (total independence). The minimum score that can be obtained is 18, and the maximum score is 126.[28] Functional Independence Measure for Children was conducted by an experienced physiotherapist by direct observation and with interviews conducted with the caregivers or parents of the children.

Constipation Assessment Scale. Constipation Assessment Scale is a valid and reliable tool consisting of 8 self-reported items investigating the presence and severity of constipation in both children and adults.[29] The scoring is provided by a 3-point rating scale indicating 0 as no constipation, 1 as some problem, and 2 as severe problem. Total score ranges between 0 (no constipation) and 16 (severe constipation). Although CAS is a self-reported questionnaire, parents or caregivers were asked to answer the questions for those children who were unable to read and/or comprehend the scale because of their age.

Visual Analogue Scale. Satisfaction of treatment was measured on a 10-cm scale. Both the children and the caregivers or parents were asked to rate their overall satisfaction between 0 (indicating no satisfaction) and 10 (most satisfied). Although VAS is most frequently used to evaluate the degree of pain, it has also been used to assess the burden and the severity of musculoskeletal disorders in various studies.[30,31] Visual Analogue Scale use is shown to be a valid and reliable assessment method for use in children.[32]

Table 2. *Frequency of GMFCS levels*

GMFCS levels	Group 1 (n = 7) n (%)	Group 2 (n = 6) n (%)
Level II	–	1 (16.7)
Level III	1 (14.3)	–
Level IV	5 (71.4)	3 (50)
Level V	1 (14.3)	2 (33.3)

Table 3. *Pretreatment posttreatment differences at 3 and 6 months compared with baseline assessments*

	Group 1		Group 2	
	Month 3 (*P*)	Month 6 (*P*)	Month 3 (*P*)	Month 6 (*P*)
Defecation frequency	.018 *	.027 *	.026 *	.017 *
MAS lower extremity	.046 *	.115	.039 *	.018 *
Total MAS	.028 *	.057	.027 *	.027 *
Total WeeFIM	.043 *	.066	.042 *	.028 *
CAS	.016 *	.028 *	.028 *	.016 *

* $P < .05$, Wilcoxon signed rank test.

Data Analysis

Statistical analyses were performed with the SPSS software (version 11.0; SPSS, Chicago, Ill). Median and SD were used in descriptive statistics. To detect difference between groups, we used Kruskal-Wallis test and Mann-Whitney *U* test, and to analyze pre- and posttreatment differences, we used Wilcoxon signed rank test. Level of significance was accepted as $P < .05$.

Results

The demographic characteristics of the subjects and extremity involvement are provided in Table 1. Eleven of the subjects were quadriparetic and 2 were diplegic. Most of the subjects was classified as level IV and V according to GMFCS. Frequencies related to GMFCS levels are shown in Table 2. There was no statistical difference between the groups regarding age, sex, height, and weight ($P > .05$).

At 3 months, both groups showed significant differences as compared with the baseline values for all outcome measures (Table 3). At 6 months, compared with baseline evaluation, analysis for group 1 showed no statistical difference in the lower extremity total spasticity score, whole body spasticity score, and total WeeFIM score ($P > .05$), although CAS and defecation frequencies were significantly different ($P < .05$) (Table 3). Analysis for group 2 indicated differences at 6 months in all aspects compared with baseline evaluations ($P < .05$) (Table 3).

Pretreatment (baseline assessment) and posttreatment (follow-up at 3 and 6 months) results revealed no difference between the groups ($P > .05$) (Table 4).

Table 4. *Pretreatment and posttreatment comparison of the groups at baseline, month 3, and month 6*

	Pre- and Posttreatment comparison of groups								
	Baseline			Month 3			Month 6		
	Group 1 (n = 7) Median (min-max)	Group 2(n = 6) Median (min-max)	*P*	Group 1 (n = 7) Median (min-max)	Group 2 (n = 6) Median (min-max)	*P*	Group 1 (n = 7) Median (min-max)	Group 2 (n = 6) Median (min-max)	*P*
Defecation frequency (times/wk)	2 (1-4)	2 (1-3)	.253	7 (4-7)	5 (4-7)	.256	7 (4-7)	7 (3-7)	.662
MAS lower extremity	26 (4-30)	28.5 (10-35)	.474	22 (0-32)	20.5 (5-35)	1.000	20 (0-30)	24 (3-34)	.567
Total MAS	46 (12-61)	43 (11-77)	.721	42 (0-55)	28.5 (5-73)	.631	38 (0-55)	38.5 (3-72)	.943
Total WeeFIM	56 (19-89)	44.5 (18-58)	.391	53 (19-99)	55 (18-76)	.749	76 (19-100)	56 (18-86)	.431
CAS	10 (7-18)	11 (5-13)	.664	3 (0-8)	1.5 (1-9)	1.000	3 (0-3)	0.0 (0-7)	.430

$P < .05$, Kruskal-Wallis.
Min, Minimum; *Max*, maximum.

Table 5. *Satisfaction rates (VAS) of the subjects and their families from the treatments*

	Month 3			Month 6		
	Group 1 (n = 7) Median (min-max)	Group 2 (n = 6) Median (min-max)	*P*	Group 1 (n = 7) Median (min-max)	Group 2 (n = 6) Median (min-max)	*P*
Subject satisfaction	7 (6-9)	7 (6-9)	.881	9 (7-9)	9 (7-9)	.302
Family satisfaction	8 (6-10)	7(7-1)	.805	9 (8-10)	9 (9-9)	.291

$P < .05$, Mann-Whitney *U* test.
Min, Minimum; *Max*, maximum.

Satisfaction rates from the treatment as measured by VAS indicated no difference between the groups at follow-ups; however, overall satisfaction of both families and children was higher at 6 months ($P > .05$) (Table 5).

Discussion

Osteopathy is considered as the manual art of healing and a holistic approach to the interrelation of all tissues and organs using therapeutic manual methods to treat the loss of motion within body tissues. The etiology of constipation depends on a complex neural control system between brain-gut axis encompassing the interaction of biologic, psychosocial, and early life factors related to the development of constipation.[6,13,33] In patients with neurologic involvement, the deregulation of the central nervous system, altered intestinal motility, and increased visceral sensitivity cause a disruption of this axis.[34] In addition, the normal passive movement of the visceral organs is hampered because of restrictions and limitation of body movements. In this study, the aim was to achieve the regulation of this pathological condition providing normal mobility in all related tissues with the help of osteopathic techniques. Parallel to the developments in alternative medicine, osteopathy has become a frequently used method in the clinic, although there are limited studies related to the field.

Moreover, there are fewer studies concerning the effects of osteopathic treatment methods in children with neurologic disorders.[20,22,23] Thus, this study may be considered as the first, investigating the effects of osteopathic methods on constipation in children with CP.

There are numerous studies conducted in children to investigate the efficacy of different treatment methods for constipation.[12,35-38] These studies that usually used abdominal massage were based on the same assumption similar to our study (enhancing abdominal movements, sphincter, and bowel mobilization). Thus, they formed the basic references for the current study.

In a review of 4 studies, Ernst[18] stated that abdominal massage may be used as a treatment method in patients with chronic constipation. However, he also expressed the need for more studies investigating the effectiveness of massage in constipation. Similarly, Spigelblatt et al[21] reported that the effects of alternative treatment methods such as chiropractic techniques, homeopathy, naturopathy, and acupuncture, which are widely used in adults but not in children, cannot be underestimated. In one of the 2 studies similar to our study, although the diagnosis of the subjects were different, Ayas et al[19] found that abdominal massage reduced the colonic transition time and increased the defecation frequency in patients with spinal cord injuries. In another study, Hundscheid et al[20] reported that in patients with irritable bowel syndrome, abdominal pain, cramps, constipation, and feeling of incomplete defecation of feces were significantly decreased at the follow-up of posttreatment 6 months. They also stated that satisfaction with the

treatment was very high and the subjects' perceived quality of life was increased.

Parallel to these studies, though a different specialized technique was used, we found that both methods (osteopathic treatment and osteopathic treatment with additional drug regimen) were effective in reducing the symptoms of constipation in children with CP and increased the frequency of defecation. Although we showed that there were important improvements of the symptoms in both groups, there was no difference between the groups in the level of improvement of the symptoms, which may indicate that the drug regimen had no additional beneficial effects on constipation, whereas osteopathic methods alone might cause these improvements.

The limited ambulatory function in highly disabled children with CP along with increased level of spasticity is one of the major factors affecting the digestive system. In our study, most of the subjects were classified as level IV or V, indicating a high level of disability. Chronic constipation with stomach pain, muscle cramps, and incomplete defecation of feces may lead to increased spasticity levels, which in turn may aggravate constipation further. Not surprisingly, we also showed that relief in such constipation symptoms also caused a significant decrease in overall spasticity levels. Although this decrease could only be shown in group 2, the level of significance obtained for group 1 was also close to a level of statistical significance. Also for WeeFIM results, presenting the level of independence related to group 1, a similar explanation may be an argument for the close but not statistically meaningful level of significance. However, it should be noted that medication used in group 2 might have played an important role to decrease the overall and lower extremity MAS values.

The treatment satisfaction rates were similar in both groups, implying that both groups benefited from the treatments, because the satisfaction rates at the end of the study showed no difference. This result may be due to insensitivity of the outcome measure (VAS) or low number of subjects included in the study. However, the interesting result, which is in favor of osteopathic methods, is that there was no difference at both follow-ups between the groups when satisfaction rates were compared. This result may again mean that the drug regimen has no additional beneficial effect, though it should be noted that long-term effects of eliminating drug use and other drug-related parameters that are not the focus and beyond the scope of this study are not well investigated in the relevant literature.

Limitations and Further Research

The results of this study may indicate that osteopathic treatment methods may be effective in the treatment of chronic constipation in CP. However, because this is a pilot study with a small sample size, the repeatability of our results should be tested for larger populations before osteopathic methods are used as an alternative to routine treatments such as medication. In addition, our study design had no control group (both groups receiving osteopathic treatment), which may conceal the effects of the manual techniques used; rather, it may seem to investigate the additional effect of the drug regimen. Another point of concern related to this study is the initial nutritional status and dietary changes for 6 months during the study, which are closely related to chronic constipation. These factors should also be included as an important parameter in further study designs. Furthermore, Stinson et al[32] reported some problems in using VAS to those younger than 8 years. This issue is still controversial and needs to be addressed as another point of concern. One should also note that successful interventions with manual methods are highly dependent on the skill and experience of the clinician, so results found in this study may not necessarily be found in other clinical environments.

Conclusion

This study was successful in showing that this type of study is feasible and that there seems to be a treatment effect for osteopathic methods in treating constipation in children with CP. However, it is still unclear in terms of evidence-based treatment methods to what extent they may efficiently be used. Thus, larger studies with similar interventions should be conducted before these methods are put into effect as valid and reliable alternative treatment options.

Practical Application

- Osteopathic methods may be effective in treating constipation in children with CP

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No funding sources or conflicts of interest were reported for this study.

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