

Effect of Foot Reflexology on Constipation in Children with Cerebral Palsy

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Abstract :

Background: Cerebral palsy (CP) refers to a group of conditions that affect control of movement and posture. Gastrointestinal problems in particular have a deteriorating effect on the daily life of affected children. Constipation is one of the most common digestive problems in children with Cerebral Palsy

Aim: was to determine the effect of foot reflexology on constipation in children with cerebral palsy.

Settings: The study was conducted at the Outpatient Neurology Clinic at Alexandria University Childrens' Hospital and Natural Medicine and Rheumatism and Medical Rehabilitation Department at El-Shatby in Alexandria. **Subjects:** convenience sampling of 70 children with Cerebral Palsy. **Tools:** Two tools were used for data collection. The first tool was Socio demographic and medical history record of children with Cerebral Palsy. The second tool was Modified Constipation Assessment Scale (MCAS). **Results:** Findings of the present study revealed that the majority of children with cerebral palsy bowel habits improved after reflexology sessions. The finding also revealed that, the difference was statistically significant among study and control groups.

Conclusion: From the results of the study, it was concluded that children with cerebral palsy who received reflexology exhibit improvement in their bowel functions.

Keywords: Reflexology, Constipation, Cerebral Palsy Children.

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I. Introduction

Cerebral palsy (CP) refers to a group of conditions that affect control of movement and posture (National Guideline Alliance, 2017). Cerebral palsy is the most common motor disability in childhood which occurs as a result of an injury to the developing brain at any time during pregnancy, at birth, or until the age of three years (Chung et al., 2011). The injury to the brain interferes with messages from the brain to the body affecting body movement and muscle coordination (Berker et al., 2010).

CP is a common neurologic problem in children and is reported as occurring in approximately 2 to 2.5 of 1000 live births globally (Abbasi et al.,2019). The incidence is higher in males than in females; the Surveillance of Cerebral Palsy in Europe (SCPE) reports male to female ratio of 1.33:1.00 (Cans, 2019; Duimaz ,2018). The United Cerebral Palsy Foundation states that there are 800,000 children and adults in the United States with CP. The Centers for Disease Control estimates that about 10,000 babies are born each year with CP (Balakrishnan et al., 2013). In Portugal, there are approximately 200 new cases per year, and 90% will reach adulthood (Marques et al., 2016). In Nigeria, CP is the second most common disorder seen at the pediatric neurology clinics after epilepsy (Shailaja et al., 2014). The National Survey of Childrens' Health (NSCH 2012–2013) in USA and the National Health Interview Survey (NHIS 2011–2013) in USA determined the prevalence of CP through parents' reports among children aged 2–17 years. These surveys found a CP prevalence per 1,000 live births that ranged from 2.6 in the NSCH to 2.9 in the NHIS. In Egypt, it was reported that the prevalence of children with CP is about 3.6 per 1000 live births every year (El-Tallawy et al., 2014). It was reported that 52 of 25,540 children in Al-Karga District, Egypt, had CP, giving a prevalence of 2.04 per 1,000 live births (Fathy et al., 2017).

Affected children experience secondary problems in addition to motor and sensorial ones (López et al., 2012). Frequently encountered problems are epilepsy, mental retardation, sensorial perception disorders, hearing and visual disturbances, pain, behavioral problems, and disorders related with other body systems (Darrah, J et al., 2011). Gastrointestinal problems in particular have a deteriorating effect on the daily life of affected children (Hurley et al., 2016). Different studies have demonstrated that brain injury may lead to problems in the gastrointestinal system (Reddihoug, 2016). Dysphagia, disorders in eating patterns, vomiting, and chronic constipation have been reported in children with neurologic impairment. The most frequently encountered gastrointestinal problem among children with CP is constipation (Wang et al., 2018).

Constipation is considered one of the secondary problems which, is more prevalent among children with CP (Johnson, et al., 2017; Günel, 2014). Several important risk factors that lead to constipation are insufficient nutrition, increased extensor muscle tone or general hypotonia, musculoskeletal system anomalies, decreased defecation and immobilization. (The Center for Children with Special Needs, 2011).

In recent years' complementary therapies are increasingly being used in addition to traditional methods have been increased in recent years (Reid et al., 2011). Reflexology is a form of complementary medicine which is defined as the systematic application of pressure to specific reflex points on the feet that correspond somatotypically to specific areas and organs of the body with the intention of promoting homeostasis (International Institute of Reflexology, 2012; Poole, 2001). Working from the premise that reflex areas in the foot are linked to principal organs and glands via energy zones, it is presumed that the application of pressure to these areas releases congestion and promotes the flow of energy (Kunz & Kunz, 2007). By enabling optimum circulation, helping to eliminate toxins, and aiding the major systems of the body (immune, nervous, and glandular), it is purported that the therapy helps to promote and restore balance (Shepherd et al., 2018; Varghese et al., 2014). Reflexology method is a simple and noninvasive method which has no complication and can be counted as a part of nursing care in pediatric care units (Özkan & Zincir, 2018; Babajani et al., 2014).

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II. Subjects and Method

3.1 Study design: A quasi-experimental research design was used in this study.

3.2 Study hypotheses: Children with Cerebral Palsy who receive foot reflexology exhibit less constipation than those who do not.

3.3 Study setting: The study was conducted at the Outpatient Neurology Clinic at Alexandria University Childrens' Hospital and Natural Medicine and Rheumatism and Medical Rehabilitation Department at El-Shatby in Alexandria.

3.4 Subjects: A convenient sample of 70 children with Cerebral Palsy who fulfilled the following criteria comprised the sample:

- From 3-6 years old.
- Gross Motor Function Classification System (GMFCS) levels of 2/3/4
- Receive physical therapy.
- Free from any open wounds in the foot.
- Suffering from constipation.

Cerebral palsy children were assigned into two groups:

1- Study group: Thirty-five children who received the treatment, physical therapy and reflexology. Foot reflexology sessions were performed at physiotherapy room. The session was performed for 20 minutes twice a week for a total duration of 8 weeks.

2- Control group: Thirty-five children who received the treatment and physical therapy only.

The subjects were assigned to group one (study group) or group two (control group)) as follows: One subject for study group then the other for control group and so...on.

3.5 Tools of the study: In order to collect the necessary data for the study two tools were used:

Tool (I): Socio demographic characteristics of Children with Cerebral Palsy:

Part I: Childrens' demographic data which included: age, sex and birth order.

Part II: Mother 's demographic data which included: age, educational level, occupation, income, number of children and residence

Tool (II): Modified Constipation Assessment Scale (MCAS)

Modified Constipation Assessment Scale was adopted from the Constipation Assessment Scale developed by McMillan and Williams (2005). The MCAS based on a constipation tool previously validated and modified by the same author to assess any deviations in bowel function away from the normal. The MCAS is an eight-item self-reported questionnaire.

- Abdominal distention or bloating
- Change in the amount of gas passed rectally
- Less frequent bowel movements
- Oozing liquid stool
- Rectal fullness or pressure
- Small volume of stool
- Large volume of stool
- Unable to pass stool

3.6 Method:

1. An official Permission to conduct the study was obtained from the responsible authorities after explanation of the aim of the study.
2. **Ethical consideration:**
 - Written informed consent was obtained from the mother after explaining the aim of the study and their rights to withdraw from the study at any time.
 - Mothers were ascertained about confidentiality of their childrens' data. Data collected was only used for the intended research purpose.
 - Privacy was considered.
3. Tool one was developed by the researcher after thorough review of related literature.
4. Tool two was adopted from the Constipation Assessment Scale developed by McMillan and Williams (2005).
5. The developed tool was validated by 5 experts in pediatric nursing field to determine its applicability and content validity.
6. The researcher was underwent a period of training on technique of reflexology for 30 hours by an accredited trainer and a certificate was received.
7. A pilot study was done on 7 children to ascertain the clarity and applicability of the study tools. Necessary modification was done accordingly. These children were excluded from the study sample.
8. Pre assessment: As a base line data children in both study and control groups patterns of bowel functions were assessed prior to starting reflexology sessions using tool two.
9. **For the control group:**
 - ❖ Children in group two received the treatment and physical therapy only.

10. For the study group:

Foot reflexology sessions were performed at physiotherapy room. The session was performed for 20 minutes twice a week for a total duration of 8 weeks. The massage was first performed on the right foot for 10 minutes and then on the left foot in the same manner.

11. Reflexology sessions:

Specific reflexology was performed with special attention to three important foot reflex areas that include:

- **Brain reflex:** The neck/shoulder line is drawn across the feet at the base of the toes. Brain reflex located at the toe pad of the big toe on both foot.
- **Gastrointestinal reflex areas:** The heel/pelvic line is located where the softer skin at the proximal end of the longitudinal arch meets the harder skin of the heel. The abdomen and its contents are represented between the diaphragm line and the heel/pelvic line.
- **Step 1: Reflexology for Brain reflex area:**
 - Reflexology session was started by first giving the pressure on solar plexus points (its reflex area is found beneath the diaphragm line in feet between zone 2 and zone 3). The solar plexus acts as a central hub of nerves and a nerve switch board.
 - By using the thumb walk technique, which was applied with finger movements resembling worm movement in which the medial aspect of the thumb creped slowly along in an intermittent on/off pressure.
 - By using thumb to press and rub toe pad in an up and down motion from the tip of the toe to just below the base of the toe pad and moving from one side to the other. The same steps were repeated for the left toe.

- **Step 2: Reflexology for Gastrointestinal reflex areas:**
 - Begin on the right foot where the large intestine area begins (on the outside edge of the sole of the foot). Thumb walk vertically up to the point where the large intestine bends ninety degrees.
 - Thumb walk across the foot horizontally following the large intestine area all the way to the middle of the right foot.
 - Thumb walk large intestine area on left foot, begin exactly where the large intestine would connect on the right foot and horizontally across large intestine area
 - At edge of foot thumb walk vertically downwards then back across. Continue on the left foot thumb walk from large intestine ending spot up the inside of the leg until the level of the ankle bone. These steps were repeated gently about 5 times.
- **Finishing treatment session: for about two minutes**
 - The thumb was placed in the solar plexus reflex area of each foot.
 - After completing reflexology session on both feet the palms of hands were pressed against the soles of the feet.
 - Child was given a glass of water after each session aiming to improve circulation.

12. The data were collected during the period from October 2018 to May 2019.

13. Statistical analysis:

The raw data were coded and transformed into coding sheets. The results were checked. Data were analyzed using the statistical package for social science SPSS (version 20)

-Descriptive statistics including frequency, distribution, mean and standard deviation were used to describe different characteristics. Univariate analyses including: t-test and Mann Whitney test were used to test the significance of results of quantitative variables. Moreover, Chi-Square test, Monte Carlo test and Fisher's exact test were used to test for significance among qualitative variables. Level of significance for the present study was equal to or less than 0.05%.

III. Results

Table (1) illustrates percent distribution of characteristics of mothers of children with Cerebral Palsy. Mothers whose ages less than 30 years old constituted 60.0% and 57.1% respectively among the study group and control groups. Their mean ages were 29.9 ± 3.8 and 29.6 ± 5.1 respectively. Regarding mothers' educational level, it is noticed that more than half of mothers (54.3%) had secondary school education in the study group compared to 45.7% of those in control group. More than three quarters of the mothers (82.9%) in study group were housewives compared to nearly two thirds (65.7%) of those mothers in control group. The table also shows that slightly more than half of the mothers of both the study and control group mentioned that their incomes were sufficient (51.4% for each). Furthermore, 54.3% of mothers in the study group had one or two children compared to 20 % of mothers in control group. Its revealed from the same table that, nearly two thirds of mothers among the study and control group lived in urban areas (60.0% and 62.9% respectively).

Table (2) portrays percent distribution of the characteristics of children with Cerebral Palsy. It was found that the age of 62.9% of children among study group ranged from 2 to less than 4 years old compared to 48.6% of children among control group. Meanwhile, the age of more than one third of children among study group (37.1%) ranged from 4 to 6 years compared to 51.4% of those in control group. The mean ages of children in both groups were 3.8 ± 0.75 and 4.5 ± 0.9 respectively. Male children constituted nearly two thirds (62.9%) in study group and 45.7% in control group. Concerning birth order, the table illustrate that the second born constituted nearly half of children in each study and control groups (45.7% and 42.9% respectively) while, 34.3% and 31.4 % respectively of children in study and control groups were the third born.

Table (3): presents assessment of bowel habits among study and control groups before and after reflexology sessions. As clarified in the table 5.7% only of children had no problem regarding abdominal distention or bloating in each group, that percent amazingly jumped to 57.1% in study group after reflexology sessions. On the other hand, 40.0% of children who had severe problem decreased to 5.7% only in the study group after reflexology sessions. There was statistical significant difference between the two groups ($P=0.00$). The table illustrates also that 8.6% only of children had no problem regarding the amount of gas that passed rectally in each group. After reflexology sessions the percentage increased to 37.1% in the study group. statistically significant difference was observed ($P=0.00$). Concerning less frequent bowel movements, the table reveals that nearly half of children's (45.7%) suffer from severe problem before reflexology sessions. This percentage declined to 8.6% only after reflexology sessions. There was a statistical significant difference ($P=0.00$). As regards oozing liquid stool, this problem was mentioned as severe problem by 20.0 % of children in the study group. After reflexology sessions this percentage decreased to 5.7%. The difference was statistically significant ($P=0.00$). The table shows that the percentage of children who experienced pain with defecation as severe problem before reflexology sessions constituted 45.7%. After reflexology sessions this percentage decreased to 20.0%. The difference was statistically significant ($P=0.00$). As regards passage of small volume of

stool, this problem was mentioned as severe and some problem by 68.6% and 31.4% respectively before reflexology sessions. These percentages changed to 17.1% only to those children who had severe problem and 80.0% to those children who had some problem after reflexology sessions. Again, the difference was statistically significant (P=0.00). As regards unable to pass stool, 62.9% of study group suffered from this problem, the percent changed to 28.6% after reflexology.

Table (4): presents assessment of bowel habits among study and control groups before and after reflexology sessions. Almost three quarters of children (74.3%) had severe level of bowel movement / habits. This percent declined to 20.0% after applying reflexology sessions. On the other hand, 2.9% only of children had mild level in their bowel habits, this percentage jumped to 51.4% after reflexology sessions. The difference was statistically highly significant (P=0.000).

Table (1): Percent Distribution of Characteristics of Mothers of Children with Cerebral Palsy.

Characteristics	Study Group (n=35)		Control Group (n=35)	
	No	%	No	%
Age in years				
▪ 20-	21	60.0%	20	57.1%
▪ 30-	13	37.1%	14	40.0%
▪ 40-50	1	2.8 %	1	2.8 %
Min -Max	24 -42		22 - 40	
Mean ± S.D	29.9 ± 3.8		29.6 ± 5.1	
Level of education				
▪ Illiterate	4	11.4%	6	17.1%
▪ Elementary (Primary / prep school)	8	22.9%	11	31.4%
▪ Secondary school	19	54.3%	16	45.7%
▪ University education	4	11.4%	2	5.7%
Occupation				
▪ Housewives	29	82.9%	23	65.7%
▪ Working	6	17.1%	12	34.3%
Family income				
▪ Enough	18	51.4%	18	51.4%
▪ Not enough	17	48.6%	17	48.6%
Number of children in family				
▪ 1-2	19	54.3%	7	20.0%
▪ 3-4	16	45.7%	28	80.0 %
Residence				
▪ Urban	21	60.0%	22	62.9%
▪ Rural	14	40.0%	13	37.1%

Table (2): Percent Distribution of Characteristics of Children with Cerebral Palsy

Characteristics	Study Group (n=35)		Control Group (n=35)	
	No	%	No	%
Children age				
▪ 2 –	22	62.9%	17	48.6%
▪ 4 – 6 years	13	37.1%	18	51.4%
Min -Max	3- 5.4		3- 6	
Mean ± S.D	3.8 ± 0.75		4.5 ± 0.9	
Gender				
▪ Male	22	62.9%	16	45.7%
▪ Female	13	37.1%	19	54.3%
Birth order				
▪ First	7	20.0%	6	17.1%
▪ Second	16	45.7%	15	42.9%
▪ Third	12	34.3%	11	31.4%
▪ Fourth	0	0.0%	3	8.6%

Table (3): Assessment of Bowel Habits among Study and Control Groups Before and After Reflexology Sessions

	Before reflexology				After reflexology			
	Study Group (n=35)		Control Group (n=35)		Study Group (n=35)		Control Group (n=35)	
	No	%	No	%	No	%	No	%
Abdominal distension or bloating								
No problem	2	5.7%	2	5.7%	20	57.1%	2	5.7%
Some problem	19	54.3%	16	45.7%	13	37.1%	16	45.7%
Severe problem	14	40.0%	17	48.6%	2	5.7%	17	48.6%
	X2 = 0.55 P = 0.76				X2 = 26.88 P = *0.00			
Change in the amount of gas passed rectally								
No problem	3	8.6%	3	8.6%	13	37.1%	3	8.6%
Some problem	16	45.7%	17	48.6%	20	57.1%	17	48.6%
Severe problem	16	45.7%	15	42.9%	2	5.7%	15	42.9%
	X2 = 0.06 P = 0.97				X2 = 16.43 P = *0.00			
Less frequent bowel movements								
No problem	2	5.7%	3	8.6%	4	11.4%	3	8.6%
Some problem	17	48.6%	12	34.3%	28	80.0%	12	34.3%
Severe problem	16	45.7%	20	57.1%	3	8.6%	20	57.1%
	X2 = 1.51 P = 0.47				X2 = 19.11 P = *0.00			
Oozing liquid stool								
No problem	20	57.1%	5	14.3%	21	60.0%	5	14.3%
Some problem	8	22.9%	17	48.6%	12	34.3%	17	48.6%
Severe problem	7	20.0%	13	37.1%	2	5.7%	13	37.1%
	X2 = 14.04 P = *0.00				X2 = 18.78 P = *0.00			
Rectal fullness or pressure								
No problem	0	0.0%	6	17.1%	10	28.6%	6	17.1%
Some problem	21	60.0%	20	57.1%	20	57.1%	20	57.1%
Severe problem	14	40.0%	9	25.7%	5	14.3%	9	25.7%
	X2 = 7.11 P = *0.03				X2 = 2.14 P = 0.34			
Pain with defecation								
No problem	1	2.9%	6	17.1%	3	8.6%	6	17.1%
Some problem	18	51.4%	11	31.4%	25	71.4%	11	31.4%
Severe problem	16	45.7%	18	51.4%	7	20.0%	18	51.4%
	X2 = 5.38 P = 0.07				X2 = 11.28 P = *0.00			
Small volume of stool								
No problem	0	0.0%	1	2.9%	1	2.9%	1	2.9%
Some problem	11	31.4%	14	40.0%	28	80.0%	14	40.0%
Severe problem	24	68.6%	20	57.1%	6	17.1%	20	57.1%
	X2 = 1.72 P = 0.42				X2 = 12.21 P = *0.00			
Unable to pass stool								
No problem	2	5.7%	1	2.9%	5	14.3%	1	2.9%
Some problem	11	31.4%	17	48.6%	20	57.1%	17	48.6%
Severe problem	22	62.9%	17	48.6%	10	28.6%	17	48.6%
	X2 = 2.26 P = 0.32				X2 = 4.73 P = 0.09			

χ^2 : Chi-Square Test * Significant at P ≤ 0. 05

denotes that activation of the parasympathetic system as a result of bodily relaxation in addition to stimulation of the intestinal reflex points contributed to increased intestinal functions. Furthermore, by balancing homeostasis and wellness and providing proper nutrition for the children may have contributed to improving intestinal functions.

The findings of Elbasan & Bezgin, 2018 was congruent with the findings of the current study as the authors conducted a study about the effects of reflexology on constipation and motor functions in children with Cerebral Palsy and stated that reflexology may be considered as additional treatment for children with CP who suffer from constipation. Additionally, Bishop et al., 2003 findings are consistent with the present study findings where they revealed that applying 30 minutes of reflexology over 6 sessions was effective in improving intestinal function. Moreover, Woodward et al., 2010 who applied reflexology sessions for 6 weeks and reported that the defecation frequency increased and constipation decreased among children with Cerebral Palsy after applying these sessions. Furthermore, Abbasi et al., 2019 and Seyyedrafsoli, 2016 who studied the effectiveness of reflexology in children with cerebral palsy with constipation and they found that constipation severity decreased among one third of children after receiving reflexology.

The findings of previous studies revealed that using reflexology could help nurses in providing effective constipation management to children with CP and minimizing adverse effects associated with constipation medications. So, reflexology could be added to other methods of cerebral palsy treatment (Duymaz, 2019)

V. Conclusion & Recommendations

Conclusion

Based upon the findings of the current study it is concluded that children with cerebral palsy who received reflexology exhibit improvement in their bowel functions.

Recommendations

- 1-Combination between medical and routine nursing care of children with Cerebral Palsy and reflexology technique should be considered in the policy of the physical therapy unit.
- 2- Childrens' hospital nurses of physical therapy unit should attend training courses and workshops regarding reflexology to gain knowledge about importance of reflexology and how to practice it effectively to children who suffer from cerebral palsy.
- 3- Physical therapy unit could offer clear booklets and CDs regarding reflexology to guide mothers to perform it successfully for their children at home.
- 4- Mothers of children with Cerebral Palsy should be trained by specialist trained nurses in reflexology to practice it to their children at home.
- 5- Replication of the study for longer period of time with increasing reflexology sessions numbers.

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