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Original Article

TELEPHONE COACHING FOR HOME EXERCISE EFFICIENCY IN CHILDREN WITH OBSTETRIC BRACHIAL PLEXUS PALSY

Ezgi Tarhan Altınok[1], Özgün Uysal[1*], Tüzün Fırat[1]

[1]Physical Therapy and Rehabilitation Faculty, Hacettepe University, Ankara, Turkey.

*Corresponding author e-mail: uysalozgun@gmail.com

ABSTRACT

Objectives: Home exercise programs are widely used for the treatment of children with Obstetric Brachial Plexus Palsy (OBPP). Our objective was to investigate the effects of telephone coaching on the home exercise program's adherence and efficiency.
Methods: Thirty-three children with OBPP and their parents were quasi-randomized into two groups; control and study groups. The parents in both the groups were informed about the OBPP, taught home exercises, given exercise diaries and regularly received face-to-face coaching with six-week intervals for 12 week period. Study group, consisting of 17 children, was called weekly for motivating to adhere exercise program and answering any questions about exercises or OBPP. Also, the study group was allowed to call the researchers at any time throughout the study. To measure telephone coaching's effects, we used Intrinsic Motivation Inventory to assess parental motivation, an exercise diary for exercise adherence, and Gilbert and Raimondi Scores and Active Movement Scores for clinical progress.
Results: As a result of our 12-week follow-up, both groups had similar improvements in our outcome measurements. Additional weekly telephone coaching did not provide improvement to the 6-week face-to-face follow-ups in OBPP.
Discussion: In the rehabilitation of OBPP, weekly telephone coaching did not provide any significant improvements to home exercise efficiency.
Keywords: exercise therapy, mentoring, motivation, neonatal brachial plexus palsy.

ÖZET

Amaç: Obstetrik Brakiyal Pleksus Felci (OBPF) olan çocukların tedavisinde ev egzersiz programları yaygın olarak kullanılmaktadır. Amacımız, telefonla yapılan rehberliğin ev egzersiz programına uyuma ve programın etkililiği üzerindeki etkilerini araştırmaktı.
Yöntemler: OBPF olan 33 çocuk ve onların ebeveynleri, kontrol ve çalışma grupları olmak üzere iki gruba kısmi rasgeleleştirme ile ayrıldı. Her iki gruptaki ebeveynlere OBPF hakkında bilgi verildi, evde yapılabilecek egzersizler öğretildi, egzersiz günlükleri verildi ve 12 haftalık bir dönem boyunca altı haftalık aralıklarla yüzyüze rehberlik alarak düzenli olarak eğitildiler. Çalışma grubu, 17 çocuktan oluşmaktaydı ve haftalık olarak aranarak egzersiz programına uyumlarını motive etmek ve egzersiz veya OBPF ile ilgili herhangi bir soruyu yanıtlamak amacıyla iletişim kuruldu. Ayrıca, çalışma grubuna, çalışma süresince istedikleri herhangi bir zamanda araştırmacılara ulaşma izni verildi. Telefon rehberliğinin etkilerini ölçmek amacıyla ebeveyn motivasyonunu değerlendirmek için İçsel Motivasyon Envanteri, egzersiz uyumunu değerlendirmek için egzersiz günlüğü ve klinik ilerlemeyi değerlendirmek için Gilbert ve Raimondi Skorları ile Aktif Hareket Skorları kullanıldı.
Sonuçlar: 12 haftalık takibimizin sonucunda her iki grup da ölçüm sonuçlarımızda benzer iyileşmeler gösterdi. OBPF'deki altı haftalık yüzyüze takiplere ek yapılan haftalık telefon rehberliği ekstra bir iyileşme sağlamadı.
Tartışma: OBPF rehabilitasyonunda, haftalık telefon rehberliği ev egzersiz verimliliğinde önemli bir iyileşme sağlamadı.
Anahtar Kelimeler: egzersiz terapisi, mentorluk, motivasyon, neonatal brakiyal pleksus felci.

INTRODUCTION

Obstetrical Brachial Plexus Palsy (OBPP) is defined as a condition that includes unilateral or bilateral disruption of brachial plexus C5-T1, which sometimes includes C4 and T2, roots, divisions, cords, and branches, and presents different levels of paralysis and secondary complications (1). OBPP is characterized by weak or flaccid upper extremity and limited mobility of joints, depending on affected root numbers and levels (2). Conservative approaches are important in the treatment of OBPP. In physiotherapy, it is aimed to prevent joint contractures and muscle atrophies and gain function which is supported through a home exercise program (3). The home exercise program generally includes tactile stimulation; supporting the baby's normal motor development with exercises; active and passive stretching; and joint mobilizations (4). For efficiency of a home exercise program, adherence is important. However, adherence to a home exercise program can be challenging. To overcome this problem, several methods have been used: such as an educational workshop (5), a family day (6), and digital video disks (DVD) (7, 8).

Telephone-based interventions have been used for behavioral changes in programs, such as smoking cessation, diabetes, and weight loss (9). It is considered to be low cost and an easily organized intervention and also is useful to exchange information and provide health education; to reinforce the education already given; emphasize adherence; assess potential problems; monitor any deterioration of symptoms; and coordinate communication between patients and physicians (10). Although the home exercise program is frequently used in OBPP, the effect of telephone coaching on the adherence to an exercise program and movement scores are unknown.

Therefore, this controlled study was planned to examine whether weekly telephone coaching could not only increase parents' motivation and adherence to the exercise program, but also improve the child's movement scores on the OBPP.

METHODS

Design

A prospective controlled study with 12 weeks of follow-up was conducted in Hacettepe University, Pyhsical Therapy and Rehabilitation Department, Hand Surgery Rehabilitation Unit. The ethics board of the university approved the study with GO 16/313-46 approval number. The children were divided into two groups by a quasi-randomized design using the order they came into the clinic: a home exercise group consisting of 16 children aged 3.06±2.52 months, and a home exercise group with regular telephone coaching consisting of 17 children aged 1.88±1.98 months. All the exercise programs and additional motivations were given by the first researcher, who had 6 years of clinical experience on OBPP. The children and their mothers were evaluated on their first appointment, and at the sixth and twelfth week. The children were assessed using Active Movements Scale (AMS), Gilbert-Raimondi Shoulder evaluation, Gilbert Elbow evaluation, Raimondi Hand evaluation by the third researcher, who had 22 years of clinical experience on OBPP and was blinded to the groups. The mothers were assessed with Intrinsic Motivation Scale (IMI) and an exercise diary for assessing the adherence by the first researcher. The flow of participants through the study is presented in figure 1.

Patients and Participants

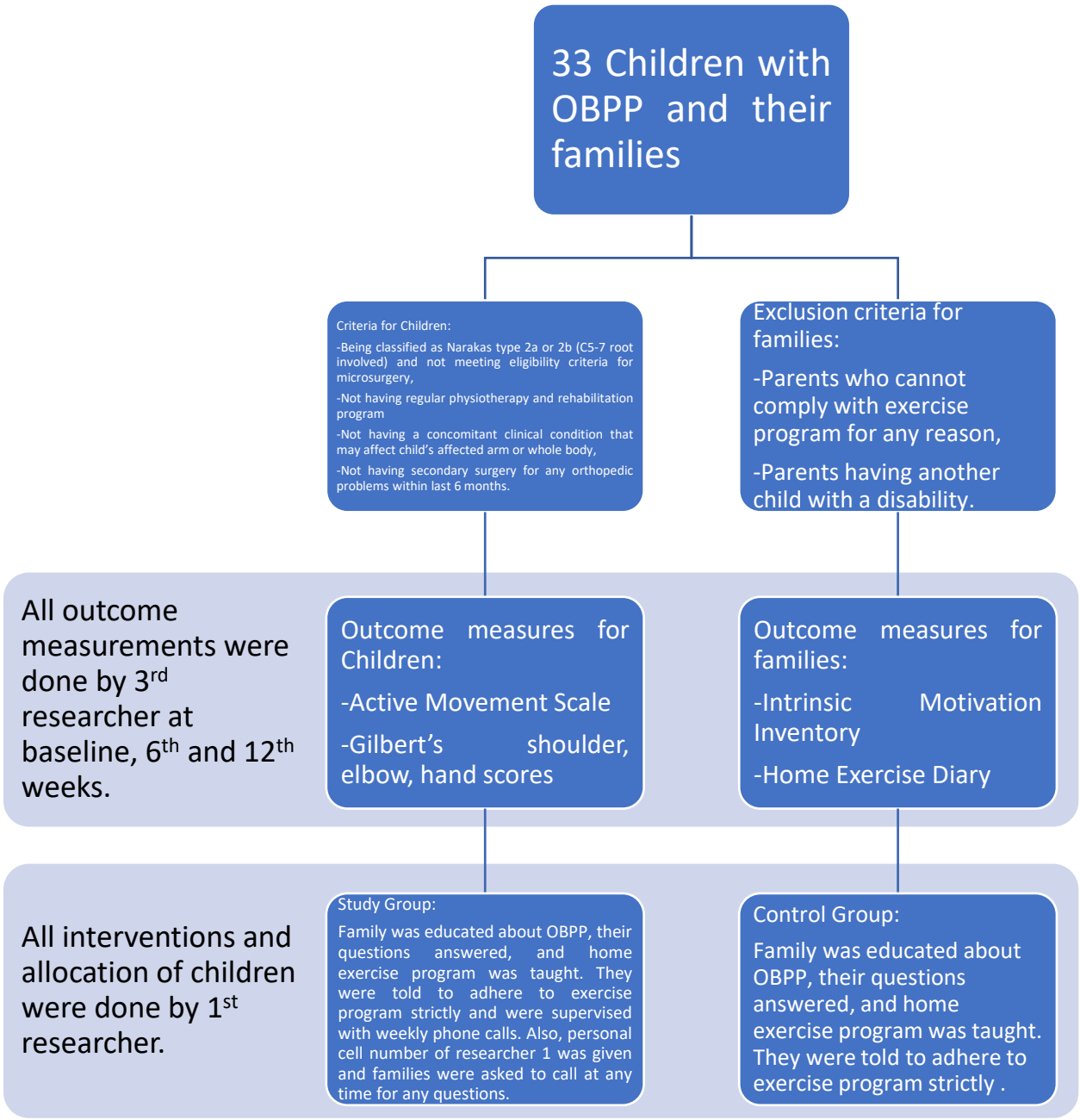
We included 33 children with OBPP, aged 0-18 months, who were referred to our clinic for physical therapy program by a hand surgeon. Informed consent from parents were taken prior to the study. Our inclusion criteria were:

- Being classified as Narakas type 2a or 2b, which is having C5-7 root involved (11) and not meeting eligibility criteria for microsurgery,
- Not having a regular physiotherapy and rehabilitation program: reasons including but not limited to lower socioeconomic status, living in urban areas which have limited access to physiotherapy, etc.

Exclusion criteria for children were:

- Having a concomitant clinical condition such as upper motor neuron lesion that may affect children's affected arm or whole body,
- Having secondary surgery for any orthopedic problems within the last 6 months.
- Exclusion criteria for families were:

Fig. 1 Flow diagram for the current study



- Mothers who could not comply with the exercise program for any reason,
- Mothers having another child with a disability.

Intervention

Guidance on the Disease

Mothers in both groups were well informed about OBPP in a face to face meeting on the anatomy of the brachial plexus, which was consisting of nerve roots, functions of roots, normal motor development for the child; OBPP's definition, mechanism of injury, types, and progression; problems which may be encountered in the normal development process, i.e. problems in turning, grasping, crawling; and aims and effects of the home exercise program, which were to keep muscles and joints flexible and support normal motor development (11). Both groups' mothers' questions were answered at routine controls at the 6th and 12th weeks and children received the home exercise program customized to the clinical needs and developmental stage of their children, which were customized by the third researcher and set by the first researcher.

In addition to these, for the study group, the first researcher called the mothers weekly to answer their questions, check the adherence to the given program and motivate and supervise the exercises. Additionally, mothers could call researchers at any time of the day.

Home Exercise Program

The 12-week home exercise program consisted of repeat-based and time-based exercises. The repeat-based exercises were: passive shoulder movements while scapulothoracic joint fixated (12); glenohumeral joint tractions combined with internal and external rotations; anterior/posterior mobilizations of the glenohumeral joint, were given to prevent glenohumeral joint capsule tightness; and passive elbow joint stretch with one hand fixating the radius head (13). The time-based exercises were classical massage of the whole limb and exercises for tactile stimulation, which were touching with different materials such as wool, cotton, silk, etc., applying vibration with an electrical toothbrush handle, shifting weight on to forearm and hand in crawling position. Also, brachial plexus orthosis during night time, worn up to 6 hours, and elbow orthosis for elbow contracture were included. Additionally, families were asked to keep the affected arm in the child's field of view to keep visual feedback of the arm during all exercises. To keep a track of home exercises, each family was asked to fill in an exercise diary and bring it to every check-up. All mothers were encouraged to perform exercises strictly.

Outcome Measurements

Active Movement Scale

AMS was developed for the children with OBPP to investigate the motor performance of the denervated upper extremity and to evaluate 15 motions in the upper extremity. The scoring system uses a 7-point scale for movement, based on the percentage of active movement observed considering the full range of motion for each joint. 0-4 points are given for the movement of the joint in the gravity minimized position. 5-7 points are given based on performing activities against gravity. In this study, shoulder flexion, abduction, internal and external rotation; elbow flexion and extension; forearm supination and pronation; wrist flexion, and extension movements were evaluated with AMS (Interrater k=0.66, intrarater k=0.85) (14).

Gilbert and Raimondi's Scales

Gilbert and Tassin (1987) modified the Medical Research Council (MRC) grading system for use on infants and non-cooperative patients. In this system, muscle groups take a score between 0 to 3 (15). This is also used in OBPP. Gilbert and Raimondi's scale was used for the shoulder, while Gilbert's scale was used for elbow and Raimondi's scale was used for hand functions (16).

Intrinsic Motivation Inventory

To evaluate the mother's motivation level, the authors used IMI which was developed by Ryan in 1982 and translated by Çalışkur and Demirhan in 2013 (17, 18). This questionnaire consists of seven subscales with 45 total questions which have Likert type answers (17). From 0 to 7, all questions are rated from "strongly disagree" to "strongly agree", with point 4 being the neutral score. While scores higher than 4 mean a positive motivation, lower ones mean a negative motivation. Each item is scored and summed up to make up the total score (17, 18). Ryan has stated that the inventory could be modified depending on the needs; thus, we have used a shorter version of IMI with a total of 21 questions. Therefore, in our study, a score above 84 would be accepted as positively motivated.

Home Exercise Diary and Adherence

In the home exercise diary, each exercise is described in colloquial speech; and suggested time, duration, and repeats were written down. Before giving the diaries out to the families, those exercises that were not required for the children were blacked out. Exercises were standardized for both groups as three times a day, 15 repeats for each exercise, and 15 minutes for sensory input. To determine the degree of adherence to the exercise program, the authors calculated the family's achieved number of exercises using the formula given below and divided it by the maximum, which were our recommended numbers.

For the repeat-based exercises= repeats × sets × days,

For the time-based exercises= duration × repeats × sets × days.

Data Analysis

Statistical analyses were performed using the SPSS 20 (IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp). The variables were investigated using visual and analytical methods to determine whether or not they are normally distributed. Since the variables were not normally distributed, nonparametric tests were conducted. Differences between the groups' improvements were analyzed with Mann Whitney U Test. For analyzing improvements between groups, the differences between the last and the first values were calculated and the differences were compared using Mann Whitney U Test. Since three assessments were performed within each group, Friedman Test was used. The significance level was set at $p<0.05$.

RESULTS

Between February 2017 and September 2018, 33 children with OBPP and their families were recruited to our study. They were quasi-randomized to control, consisting of 16 children and study groups, consisting of 17 children. Descriptive information of the study group and the control group is given in Table 1.

Table 1. Baseline demographic data of the groups.

	Study Group (n=16)	Control Group (n=17)
Type (2a/2b)*	15 (94%) / 1 (6%)	14 (82%) / 3 (18%)
Birth Length (cm)	50.75±3.53	51.94±1.09
Birth Weight (gr)	3811±477.89	3826.76±384.79

Values are given as Mean ± Standard Deviation. *Frequency. cm: centimeter. gr: gram

Although there were significant improvements in both groups for all measured outcomes, mean difference estimates were too low to show clinical improvement ($p>0.05$). IMI scores were similar between the groups in the 6th week, and at the 12th week favored the study group, but the mean difference estimate was too imprecise to clearly show the effect was beneficial (%95 CI -5.77 to 11.89). This meant informing and supervising mothers via weekly phone calls did not have a significant effect on motivation.

Mean difference for exercise diary adherence was low throughout the study period for all accounts except the total number of exercises. At the 12th week, the mean difference was 2399.3 (95% CI -1975.4 to 6773.9) in favor of the study group. The results are summarized in Table 2.

DISCUSSION

In this study, we aimed to investigate the effect of telephone coaching on mother's motivation and adherence, and child's movement scores. We found that the telephone coaching was ineffective for increasing mother's adherence and motivation, and child's movement scores.

The telephone coaching mainly aimed to reinforce the education already given or provide additional education, emphasize adherence, assess potential problems, monitor any deterioration of symptoms, and coordinate communication between patients and health professionals (19). There are several studies that telephone coaching was used in the follow-up processes of children with disease including obesity, diabetes, and asthma (20). Several studies have stated that telephone coaching was effective to support behavioral change. Bohlin et al. (9) suggested that after an initial weight loss treatment, usual face-to-face visits could be substituted with more frequent telephone coaching sessions in childhood obesity treatment. Although the improvements between the face-to-face group and telephone coaching group were similar, i.e. preserving the body weight, they found the telephone coaching to be sufficient for children aged between 5-14 years. In the study of Garbutt et al. (21), asthma morbidity reduced in children between 3-12 years with telephone-based peer coaching for parents.

Expecting a healthy child during pregnancy and having a difficult delivery leads to a shocking experience in OBPP. Several studies have shown that the quality of life, mood state, and psychological condition of the mothers are affected due to traumatic birth experience (22).

Table 2. Mean (SD) of groups, mean (SD) difference within groups, and mean (95% CI) difference between groups for the clinical outcomes.

Outcome			Groups						Within-group Difference				Between-group difference	
			Week 0		Week 6		Week 12		Week 6 minus week 0		Week 12 minus week 0		Week 6 minus week 0	Week 12 minus week 0
			Study (n=17)	Con (n=16)	Study (n=17)	Con (n=16)	Study (n=17)	Con (n=16)	Study	Con	Study	Con	Study minus con	Study Minus con
AMS score			33 (10.12)	29.06 (6.78)	41.56 (9.85)	37.59 (8.54)	43.19 (9.77)	39.94 (7.73)	8.56 (8.68)	8.53 (7.93)	10.19 (9.38)	10.88 (7.29)	-0.63 (-5.2 to 5.1)	-0.81 (-5.9 to 4.3)
Gilbert *	Shoulder		2 (0-4)	1 (0-4)	3 (1-5)	2 (1-4)	3 (1-5)	3 (2-4)	1.13 (0.72)	1.11 (0.99)	1.5 (0.73)	1.65 (0.93)	0 (-0.75 to 0.75)	-0.19 (-0.71 to 0.34)
	Elbow	Flexion	1 (1-3)	1 (1-3)	3 (1-3)	2 (1-3)	3 (1-3)	3 (1-3)	0.88 (0.81)	0.71 (0.85)	1.19 (0.91)	1.18 (1.01)	0.19 (-0.49 to 87)	0 (-0.78 to 0.78)
		Extension	2 (2-2)	2 (1-2)	2 (2-2)	2 (2-2)	2 (1-2)	2 (2-2)	0	0.12 (0.33)	-0.06 (0.25)	0.12 (0.33)	-0.13 (-0.31 to 0.06)	-0.19 (-0.4 to 0.03)
		Extension Deficit	0 (0-0)	0 (0-1)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-1)	-2 (0)	-1.88 (0.33)	-2 (0)	-1.82 (0.39)	-0.13 (-0.31 to 0.06)	-0.19 (-0.4 to 0.03)
Raimondi Hand*			2 (2-3)	2 (1-3)	3 (2-4)	3 (2-4)	3 (2-4)	3 (2-4)	0.75 (0.77)	0.35 (0.61)	0.88 (0.62)	0.71 (0.59)	0.38 (-0.17 to 0.92)	0.13 (-0.35 to 0.6)
IMI scores			123.2 (15.6)	119.5 (14.2)	123.4 (15.3)	120 (18.6)	128.2 (12.2)	121.1 (17.9)	0.19 (5.45)	0.53 (7.4)	5 (10.1)	1.65 (8.44)	0.06 (-5.84 to 5.96)	3.06 (-5.77 to 11.89)
Repetition (%)			N/A	N/A	79.33 (21.3)	77 (24.54)	76.29 (16.24)	70.55 (23.7)	79.33 (21.3)	77 (24.54)	77.81 (15.36)	73.78 (21.16)	3.21 (-7.36 to 13.78)	3.86 (-6.03 to 13.74)
Sensory duration (%)			N/A	N/A	77.9 (22.96)	84.01 (16.24)	79.6 (23.51)	82.27 (14.91)	77.9 (22.96)	84.01 (16.24)	78.75 (20.33)	83.14 (13.95)	-5.26 (-18.51 to 7.98)	-4.63 (-17.72 to 8.46)
Orthosis duration (%)			N/A	N/A	80.84 (26.46)	87.93 (18.44)	87.81 (16.92)	86.53 (18.45)	80.84 (26.46)	87.93 (18.44)	86.54 (17.73)	91.29 (10.48)	N/A**	N/A**
Total number of exercises			N/A	N/A	13160.3 (3683.7)	13409.4 (4428.6)	13989.7 (2848.2)	11306.8 (4351.1)	13160.3 (3683.7)	13409.4 (4428.6)	27149.9 (5392.2)	24716.2 (7544.8)	-116.94 (-3135.4 to 2900.6)	2399.3 (-1975.4 to 6773.9)

*values are given as median (min-max).
**Orthosis CI could not be calculated because only 6 of study and 3 of control group used orthosis.

Because of proven positive effects, we expected that children with OBPP and their mothers would benefit from the telephone coaching, consisting of regular motivation, support, and communication. However, we found that the telephone coaching was ineffective in these regards.

There may be many reasons for our finding. Firstly, our population has consisted of Narakas type 2 children, which have a good prognosis within the first 18 months. We used an extensive treatment program with detailed information and exercises. The good prognosis and the extensive treatment protocol might reduce the parents' need for expert support, which, in this case, was telephone coaching. The mothers of the children with Narakas type 3 or 4, who had a worse clinical prognosis, might need more support by experts, or in older children, where deformity is developed, telephone coaching may be more effective.

Secondly, baseline IMI scores showed that both groups' mothers were motivated (17). There is no previous study investigating the relationship between motivation and telephone coaching. There could be an inverse relationship between motivation and the need for coaching: being already motivated, might have a detrimental effect on telephone coaching. As previously mentioned, our families have undergone shocking experiences, which we assumed would affect their motivation. But, our standard extensive information, which was given in the baseline to both groups, might have satisfied families' need for knowledge and increased mother's baseline motivation.

Thirdly, telephone coaching, as a method, might have been inefficient, when the parents had questions about exercise execution such as hand positions, traction direction, etc. In the literature, participants reported the telephone coaching to be useful, as they could ask questions regarding caregivers and resolve their doubts about the provision of care. This emphasized the use of a telephone follow-up to evaluate plans and offer caregivers reminders about self-care(23). A more advanced way involving visual communication could be more suitable to satisfy parent's need for specific information. Leow and Chan (19) showed that caregivers of persons with cancer favored the use of video rather than telephone calls as a psychoeducational intervention. They liked the visual and audio aspects of the video, which enabled them to have a better understanding of themselves, of the caregiver experience, and the plight of patients. In the future, video approaches may be preferred over telephone coaching.

Lastly, our cultural structure might also have influenced this matter. In Turkish culture, mothers undertake too many responsibilities including doing chores and taking care of the children. Because of these responsibilities, mothers are forced to stop working and lose leisure time (24). Having no time besides house chores and childcare could have overwhelmed the mothers, and in return, the motivation via telephone coaching calls might not have been sufficient.

Our study has consisted only of Narakas type 2 patients. Telephone coaching could be better for children with Narakas type 3 and 4 and their mothers, as they are more limiting and demanding in the clinical perspective. The study sample was relatively young, so it would be harder to generalize these results to all OBPP populations. A telecommunication method with visual feedback could provide better results.

CONCLUSION

In conclusion, managing with a home exercise program and coaching with six weeks intervals was enough to elicit improvements in children with Narakas type 2 OBPP. Additional telephone coaching did not make any difference. The effects of telephone coaching on older children with OBPP and their mothers should be investigated. Also, in future studies, visual feedback provided through video conferences may have a better effect on parents' adherence to exercise programs.

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Ethics approval: This study is approved by our Institutional Ethics review board.

Consent to participate: Informed consent from parents of the children were taken prior to the study.

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