FİZİKSEL TIP VE REHABİLİTASYON BİLİMLERİ DERGİSİ
Journal of Physical Medicine and Rehabilitation Sciences J PMR Sci. 2021;24(2):107-13

ORİJİNAL ARAŞTIRMA ORIGINAL RESEARCH

DOI: 10.31609/jpmrs.2020-79134

Effects of Education and Exercise Program for Pain and Functional Capacity on Low Back Pain in Mothers of Children with Cerebral Palsy

Serebral Palsili Çocukların Annelerinde Ağrı ve Fonksiyonel Kapasiteye Yönelik Eğitim ve Egzersiz Programının Bel Ağrısına Etkisi

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ABSTRACT Objective: Aim of this cross-sectional study is to evaluate low back pain (LBP) frequency in mothers of children with cerebral palsy (CP) and effects of education and exercise programs on functional capacity and pain in those with LBP. **Material and Methods:** Mothers of 164 children with CP were included in the study. Gross Motor Function Classification System was used to classify severity of CP. Nottingham Health Profile (NHP) and Beck Depression Inventory were applied to all of the mothers. Severity of LBP was assessed with NRS (Numeric Rating Scale) (0-10). Oswestry Disability Index (ODI) and Leeds Assessment of Neuropathic Symptoms and Signs were applied to the cases with LBP. Low back protection tecniques and education programme including exercises were given to mothers with LBP.Three months later, these cases were assessed again with NRS and ODI. **Results:** Seventy eight of 164 mothers had low back pain. NHP pain, NHP sleep and NHP physical activity scores were statistically higher in mothers with LBP (p=0.001, p=0.049, p=0.001, respectively). NRS and ODI scores of the 68 cases who followed the recomendations and exercised were compared at baseline and 3 months later. There was a significant improvement in NRS and ODI scores in the third month (p<0.001, p<0.001, respectively). **Conclusion:** LBP prevelance is high in mothers of children with CP. Mothers benefit from an education and proper exercise program, their functional limitations decrease and quality of life improves.

Keywords: Cerebral palsy; exercise; low back pain

ÖZET Amaç: Bu kesitsel çalışmanın amacı, serebral palsili (SP) çocukların annelerinde bel ağrısı sıklığını ve bel ağrısı olanlarda eğitim ve egzersiz programlarının fonksiyonel kapasite ve ağrı üzerine etkilerini değerlendirmektir. **Gereç ve Yöntemler:** Çalışmaya, SP'li 164 çocuğun anneleri dâhil edildi. SP şiddetini sınıflandırmak için Kaba Motor Fonksiyon Sınıflandırma Sistemi kullanıldı. Annelere Nottingham Sağlık Profili ve Beck Depresyon Envanteri uygulandı. Bel ağrısı şiddeti Sayısal Derecelendirme Ölçeği (SDÖ) (0-10) ile değerlendirildi. Bel ağrısı olanlara Oswesty Disabilite İndeksi (ODİ) ve Leeds Nöropatik Semptom ve Bulgu Değerlendirmesi uygulandı. Bel ağrısı olan annelere bel koruma teknikleri ve egzersiz içeren eğitim programı verildi. Bu olgular, 3 ay sonra Sayısal Derecelendirme Ölçeği ve ODİ ile tekrar değerlendirildi. **Bulgular:** Yüz altmış dört annenin 78'inde bel ağrısı vardı. Bel ağrısı olan annelerde, NSP ağrı, uyku ve fiziksel aktivite skorları istatistiksel olarak daha yüksekti (p=0,001, p=0,049, p=0,001). Önerilere uyan ve egzersiz yapan 68 olgunun, başlangıç ve 3 ay sonra SDÖ ve ODİ puanları karşılaştırıldı. Üçüncü ayda SDÖ ve ODİ skorlarında anlamlı düzelme saptandı (sırasıyla p<0,001, p<0,001). **Sonuç:** SP'li çocukların annelerinde, bel ağrısı görülme sıklığı yüksektir. Anneler, eğitim ve uygun egzersiz programından yararlanır, fonksiyonel sınırlılıkları azalır ve yaşam kaliteleri artar.

Anahtar Kelimeler: Serebral palsi; egzersiz; bel ağrısı

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Peer review under responsibility of Journal of Physical Medicine and Rehabilitation Science.

Received: 28 Oct 2020 ***Received in revised form:*** 02 Feb 2021 ***Accepted:*** 07 Feb 2021 ***Available online:*** 13 Feb 2021

Low back pain (LBP) is a common disorder especially in developed countries and causes functional disability and labour loss. Along with its negative effect on quality of life, LBP is an important health problem with high cost to the public. Lifelong prevalance is reported to be 60-85% and incidence is 15% in adult population at follow-up studies.[1,2] Regional mechanic disorders are the most common causes of LBP. Inappropriate static and dynamic posture, incorrect body mechanics, decrease in flexibility and strength of abdominal and back muscles, decrease in cardiovascular endurance, smoking, vibration and poor working conditions are known as causes of LBP.[3,4] Physical endurance and functional capacity decrease and quality of life is negatively effected because of pain, spasm, decrease of muscle strenght and disturbed posture in people with LBP.

Because workforce loss increases, the treatment time is long and cost of the treatment is high, a multidisciplinary approach becomes crucial. It is known that specific dynamic low back exercises, where active patient participation is neccesary, back schools and fitness programs are effective on the prevention and treatment of LBP.[5]

Cerebral palsy (CP) is among the most frequent causes of disability of childhood. Motor and mental functions are affected and due to other comorbid problems, there can be complex limitations in self care activities in CP cases. For this reason, they need close and long-term care.[6] They need assistance to do daily activities and for movement as well.[7] Their parents hold child for long duration and exert themselves in different awkward posture and these mechanic risk factors may cause development of musculoskeletal disorders. There are many studies suggesting that the mother, assuming primary care of the child, is physically and psychologically affected. Tong et al. suggested that psychology of the caregivers of children is related with LBP and physiologic disorders, and repetetive physical pressure can increase the incidence of LBP.[8] Özgüler et al. indicated that psychosomatic problems and carrying load are often related with LBP.[9] Terzi et al. reported that age and functional level of the child with CP and depression level of the mother are independent risk factors for musculosceletal system pain.[10]

Aim of this study was to evaluate effectivenes of education and exercise program on functional capacity and pain in mothers of children with CP who have LBP.

MATERIAL AND METHODS

STUDY DESIGN

This study was conducted at Ankara Oncology Training and Research Hospital, with a capacity of 200 beds, which is one of the largest national rehabilitation center in Turkey. Patients with CP constitute approximately one fourth of the total patient population. A cross-sectional study was performed. The study was conducted according to the principles of the Helsinki Declaration.The study was approved by the local ethics committee and consent of the participants was obtained prior to the study.

PARTICIPANTS

Mothers of 164 children with CP were included in the study. Mothers who had only one child with CP and who were responsible for the care of the child, and also mothers of children with CP who received an inpatient rehabilitation program were included in the study.

Cases with inflammatory LBP, with a history of metabolic, endocrine, infectious, chronic and systemic diseases, with a history of lumbar disc herniation operation, with acute LBP and presence of neurologic deficits were excluded from the study.

OUTCOME MEASURES

Age, education, height, weight and body mass index (BMI) (kg/m²) of mothers and children, number of children, occupation, presence of LBP of mothers were recorded. Each child was classified with Gross Motor Function Classification System (GMFCS) for CP severity. GMFCS is a standardized measurement which classifies gross motor function in CP. While children at first level are quite independent, those at fifth level are fully dependent (Level 1-2: mild, Level-3: modarete, Level 4-: severe).[11]

Severity of LBP was assesed with NRS (Numeric Rating Scale 0-10).[12] Nottingham Health Profile (NHP) was used to assess the quality of life of

the mothers.[13,14] Beck Depression Inventory (BDI) was used to assess mood state disorders of the mothers.[15] Oswestry Disability Index (ODI) and Leeds Assessment of Neuropathic Symptoms and Signs (LANSS) were applied to the mothers with LBP.[16-18]

PROCEDURE

An education and exercise program for LBP was created for mothers. This education program was administered by a physiotherapist. Education program included the anatomy of spine, biomechanics, ergonomics, risk factors of LBP, lumbar proctection techniques, straight posture, lifting weight correctly, proper positions which will not assert pressure while transfering and helping children during rehabilitation courses. The content of the education program is given in Table 1).[19]

Exercise program was administered by the same physiotherapist. Each session started with 5 min warm up, followed by 20 min partial crunches, sit-ups, press-up back extension, mobilisation, knee to chest. pelvic tilt, dorsal hamstring streching, and cat-camel posture. The strength training focused on the deep abdominal stabilization muscles (internal oblique and the transverse abdominal muscle), pelvic floor and back muscles. The last 5 min included stretching, relaxation exercices. It was recommended that mothers should pay attention to do exercises with at least 10 repeats and 2 times daily. Written documents were given to the mothers about exercises and education issues.

A weekly phone call was made with all mothers and it was questioned whether they did their exercises in accordance with the training program. At the end of three months, NRS ODI and LANSS were repeated during face-to-face interview and LBP was evaluated.

STATISTICAL ANALYSIS

The Statistical Package for the Social Sciences (IBM, SPSS 15) version was used for data analyses. Descriptive analysis was performed for socio-demographical data. The statistical results were presented as the mean±standard deviation for parametric variables and as frequency (percantage) for categorical variables. Student-t test was used for comparison of independent groups. Mann-Whitney U test was used for comparison of independent groups and Wilcoxon test was used for dependent groups. The significance level was accepted as $p<0.05$. Pearson correlation analysis was used for relation between mother-child age, BMI, and NHP subgroups.

RESULTS

Demographic charasteristics of mothers and children with CP are given in Table 2. There were 78 mothers

TABLE 1: Content of educational intervention.

Part	Content
First Part	Epidemiology of musculoskeletal disorders,
	Individual factors associated with musculoskeletal disorders
	The relationship between job and musculoskeletal disorders, high-risk occupations
	The impact of lifestyle in musculoskeletal disorders
	The importance and necessity of self-care in preventing and reducing musculoskeletal disorders
	Costs of musculoskeletal disorders,
Second Part:	Physiology and anatomy of the spine,
	Types and etiology of LBP,
	The results of posture abnormalities
Third Part:	Lumbar protection techniques,
	Maintaning proper body posture (sleeping, sitting, driving, standing and walking)
	Proper techniques for picking up objects and transporting patients,
Forth Part:	Exercise for LBP

LBP: Low back pain.

TABLE 2: Demographic characteristics of cases.

n=164	
Mother age (year±SD)	33.94±6.51
BMI (kg/m²±SD)	26.81±5.48
Low back pain	
Yes n(%)	78 (47.56%)
No n(%)	86 (52.44%)
Education	
Non –literate n(%)	6 (3.7%)
Primary school n(%)	98 (59.8%)
Middle school n(%)	28 (17.1%)
High school n(%)	26 (15.9%)
University n(%)	6 (3.7%)
Occupation	
Housewife n(%)	158 (96.34%)
Nurse n(%)	2 (1.22%)
Secretary n(%)	2 (1.22%)
Worker n(%)	2 (1.22%)
Number of children (mean±SD)	2.33±1.25
Age of child (year±SD)	7.63±3.42
BMI of child (kg/m²±SD)	16.45±3.14
GMFCS	
Level I	4 (2.4%)
Level II	34 (20.7%)
Level III	48 (29.2%)
Level IV	54 (32.9%)
Level V	24 (14.6%)

SD: Standard deviation; **BMI:** Body mass index;
GMFCS: Gross Motor Function Classification System.

with LBP and 86 mothers without LBP. Ten of 78 mothers with LBP were excluded from the study because they did not apply the exercise program in the 3rd month evaluation. The flow-chart of the study is shown in Figure 1.

As regards GMFCS levels of children, there was no statistical significance between the cases with and without LBP (p=0.412). When cases with and without LBP were compared with regard to NHP scores, NHP pain, NHP sleep and NHP physical activity scores were statistically high in cases with LBP (respectively p=0.001, p=0.016, p=0.001), respectively (Table 3).

NRS and ODI scores of 68 compliant patients (who followed the recomendations and exercised) at the initial and third month were compared. There was a significant improvement in NRS and ODI scores in the third month evaluation (respectively p<0.001, p<0.001). There was an improvement in LANSS scores of patients with LBP at the third month

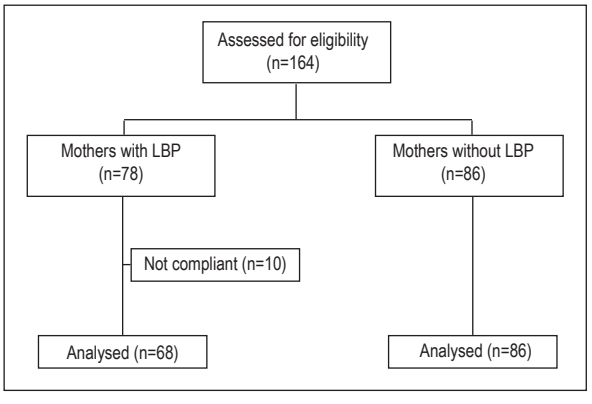

FIGURE 1: The flow-chart of the study.
LBP: Low back pain.

TABLE 3: Comparison of parameters between mothers with and without low back pain.

Parameters	Low back pain+(n:78)	Low back pain-(n:86)	p value
Age (mean±SD)	33.97±5.8	33.92±7.01	0.971
BMI of mother (mean±SD)	26.76±5.41	26.84±5.58	0.945
BMI of children (mean±SD)	16.24±3.40	16.61±2.97	0.060
BDI (mean±SD)	12.32±8.14	10.35±8.15	0.284
NHP energy (mean±SD)	58.80±38.54	46.31±35.62	0.134
NHP pain (mean±SD)	43.75±27.56	24.48±16.40	0.001*
NHP emotional (mean±SD)	42.78±36.19	33.76±30.79	0.243
NHP sleep (mean±SD)	40.0±30.74	25.87±21.41	0.016*
NHP social (mean±SD)	27.54±20.02	29.89±19.58	0.381
NHP physical activity	28.75±18.12	15.68±12.5	0.001*

* p<0.05, statistically significant.
SD: Standard deviation; **BMI:** Body mass index; **BDI:** Beck Depression Inventory, **NHP:** Notingham Health Profilef.

(15.42±3.6), but the difference was not statistically significant (p=0.382) from the initial scores (16.28±4.7).

The relationship between maternal age and children's age, BMI, NHP and BDI scores were examined. A significant positive correlation was found between maternal age and NHP social (r=0.34, p=0.04), mother BMI and NHP pain scores (r=0.36, p=0.03). A positive correlation was also found between child BMI and NHP sleep scores (r=0.37, p=0.03).

DISCUSSION

LBP is the most common cause of disability under 45 years and mothers of children with physical disabilities have higher risk for LBP. Kaya et al. reported that frequency of locomotor system problems (62.5%) and LBP (42%) were high in mothers of children with CP.[20] Tong et al. implemented that LBP prevalance was high in mothers of children with physical disability when compared with mothers of healthy children.[8] In our study, frequency of LBP was close to that of Kaya et al. (Table 1).

Pain and limitation of motion in cases with LBP lead to distress, anxiety and depression. This condition hinders daily living activities and social life, and ultimately affects the quality of life.[21] NHP pain, physical mobility and sleep scores of mothers of children with CP were significantly high. As a result, LBP negatively affects the quality of life of patients. Kaya et al. demonstrated that physical and mental health component of quality of life scores were lower in mothers of children with CP than mothers of healthy children.[20] Studies showed that both LBP and accompanying anxiety and depression disturbed quality of life.[22,23] Pincus et al. suggested that physical distress and depression were together with chronic LBP.[24] In another study it was found that BDI scores of mothers with CP children were higher than those with healthy children but no relationship was determined between severity of disability, functional status of children and existing depression in mothers.[20] In our study, there was no control group of mothers with healthy children, and also there was no difference in BDI scores between mothers with and without LBP. So we can comment on the data of this study that there was no relation between depression and LBP in mothers of children with CP. On the other hand, we determined that cases with LBP with neuropathic pain component had worse BDI scores. Also this can indirectly indicate that if neuropathic pain increases, depressive mood can worsen. Altough a relation between chronic pain and depression has been determined in many studies, there are only a few studies on the relation between depression and neuropatic pain. Haliloğlu et al. observed a statisticaly significant relation between neuropathic pain and depression.[25] Cherif et al. reported that depression was positively correlated with the severity and duration of the neuropathic pain. Pain may also interfere with the lives of patients with neuropathic pain by altering their quality of life.[26]

There was no relation between GMFCS levels and LBP in our study. Ones et al. indicated that quality of life of mothers of children with CP did not change as regards GMFCS level of children.[27] Similarly in our study no relation was determined between GMFCS levels and LBP in mothers. The lack of a significant correlation may be due to the distribution of the GMFCS level, in that most of the children were at 3rd and 4th levels. The small number of children within the other groups may have reduced the correlation owing to unbalanced distribution.

In mothers with LBP, NRS and ODI scores were found to be statistically lower than the mothers without LBP at initial. When interviewed at the end of third months, 68 of the 78 cases expressed that they did exercises and benefited from training programme. In patients with LBP, physical activities are limited because of fear of increased pain. As a result, trunk muscles are weakened due to inmobility. Increasing physical condition and decreasing functional disabilities are important before returning to active life.[28] At this point low back protection techniques and exercises are very important and emphasized in the literature.[29] It has been reported that LBP and relapses can be prevented with specific dynamic waist exercises.[30] Şahin et al., in their study on effectiveness of low back school on pain and functional disability in cases with chronic LBP, determined that school of low back was more effective than physical treatment

modalities.[31] Hicks et al. suggested that 8-week stabilisation exercises lead to recovery of ODI scores and functional disability.[32] According to the data of this study, pain relief was achieved in the third month. We think that knowledge of protection techniques and regular application of exercise program may have a positive effect on this result. The limitation of the study is the absence of long-term follow-up.

CONCLUSION

LBP prevelance is high in mothers of children with CP. Mothers benefit from a good training and proper exercise program and their functional limitations decrease. We consider that cotrolled studies, including more cases and investigating effect of direct techniques to decrease physical burden, will guide for prevention of LBP.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and/or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

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