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The Effect Of Age, Sex And Gross Motor Functional Level On The Satisfaction Rates In Children With Spastic Cerebral Palsy Using Dynamic Foot-Ankle Orthesis

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ABSTRACT

Aim: The aim of our study was to evaluate the satisfaction levels of the children who are diagnosed with spastic cerebral palsy (CP), and who are using dynamic foot-ankle orthosis via taking their opinions and to examine the changes in their satisfaction rates according to age, gender and gross motor function level. Materials and method: 105 children with spastic CP with a mean age of 10.8 ± 4.2 years were included in the study. Orthotic satisfaction was evaluated through 12 questions created under the headings of comfort, aesthetics, and functionality. The gross motor function classification system was used to evaluate the gross motor function level. Satisfaction rates were compared according to age, gender and gross motor function level. Results: As a result of the study, it was found that as the level of gross motor function worsened, the proportion of those who had more difficulty in putting on and taking off the orthosis increased (p=0.01) and the proportion of those complaining from pain when using the orthosis decreased (p=0.04). It was determined that the majority of the adolescents were uncomfortable with the aesthetic of the orthosis from the outside of their clothes (p=0.01) and were bored with using the same shoes with the orthosis (p=0.01). However, they were satisfied because they could walk longer distances (p=0.04) and climb stairs more easily (p=0.01). The rates did not change according to sex in any of the questions (p>0.05). Conclusion: It was determined that orthosis usage satisfaction changed with age and gross motor function level, and it seemed as if sex did not have an effect over the orthosis satisfaction rates within the framework of the questions asked. Therefore, it was concluded that Gross motor function levels and age groups should be considered in orthotic recommendations for children with CP in order to increase orthosis compliance.

Key words: Assistive device, Cerebral palsy, Orthosis, satisfaction.

Dinamik Ayak-Ayakbileği Ortezi Kullanan Spastik Serebral Palsili Çocuklarda Yaş, Cinsiyet Ve Kaba Motor Fonksiyon Seviyesinin Memnuniyet Oranlarına Etkisi

ÖZ

Amaç: Çalışmamızın amacı, dinamik ayak-ayakbileği ortezi kullanan spastik serebral palsili (SP) çocukların memnuniyet düzeyinin kendi görüşleri alınarak değerlendirilmesi ve yaş, cinsiyet ve kaba motor fonksiyon seviyesine göre oranlarının değişimini incelemektir.
Gereç ve Yöntem: Çalışmaya yaş ortalaması 10.8 ± 4.2 yıl olan 105 spastik SP'li çocuk dahil edildi. Ortez memnuniyeti konfor, görsellik ve fonksiyonellik başlıkları altında oluşturulan 12 soru aracılığıyla değerlendirildi. Kaba motor fonksiyon düzeyini değerlendirmek için kaba motor fonksiyon sınıflandırma sistemi kullanıldı. Memnuniyet oranları yaş, cinsiyet ve kaba motor fonksiyon seviyesine göre karşılaştırıldı.
Bulgular: Çalışmanın sonucunda, kaba motor fonksiyon seviyesi kötüleştikçe ortezi giyip çıkarmada daha fazla zorluk yaşayanların oranının arttığı (p=0.01) ve ortezi kullanırken ağrıdan şikayetçi olanların oranının azaldığı bulundu (p=0.04). Ergenlerin daha büyük çoğunluğunun, ortezin kıyafetlerinin dışından görünmesinden rahatsız olduğu (p=0.01) ve ortezle aynı ayakkabıyı kullanmaktan sıkıldığı belirlendi (p=0.01). Ancak daha uzun mesafe yürüyebildiği (p=0.04) ve merdivenleri daha kolay çıkabildiği için memnun oldukları görüldü (p=0.01). Hiç bir soruda cinsiyete göre oranlar değişmedi (p>0.05). Sonuç: Ortez memnuniyetinin yaş ve kaba motor fonksiyon seviyesi ile değiştiği, cinsiyetin ise sorulan sorular çerçevesinde, ortez memnuniyetini değiştirmediği belirlendi. SP'li çocuklara yapılacak ortez önerilerinde, orteze uyumun arttırılması açısından, kaba motor fonksiyon seviyeleri ve yaş grupları göz önünde bulundurulmalıdır.

Anahtar Kelimeler: Memnuniyet, Ortez, Serebral palsi, Yardımcı cihaz.

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INTRODUCTION

Cerebral Palsy (CP) is a permanent but changeable disorder of movement, posture, and tonus resulting from a non-progressive disease of the brain that has not yet completed its development in the early stages of life (Livingston et al. 2007). Secondary and tertiary deformities may develop in children with CP due to reasons such as postural control deficiencies, muscle weakness and muscle tonus problems. Depending on these, the insufficiency of the motor skills may be observed (Carlberg and Hadders-Algra 2008, Graham et al. 2019). Physiotherapy and rehabilitation approaches applied today provide prevention and reduction of disorders in CP patients and these interventions enable the individual to reach the maximum level of independence with minimal loss. The physiotherapy and rehabilitation approaches aim to achieve regular and close-to-normal bodily movements by minimizing the existent musculoskeletal problems. During the physiotherapy and rehabilitation process, the use of dynamic foot-ankle orthoses (DAFO) is preferred for purposes such as ensuring proper body alignment and correcting standing during walking, normalizing gait kinematics, and reducing energy consumption during walking (Aboutorabi et al. 2017, Everaert et al. 2023, Novak et al. 2013). The orthoses used can minimize the medical treatment requirements which may be needed in the future and can prevent other problems that may arise in the musculoskeletal system, increasing the individual's overall performance (Morris, 2002).

The functionality, comfort, aesthetic appearance, and psychological role of the orthosis are among the factors affecting the satisfaction rates which stem from the usage of the orthosis (Swinnen et al., 2017; Magnusson et al.,2013). Factors such as the correct assessment of the patient's needs, the material used in the manufacture of the orthosis, and the workmanship during the production of the orthosis affect the usefulness of the orthosis. Another factor related to the effectiveness of the orthosis is the compliance of the patients with the orthosis. Thanks to the fact that the orthosis does not force the patient during use, the duration of usage increases, thus increasing the effectiveness of the treatment (Malas, 2011, Waterval et al. 2017). The level of satisfaction of children with CP regarding their orthoses may affect their use. In a study in which orthotic satisfaction was investigated from the family perspective, it was concluded that about half of the participants did not use the given orthosis. In the study, the reasons why the children were not using the orthotics were primarily due to the fact that they found the equipment ugly and difficult to use (Tezel et al. 2020). In basic health services, evaluation of patient satisfaction is important in order to obtain evidence-based information and to ensure improvement in service.

When studies on the use of orthoses in CP are examined, studies which were conducted on the clinical effects of orthosis come to the fore in the literature (Betancourt et al. 2019; Ricardo et al. 2021; Goihl et al. 2021). Exploring users' satisfaction with DAFO from their own perspective can lead to identifying and eliminating DAFO compliance issues. Satisfaction with the orthosis may vary depending on age, motor functions and sex, but the inadequacy of studies investigating this phenomenon is striking. It is thought that orthosis satisfaction may be affected by the characteristics of children with orthosis wearers. In order to increase orthosis compliance, it is important to examine how the satisfaction rates of children vary according to their different characteristics. Therefore, the aim of this study is to investigate orthosis satisfaction in children with CP of different ages and with different motor function levels using DAFO and to compare them according to age, sex and motor functions.

MATERIAL AND METHOD

This study was conducted in four private education and rehabilitation centers between May and August 2022. Children between the ages of 5-18, diagnosed with spastic CP, using DAFO for at least six months, who were classified as being in level I-II-III according to Gross Motor Function Classification System (GMFCS), and who volunteered to participate in the study and given consent by their parents were included in the study. Children who could not speak or understand Turkish and children who did not have the cognitive expression ability to answer questions were excluded from the study. All children who met the inclusion criteria at four centers

were evaluated, 105 children were included in the study and a signed parental informed consent form was obtained from the families of the children who participated in the study. The required ethics committee permission for the study was obtained from The Hatay Mustafa Kemal University Non-Interventional Research Ethics Committee on 14/04/2022 with the 07 numbered permission of the ethics committee.

Demographic information such as age, bodyweight, height, sex, type of CP, school attendance information, dominant limb, and bilateral/unilateral orthosis of the children participating in the study was recorded. GMFCS was used by S.B. and K.U.A., who both have 10 years of experience in pediatric rehabilitation, following the rehabilitation processes of children to classify gross motor function level. GMFCS is a standardized assessment system that classifies individuals at five levels according to gross motor functions. Level I shows the lightest impact, and Level V shows the heaviest impact (Palisano et al. 1997). Children's views on the usage of orthoses and their satisfaction levels were evaluated through 12 questions which prepared by the researchers according to the literature under the headings of comfort, aesthetics, and functionality (van Swigchem et al., 2010; Zaino et al 2022; Bettoni et al., 2016).

Questions about comfort were "*I'm having trouble putting on and taking off my orthosis"; "*I feel my legs relaxing after wearing my orthosis"; "*I experience pain when using my orthosis" and "*I feel my legs get very hot when using my orthosis". Questions about aesthetics were "*I like the look of my orthosis"; "*It bothers me that my orthosis is visible through my outfit"; and "*I feel like I walk more gracefully when I wear my orthosis". Questions about functionality "*I feel like I'm walking a longer distance when I walk with my orthosis on,"; "*I feel less tired when I walk with my orthosis on"; "* I feel more balanced and controlled when I walk with my orthosis on"; "*I have less difficulty climbing stairs when I have my orthosis on ". 4 of the questions contained negative statements. Each question was answered using a 5-point Likert-type scale (1: Strongly disagree, 5: Strongly agree). While 5 was the best answer for positive questions, 1 was accepted as the best answer for negative questions. Children who could read and write on their own were asked to read and answer the questions themselves, while the answers of the children who were not able to do so were recorded after having the questions read out loud by the therapist. The answers were evaluated according to age, sex, and gross motor function variables.

Statistical Analysis

The statistical analyses of the study was performed via using the "Statistical Package for Social Sciences" (SPSS) Version 21.0 (SPSS inc., Chicago, IL, USA). According to the aesthetic satisfaction scores obtained, the effect size was found to be moderate (d=0.47). For this effect size, it was calculated that our study reached 76% power at 95% confidence level. Descriptive analyses were given as mean and standard deviations, and categorical variables were given as frequencies and percentages. The children participating in the study were separated according to their sex, GMFCS levels, and age (as the childhood period of 5-11 years and adolescence period of 12-18 years), and their satisfaction levels regarding orthosis usage were compared. The conformity of the variables to the normal distribution was examined by visual (histogram and probability graphs) and analytical methods (Kolmogorov-Smirnov/ Shapiro-Wilk tests). The Mann-Whitney U and Kruskal Wallis Test were used to compare the differences in the independent group. The p value of 0.05 was considered statistically significant in all analyses.

RESULTS

Mean age, height and body weight of the children participating in the study was 10.8±4.2 years, 138.37±27.49 cm and 41.60±16.15 kg, respectively. While 35 (33.4%) of the children were found to be affected unilaterally, 70 (66.6%) of them were found to be bilaterally affected. The number of children was 67, while the number of adolescents was 42. The demographic characteristics of the children participating in the study are given in Table 1.

Table 1. Demographic characteristics

	min-max	mean ± SD	
Age (year)	5-18	10.80 ± 4.20	
Height (cm)	70-178	138.37 ± 27.49	
Body weight (kg)	11-90	41.60 ± 16.15	
		n	%
Sex	Female	44	41.90
	Male	61	58.10
Types of CP	Unilateral spastic	35	33.40
	Bilateral spastic	70	66.60
GMFCS	Level I	27	25.70
	Level II	49	46.70
	Level III	29	27.60
School attendance status	Yes	83	79.0
	No	22	21.0
Orthosis used	Unilateral	15	14.30
	Bilateral	90	85.70

Min: Minimum; Max: Maximum; SD: Standart Deviation; GMFCS:Gross Motor Function Classification System; CP: Cerebral Palsy; n:frequency; %: percentage

When the answers given by the majority of the children participating in the study to the comfort questions were examined, 39% chose to neither agree nor disagree to the question "I'm having trouble putting on and taking off my orthosis"; 41.9% chose to neither agree nor disagree to the question "I feel my legs relaxing after wearing my orthosis"; 41.9% disagreed with the question "I have pain when using my orthosis" and it was seen that 35.2% disagreed with the question "I feel my legs get very hot when using my orthosis" (Figure 1).

When the answers given to the questions about comfort were analyzed, it was seen that there was no difference in satisfaction rates in terms of sex and age ($p>0.05$).

It was observed that the difficulty in putting on and taking off the orthosis varied according to the GMFCS levels, and this change was especially at the GMFCS levels of II and III ($p<0.05$). 7.40% of the children in GMFCS I, 12.24% of the children in GMFCS II and 24.13% of the children in GMFCS III opted for the choice of "strongly agree". The majority of children in GMFCS III had difficulty wearing the orthosis compared to those in GMFCS II. As the children's level of gross motor function declined, it was seen that they had trouble putting on and taking off their orthoses ($p=0.01$) (Table 2).

The results of the question "I have pain while using the orthosis" also changed according to the level of gross motor function. 7.40% of children in GMFCS 1, 10.20% of children in GMFCS II and 3.44% of children in GMFCS III chose the "strongly agree" choice here. According to statistical analysis, there was a difference between GMFCS II and GMFCS III; a greater majority of those in the GMFCS II, rather than GMFCS III complained of pain when using the orthosis ($p=0.04$) (Table 2).

When the answers of the majority of the children which were given to the aesthetics questions were examined, 28.6% chose to neither agree nor disagree to the question "*I like the look of my orthosis"; 35.2% agreed to the question, "*It bothers me that my orthosis is visible from the outside of my outfit"; 26.7% agreed with the question "*I feel like I walk more gracefully when I wear my orthosis" and it was seen that 33.3% agreed with the question "*I feel like I walk more

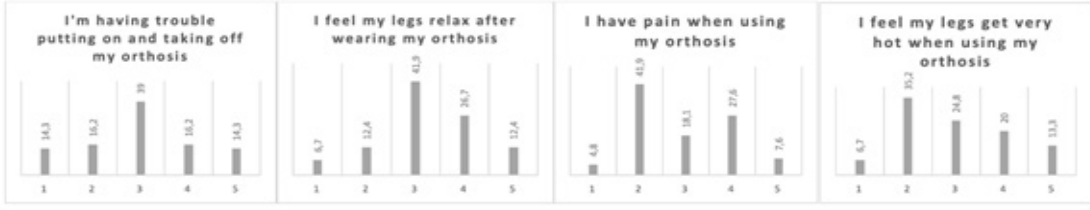

Figure 1. Satisfaction rates of all participants from the comfort of DAFO

Table 2. Distribution of satisfaction rates regarding comfort in orthosis usage according to independent variables

Comfort Satisfaction		Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree	Mean ± SD	Median (min-max)	p	p[a]
I'm having trouble putting on and taking off my orthosis	Child	15.87	12.69	41.26	17.46	12.69	2.98±1.21	3 (1-5)	0.98¤	
	Adolescent	11.90	21.42	35.71	14.28	16.66	3.02±1.23	3 (1-5)		
	Female	11.36	13.63	34.09	18.18	22.72	3.27±1.28	3 (1-5)	0.05¤	
	Male	16.39	18.00	42.62	14.75	8.19	2.80±1.13	3 (1-5)		
	GMFCS I	29.62	25.92	22.22	14.81	7.40	2.44±1.28	2 (1-5)	**0.01§***	0.002
	GMFCS II	12.24	12.24	49.00	14.28	12.24	3.02±1.12	3 (1-5)		
	GMFCS III	3.44	13.79	37.93	20.68	24.13	3.48±1.12	3 (1-5)		
I feel my legs relaxing after wearing my orthosis	Child	7.93	11.11	46.03	28.57	6.34	3.14±0.98	3 (1-5)	0.21¤	
	Adolescent	4.76	14.28	35.71	23.80	21.42	3.42±1.12	3 (1-5)		
	Female	6.81	13.63	45.45	18.18	15.90	3.22±1.09	3 (1-5)	0.65¤	
	Male	6.55	11.47	39.34	32.78	9.83	3.27±1.01	3 (1-5)		
	GMFCS I	7.40	14.81	48.14	22.22	7.40	3.07±0.99	3 (1-5)	0.52§	
	GMFCS II	6.12	10.20	42.85	24.48	16.32	3.34±1.07	3 (1-5)		
	GMFCS III	6.89	13.79	34.48	34.48	10.34	3.27±1.06	3 (1-5)		
I have pain when using my orthosis	Child	6.34	42.85	19.00	28.57	3.17	2.79±1.03	3 (1-5)	0.21¤	
	Adolescent	2.38	40.47	16.66	26.19	14.28	3.09±1.16	3 (1-5)		
	Female	11.36	43.18	6.81	27.27	11.36	2.84±1.27	2 (1-5)	0.43	
	Male	0	40.98	26.22	27.86	4.91	2.96±0.94	3 (2-5)		
	GMFCS I	3.70	55.55	11.11	22.22	7.40	2.74±1.09	2 (1-5)	**0.04§*[a]**	0.026
	GMFCS II	4.08	28.57	22.44	34.69	10.20	3.18±1.09	3 (1-5)		
	GMFCS III	6.89	51.72	17.24	20.68	3.44	2.62±1.01	2 (1-5)		
I feel my legs get very hot when using my orthosis	Child	7.93	33.33	23.80	19.00	15.87	3.01±1.22	3 (1-5)	0.75¤	
	Adolescent	4.76	38.09	26.19	21.42	9.52	2.92±1.09	3 (1-5)		
	Female	2.27	40.90	18.18	27.27	11.36	3.04±1.11	3 (1-5)	0.66¤	
	Male	9.83	31.14	29.50	14.75	14.75	2.93±1.20	3 (1-5)		
	GMFCS I	3.70	29.62	25.92	14.81	25.92	3.29±1.26	3 (1-5)	0.11§	
	GMFCS II	8.16	44.89	24.48	8.16	14.28	2.75±1.18	2 (1-5)		
	GMFCS III	6.89	24.13	24.13	44.82	0	3.06±0.99	3 (1-4)		

GMFCS: Gross Motor Function Classification System; ¤: Mann Whitney U Test; §: Kruskal Wallis Test; SD: Standart Deviation; min:minimum; max: maximum

*: p<0.05 [a]: post-hoc statistical significance between GMFCS II-III

Figure 2. Satisfaction rates of all participants from the aesthetics of DAFO

gracefully when I wear my orthosis " (Figure 2). Accordingly, it was determined that the children were somewhat dissatisfied with the aesthetics/visual of the orthosis in general but were satisfied that their gait looked better thanks to the orthosis.

When the answers about orthosis aesthetics were analyzed, it was seen that there was no difference in satisfaction rates in terms of sex and motor function levels ($p>0.05$). However, it was observed that the answers of children and adolescents were different in all questions regarding the satisfaction towards orthosis aesthetics ($p<0.05$). 6.34% of the children and 23.80% of the adolescents stated that they absolutely liked the look of the orthosis. It was found that the majority of the study's adolescent participants were pleased with how the orthosis looked ($p=0.02$). 4.76% of the children and 42.85% of the adolescents opted for "strongly agree" in this matter. It was shown that, compared to children, adolescents were more disturbed by the sight of the orthosis when visible through the garment ($p=0.01$). 6.34% of the children and 42.85% of the adolescents gave the answer of strongly agree in terms of being disturbed by the visibility of the orthosis through clothes. It was found that adolescents were more likely than children to get bored wearing the same shoes with orthoses ($p=0.01$). 14.28% of the children and 33.33% of the adolescents stated that they strongly agreed regarding getting bored by wearing the same shoes with the orthosis. It was observed that adolescents thought that they could walk better thanks to orthoses compared to children ($p=0.01$) (Table 3).

When the answers given to the functionality questions by the majority of the children participants were examined; 31.4% neither agreed nor disagreed to the question "*I feel like I'm walking a longer distance when I walk with my orthosis on"; 35.2% neither agreed nor disagreed to the question "*I feel less tired when I walk with my orthosis on"; 39% agreed with the question "*I feel more balanced and controlled when I walk with my orthosis on " and it was seen that 36.2% of the participants neither agreed nor disagreed with the question "*I have less difficulty climbing stairs than when I have my orthosis on ". Accordingly, it was determined that the majority of the children were moderately satisfied with the contribution of the orthosis to their bodily functionality (Figure 3).

When the answers given to the questions about functionality were analyzed, it was seen that there was no difference in satisfaction rates in terms of sex and motor function levels ($p<0.05$). However, it was observed that the satisfaction rates of children and adolescents were different in some questions regarding functionality. Adolescents were more likely than children to be satisfied with walking longer distances with an orthosis and having less difficulty climbing stairs ($p>0.05$) (Table 4).

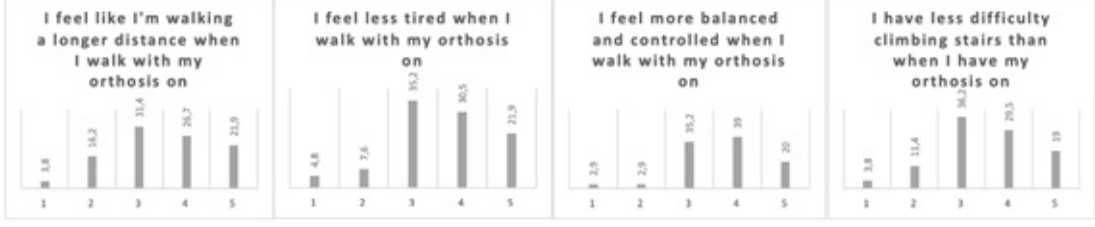

Figure 3. Satisfaction rates of all participants from the functionality of DAFO

Table 3. Distribution of aesthetic satisfaction in orthosis use according to independent variables

Aesthetic Satisfaction		Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree	Mean ± SD	Median (min-max)	p
I like the look of my orthosis	Child	17.46	30.15	28.57	17.46	6.34	2.65±1.15	3 (1-5)	**0.02¤***
	Adolescent	14.28	14.28	28.57	19.00	23.80	3.23±1.35	3 (1-5)	
	Female	20.45	25.00	25.00	15.90	13.63	2.77±1.32	3 (1-5)	0.41¤
	Male	13.11	23.00	31.14	19.67	13.11	2.96±1.22	3 (1-5)	
	GMFCS I	29.62	22.22	29.62	7.40	11.11	2.48±1.31	2 (1-5)	0.11§
	GMFCS II	8.16	26.53	24.48	28.57	12.24	3.10±1.17	3 (1-5)	
	GMFCS III	17.24	20.68	34.48	10.34	17.24	2.89±1.31	3 (1-5)	
It bothers me that my orthosis is visible from the outside of my outfit	Child	14.28	20.63	20.63	39.68	4.76	3.00±1.17	3 (1-5)	**0.01¤***
	Adolescent	0	2.38	26.19	28.57	42.85	4.11±0.88	4 (2-5)	
	Female	11.36	9.09	22.72	40.90	15.90	3.40±1.20	4 (1-5)	0.82¤
	Male	6.55	16.39	23.00	31.14	23.00	3.47±1.20	4 (1-5)	
	GMFCS I	3.70	11.11	22.22	40.74	22.22	3.66±1.07	4 (1-5)	0.06§
	GMFCS II	14.28	18.36	24.48	26.53	16.32	3.12±1.30	3 (1-5)	
	GMFCS III	3.44	6.89	20.68	44.82	24.13	3.79±1.01	4 (1-5)	
I get bored of using similar shoes all the time with my orthosis	Child	14.28	23.80	23.80	31.74	6.34	2.92±1.18	3 (1-5)	**0.01¤***
	Adolescent	0	9.52	28.57	19.00	42.85	3.95±1.05	4 (2-5)	
	Female	0	18.18	29.54	31.81	20.45	3.54±1.02	4 (2-5)	0.20¤
	Male	14.75	18.00	23.00	23.00	21.31	3.18±1.36	3 (1-5)	
	GMFCS I	3.70	14.81	18.51	33.33	29.62	3.70±1.17	4 (1-5)	0.08§
	GMFCS II	16.32	22.44	20.40	22.44	18.36	3.04±1.36	3 (1-5)	
	GMFCS III	0	13.79	41.37	27.58	17.24	3.48±0.94	3 (2-5)	
I feel like I walk more gracefully when I wear my orthosis	Child	4.76	15.87	33.33	31.74	14.28	3.34±1.06	3 (1-5)	**0.01¤***
	Adolescent	0	4.76	26.19	35.71	33.33	3.97±0.89	4 (2-5)	
	Female	6.81	13.63	20.45	31.81	27.27	3.59±1.22	4 (1-5)	0.72¤
	Male	0	9.83	37.70	34.42	18.00	3.60±0.89	4 (2-5)	
	GMFCS I	0	18.51	25.92	37.00	18.51	3.55±1.01	4 (2-5)	0.42§
	GMFCS II	6.12	8.16	22.44	36.73	26.53	3.69±1.14	4 (1-5)	
		0	10.34	48.27	24.13	17.24	3.48±0.91	3 (2-5)	

GMFCS: Gross Motor Function Classification System; ¤: Mann Whitney U Test ; §: Kruskal Wallis Test; SD: Standart Deviation; min:minimum; max: maximum *: p<0.05

Table 4. Distribution of satisfaction rates with regards to functionality in orthosis use according to independent variables

Functional Satisfaction		Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree	Mean ± SD	Median (min-max)	p
I feel like I'm walking a longer distance when I walk with my orthosis on	Child	4.76	19.00	33.33	28.57	14.28	3.28±1.08	3 (1-5)	**0.04¤***
	Adolescent	2.38	11.90	28.57	23.80	33.33	3.73±1.12	4 (1-5)	
	Female	6.81	11.36	27.27	29.54	25.00	3.54±1.19	4 (1-5)	0.41¤
	Male	1.63	19.67	34.42	24.59	19.67	3.40±1.07	3 (1-5)	
	GMFCS I	3.70	25.92	25.92	29.62	14.81	3.25±1.12	3 (1-5)	0.18§
	GMFCS II	6.12	10.20	24.48	30.61	28.57	3.65±1.18	4 (1-5)	
	GMFCS III	0	17.24	48.27	17.24	17.24	3.34±0.97	3 (2-5)	
I feel less tired when I walk with my orthosis on	Child	6.34	6.34	39.68	31.74	15.87	3.44±1.04	3 (1-5)	0.13¤
	Adolescent	2.38	9.52	28.57	28.57	31.00	3.76±1.07	4 (1-5)	
	Female	6.81	4.54	29.54	31.81	27.27	3.68±1.13	4 (1-5)	0.24¤
	Male	3.27	9.83	39.34	29.50	18.03	3.49±1.01	3 (1-5)	
	GMFCS I	3.70	7.40	40.74	33.33	14.81	3.48±0.97	3 (1-5)	0.71§
	GMFCS II	8.16	8.16	26.53	28.57	28.57	3.61±1.22	4 (1-5)	
	GMFCS III	0	6.89	44.82	31.03	17.24	3.58±0.86	3 (2-5)	
I feel more balanced and controlled when I walk with my orthosis on	Child	4.76	3.17	33.33	47.61	11.11	3.57±0.91	4 (1-5)	0.13¤
	Adolescent	0	2.38	38.09	26.19	33.33	3.90±0.90	4 (2-5)	
	Female	6.81	4.54	27.27	40.90	20.45	3.63±1.08	4 (1-5)	0.95¤
	Male	0	1.63	41.00	37.70	19.67	3.75±0.78	4 (2-5)	
	GMFCS I	0	0	44.44	40.74	14.81	3.70±0.72	4 (3-5)	0.24§
	GMFCS II	6.12	2.04	24.48	40.81	26.53	3.79±1.06	4 (1-5)	
	GMFCS III	0	6.89	44.82	34.48	13.79	3.55±0.82	3 (2-5)	
I have less difficulty climbing stairs than when I have my orthosis on	Child	4.76	15.87	39.68	28.57	11.11	3.25±1.01	3 (1-5)	**0.01¤***
	Adolescent	2.38	4.76	30.95	30.95	30.95	3.83±1.01	4 (1-5)	
	Female	4.54	15.90	31.81	27.27	20.45	3.43±1.12	3 (1-5)	0.69¤
	Male	3.27	8.19	39.34	31.14	18.00	3.52±0.99	3 (1-5)	
	GMFCS I	0	7.40	37.03	44.44	11.11	3.59±0.79	4 (2-5)	0.42§
	GMFCS II	2.04	14.28	32.65	26.53	24.48	3.57±1.08	4 (1-5)	
		10.34	10.34	41.37	20.68	17.24	3.24±1.18	3 (1-5)	

GMFCS: Gross Motor Function Classification System; ¤: Mann Whitney U Test ; §: Kruskal Wallis Test; SD: Standart Deviation; min:minimum; max: maximum *: p<0.05

14.28% of the children and 33.33% of the adolescents gave the answer of "strongly agree" regarding this situation. When compared to children, it was shown that the adolescents felt they could walk farther thanks to orthoses (p=0.04). In accordance, 11.11% of the children and 30.95% of the adolescents opted for "strongly agree". Compared to children, adolescents have less difficulty in climbing stairs thanks to orthoses (p=0.01) (Table 4).

DISCUSSION

In our study, satisfaction rates in terms of DAFO usage in children with CP was evaluated from the children's point of view, and the effects of age, sex, and gross motor function level variables on satisfaction rates were examined. It was revealed that orthosis satisfaction changed with age and gross motor function level, and that sex did not change orthosis satisfaction within the framework of the questions asked.

Orthosis satisfaction contributes to the optimization of the expected benefits from the orthosis equipment and increases the usage of the orthosis. In the study conducted by Kane et al. in 2019, the differences in perspectives between therapists, orthotics prosthetists, and physical therapists were revealed and the necessity of cooperation in the prescribing process was emphasized. With a similar idea, the perspective of the mothers of the children using DAFO was evaluated, and it was concluded that the mothers thought that the use of DAFO was an integral part of the rehabilitation process. As a result of the study, feedback was also obtained that some aspects need to be improved regarding aesthetics, comfort, and heat increases in DAFO production (Ribeiro Volpini Lana et al. 2021). The authors emphasized that listening to mothers and taking into account their feedback is important in family-centered rehabilitation approaches. In our study, by taking the opinions of the children, who are the most important elements of rehabilitation, they were enabled to contribute to the rehabilitation process, and results were obtained to increase the efficiency related to the use of DAFO. Satisfaction status was basically evaluated under the headings of comfort, orthosis aesthetics, and functionality. Since the situations affecting the satisfaction perceptions of individuals in the children and adolescent age groups may be different, the answers obtained were analyzed according to age groups.

As a result of our study, it was observed that as the gross motor functions decreased, the rate of those who stated that they had difficulty in putting on and taking off the orthosis increased. In individuals with CP, the level of independence with regards to daily life activities increase as gross motor function improves (Akkaya et al. 2022). Because in children with cerebral palsy, as the level of gross motor function worsens, factors such as tone and deformity, which are determinants for gross motor functions, also worsen, causing the functional independence of children to be restricted (Rethlefsen et al. 2017; Østensjø et al. 2004). As a result of our study, it was found that the difficulty experienced when putting on and removing DAFO changed according to the level of gross motor function. One of the goals of rehabilitation is to increase the level of independence in individuals with CP (Aisen et al. 2011). For this reason, it would be the right approach to make modifications to the orthoses when necessary, as well as to the related equipment used in daily life, to gain independence and to ensure that the wearing and removal are achieved at every motor level (Bjornson et al.2023). In our study, significant results have been obtained in terms of emphasizing this principle.

In our study it was determined that as the GMFCS level worsened, the rate of those who felt pain during orthosis usage decreased. And it was seen that this situation became especially evident between GMFCS II and III. Because of the deformities which increase with worsening of the motor level, it may be necessary to apply higher corrective force in the orthotic applications of children diagnosed with CP (Wright and DiBello. 2020). While children in GMFCS III level can be mobilized with walking aid, children in level II may walk independently and be constantly exposed to this corrective force (Charlton et al.1999). It can be thought that this difference is due to the aforementioned situation.

Orthosis aesthetics is one of the important factors affecting the use of orthoses in children and adolescents. In a study investigating orthosis and prosthesis satisfaction levels in 293 participants, questions about orthotic aesthetics received

low scores from participants (Ghoseiri and Bahramian 2012). In another study, it was revealed that approximately half of the patients with CP included did not use their orthoses and one of the reasons for not using them was the dislike of the aesthetics of the orthosis. they reported that children in the adolescent group did not like the appearance of their orthoses and therefore, the level of satisfaction was lower in the adolescent group (Tezel et al. 2020). As a result of our study, it was determined that a greater majority of adolescents were not disturbed by the look of the orthosis but were not satisfied with it being visible through their outfit. Today, colored prints can be made on orthoses to attract the attention of children. Children may see themselves as different from their peers with colored printed orthoses and may think that they attract attention. For this reason, it was thought that children were not disturbed by the aesthetics of their orthoses as in adolescents (Lahoud et al. 2020). However, in adolescents, the desire to be liked by others may come to the fore. Similarly, it was concluded that the majority of adolescents were bored of wearing the same shoes with the orthosis. They stated that the orthosis compliance decreased due to the difficulty in finding shoes suitable for DAFO in patients with post-stroke drop foot problems. In the study of Tezel et al. (2020), it was reported that the families of children with CP also had difficulty in using them because they had difficulty in finding shoes suitable for the orthosis. It can be said that this is one of the points that should be emphasized as a result of our study. Especially in orthotic approaches to be applied in adolescents with CP, it may be important to pay attention to visuality, to offer shoe options that can be used with the orthosis, in order to increase the satisfaction of orthosis usage (Marcotte et al. 2023).

The majority of the adolescents participating in our study stated that they were satisfied with the functionality provided by the orthosis. Unlike children, it can be thought that the orthosis increases the functional satisfaction of adolescents with CP, as it helps to eliminate their anxieties such as participating in social life and competing with their peers (King et al. 2000; Wintels et al. 2018).

THE LIMITATIONS OF THE STUDY

Our study revealed generalizable results in terms of investigating the satisfaction rates of children who are users of DAFOs, with a high number of participants from private education and rehabilitation centers in four different regions of the country. However, the fact that the questionnaire which was prepared and used by the researchers is seen as a limitation of our study. In addition, the stages of obtaining an expert opinion, pre-test and validity were not applied in the preparation of the scale. Another factor that may affect the results is the fact that the GMFCS evaluations of the children participating in the study were made by more than one expert, and that the orthoses applied in different centers were made of different materials with different workmanship. In the future, it is recommended to carry out studies in which the family and the child are evaluated together, and all these factors are taken into account.

CONCLUSION

Our study provided important findings in terms of eliminating the deficiencies in the use of DAFOs, which has become an integral part of the rehabilitation process of children with CP, and in terms of increasing the motivation for, and the duration of usage. In addition, the child-centered approach was emphasized by taking the opinions of the children. It was concluded that orthosis satisfaction differed in some areas according to age and gross motor function level, but sex has not changed the satisfaction rates. In addition to clinical requirements, gross motor function levels and the age range should be considered when deciding on orthosis usage in children with CP. In order to increase the satisfaction rates of individuals in line with the findings obtained, we recommend that the opinions of children, who are the primary audience of these devices, should be taken into account when designing, developing and producing the equipment.

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AUTHOR CONTRIBUTION

Idea/Concept: SB; Design: SB ; Data Collection and/ or Processing: SB, KUA; Analysis and/or Interpretation: BE; Writing the Article: SB, KUA, BE; Critical Review: SB, KUA, BE.

CONFLICT OF INTEREST

The authors declared no potential conflict of interest with respect to the research, authorship, and/or publication of this article.

FINANCIAL DISCLOSURE

The authors declared that this study received no financial support.

ETHICAL STATEMENT

For the study, ethical consent was received from the Non-Interventional Research Ethics Committee of Hatay Mustafa Kemal University on 14/04/2022 with the 07 numbered permission. The rights of human participants were protected, the procedures were conducted according to the Helsinki Decleration.

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