

Factors Affecting Compliance with Lower and Upper Extremity Orthoses in Patients with Disability Due to Neurological Diseases

Nörolojik Hastalıklara Bağlı Engellilik Gelişmiş Bireylerde, Alt ve Üst Ekstremitte Ortezlerine Uyumu Etkileyen Faktörler

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ABSTRACT Objective: Orthosis is frequently used in individuals with disability due to neurological diseases. Non-compliance with the orthosis is an important problem in these patients. However, studies examining the factors affecting orthotic compliance are limited. The aim of this study is to examine the factors affecting compliance with lower and upper extremity orthoses in individuals with disability due to neurological diseases. **Material and Methods:** Orthosis compliance of 45 patients who were previously recommended lower and/or upper extremity orthosis and followed up for neurological rehabilitation was questioned. In addition, the relationship of factors such as age, gender, height, weight, duration of disease, diagnosis, clinical stage of the disease, reasons for non-compliance with the device, occupation, education level, residence, what floor their house is on, whether there is an elevator in the building they live in, the number of physiotherapy sessions they receive per year, the duration of home exercise they use, the walking aid they use, the type of orthosis prescribed, the time their orthoses are prescribed, affected extremities, and ambulation status of patients with orthosis compliance were examined. **Results:** Device-related reasons were found to be significantly more common than other reasons, among the reasons for leaving the device in patients who were offered lower extremity orthosis and did not comply with the device. The rate of use of upper extremity orthosis was found to be negatively related to disease duration and orthosis prescription time, and positively related to age. **Conclusion:** It has been determined that the most important factors affecting the orthotic compliance of patients using orthoses are device-related reasons. In addition, patients' disease duration, age, and orthosis prescription duration are also associated with orthosis compliance. These results should be considered during prescribing, orthotic manufacture, and patient follow-up.

Keywords: Orthosis; orthosis compliance; hemiplegia; foot-ankle orthosis; rehabilitation

ÖZET Amaç: Nörolojik hastalıklara bağlı engellilik gelişmiş bireylerde ortez sıkça kullanılmaktadır. Bu bireylerde, orteze uyum göstermeme önemli bir sorundur. Bununla birlikte ortez uyumunu etkileyen faktörleri inceleyen çalışmalar sınırlıdır. Bu çalışmanın amacı, nörolojik hastalıklara bağlı engellilik gelişmiş bireylerde alt ve üst ekstremitte ortezlerine uyumu etkileyen faktörleri incelemektir. **Gereç ve Yöntemler:** Nörolojik rehabilitasyon nedeniyle takip edilen, daha önce alt ve/veya üst ekstremitte ortezi önerilmiş 45 hastanın orteze uyumları sorgulandı. Ayrıca hastaların yaş, cinsiyet, boy, kilo, hastalık süresi, tanısı, meslek, eğitim durumu, yaşadığı yer, evinin kaçınca kat olduğu, yaşadığı binada asansör olup olmadığı, yılda aldığı fizyoterapi seans sayısı, uyguladığı ev egzersizi süresi, kullandığı yürüme yardımcısı, reçetelenen ortezin tipi, ortezinin reçete edilme zamanı, etkilenen ekstremiteler, ambulasyon durumu, hastalığının klinik evresi, cihaza uyum göstermeme nedeni gibi faktörlerin ortez uyumu ile ilişkisi incelendi. **Bulgular:** Alt ekstremitte ortezi önerilip de cihaza uyum göstermeyen hastaların cihazı aksatma nedenlerinden cihaz kaynaklı nedenler diğer nedenlere göre anlamlı olarak daha fazlaydı. Üst ekstremitte ortez kullanım oranı ile hastalık süresi ve mevcut ortez reçetelenme süresi arasında negatif yönlü; yaş ile ise pozitif yönlü anlamlı bir ilişki saptanmıştır. **Sonuç:** Ortez kullanan hastaların ortez uyumunu etkileyen en önemli faktörlerin cihaza bağlı nedenler olduğu tespit edilmiştir. Ayrıca hastaların hastalık süresi, yaş ve ortez reçete süresi de ortez uyumu ile ilişkilidir. Bu sonuçlar ortez reçeteleme, ortez üretimi ve hasta takibi sırasında dikkate alınmalıdır.

Anahtar Kelimeler: Ortez; ortez uyumu; hemipleji; ayak -ayak bileği ortezi; rehabilitasyon

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According to the International Organization for Standardization, the orthoses are defined as “an externally applied device used to modify the structural and functional properties of the neuromuscular and skeletal system”. Orthoses are often prescribed to restore physical function and improve patients’ health. There are 3 groups of orthoses: spine, upper extremity and lower extremity. While spine orthoses are primarily used to support and immobilize the spine, limb orthoses can be applied in a wide variety of clinical conditions. They are often used to support, immobilize or treat weak, ineffective, deformed or injured muscles, joints or skeletal parts.¹ These devices can be used in neurological diseases such as multiple sclerosis, spinal cord injury, stroke and cerebral palsy, musculoskeletal diseases such as Duchenne muscular dystrophy and rheumatoid arthritis, as well as orthopedic problems such as knee osteoarthritis and anterior cruciate ligament injury.²⁻⁸

Although orthoses have many positive effects, it is known that some users have some dissatisfaction with these devices. This may lead to a decrease in the frequency of use. In addition, orthosis non-compliance of patients who are prescribed inappropriate orthoses is a common problem in rehabilitation.⁹ In the literature, orthosis non-compliance rates ranging from 8-60% have been reported.¹⁰ Limb not fully inserted into the device, pressure sores, ability to climb stairs, walking problems with activities of daily living, difficulties in getting into a wheelchair, long wearing and removing time, impracticality, requiring too much energy to walk, feeling unsafe, worsening spasms, fractures, unsuitable environment and shoulder problems are some of the problems reported with orthosis use.¹¹⁻¹⁴ Unsuitable orthoses may cause complications such as pressure sores, nerve damage, pain and deformity, as well as a decrease in the effectiveness of treatment, unnecessary expenditures on the patient and the country’s economy.^{9,15} In addition, compliance and adherence are the primary determinants of the effect of any treatment.¹⁶

Failure to use the prescribed orthosis is common in clinical practice, and the number of studies examining factors associated with discontinuation of orthosis use is limited. This study aims to investigate the compliance of the individuals with disabilities due

to neurological diseases with the prescribed orthosis and the factors related to the discontinuation of the orthosis.

MATERIAL AND METHODS

This study was approved by the Clinical Research Ethics Committee of Kırşehir Ahi Evran University (date: July 2, 2020, no: 2020-9/76). The study was conducted in accordance with the principles of the Declaration of Helsinki. Between August 2020 and October 2020, 45 patients who were followed up in Kırşehir Ahi Evran University Faculty of Medicine, Physical Medicine and Rehabilitation Clinic for neurological rehabilitation and previously prescribed upper and lower extremity orthoses were evaluated. Patients with cancer, active infection were not included in the study. Consent to participate in the study was obtained from the patients and the parents of the pediatric patients.

The patients’ age, gender, height, weight, duration of disease, occupation, education status (educational status of the primary caregiver for children), place of residence (city, district, village), the floor of the house, and whether there was an elevator in the building were noted. The number of physiotherapy sessions they received in a year and the duration of home exercise they applied were recorded. In addition, the walking aid (walking stick etc.), the type of orthosis prescribed, the time of prescription of the orthosis, the recommended daily usage time, the reason for not continuing the orthosis, the affected extremities, the pathological condition requiring the use of the orthosis, and the characteristics of the disease were questioned. The ambulation level of the patients was evaluated with the functional ambulation scale (FAS). Stroke patients were evaluated in 3 groups according to their etiology: hemiplegia due to ischemic and hemorrhagic cerebrovascular accident and hemiplegia due to traumatic brain injury. Hemiplegic hand, upper and lower extremity motor recovery were evaluated with Brunnstrom staging. The reasons of the patients who used the orthosis less than necessary or did not use it at all were divided into 4 groups as device-related reasons (the device is tight or heavy enough to cause discomfort, difficulty in using it, taking a lot of time), functional reasons (such as improvement in movement that

does not requiring the device, making the device difficult to walk, low activity, not increasing the mobility as desired, causing unwanted movement, and deterioration of the movement in such a way that the device cannot be used), medical reasons (such as excessive spasticity, excessive contracture, pain, skin allergy, worsening of general condition), and aesthetic concerns.¹⁵

The patients were asked about how many days a month they used the orthosis and how many hours they used the orthosis on average, and it was recorded. Orthosis usage rates (OUR) of the patients were determined by dividing the average wearing time of the patient by the recommended orthosis wearing time. With this ratio, it was aimed to compare patients with different device prescription times. The patients were divided into groups according to some sociodemographic and clinical characteristics and OUR were compared. A questionnaire consisting of 3 questions prepared by the authors was applied to the patients to question their attitudes towards orthosis.

STATISTICAL ANALYSIS

Statistical analyzes of the study were performed with SPSS version 21.0 software for Windows (IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp., USA). The normality assumption of the variables was tested with the Kolmogorov-Smirnov and Shapiro-Wilk tests. Explanatory statistics of the variables are given as mean±standard deviation, median (minimum-maximum) and frequencies (n, %). Univariate statistical analyzes of the study were performed using Mann-Whitney U, Kruskal-Wallis, chi-square tests. Relationships between variables were evaluated with Spearman's Rho coefficients. In all statistical analyzes, cases with a p value below 0.05 were interpreted as statistically significant.

RESULTS

A total of 45 patients (16 men, 29 women) were included in the study. The mean age of the patients (n=35) for whom lower extremity orthosis was recommended was 51.68±20.67 years. The mean age of the patients (n=30) for whom upper extremity orthosis was recommended was 58.86±13.55 years. The number of patients using both lower extremity ortho-

sis and upper extremity orthosis was 12. The mean rate of lower and upper extremity orthosis use (OUR) was found to be (0.64±0.42) and (0.63±0.44), respectively; no significant difference was found ($p>0.05$). Lower extremity OUR or upper extremity OUR values were not associated with educational status, the floor of their house, whether there is an elevator in the place where they live, whether they live in a village, district or city, diagnosis-etiology, occupation, affected side (right, left), affected extremity (hemiplegia, paraplegia, tetraplegia), Brunstroom stages, FAS stage, type of orthosis or presence of walking aids.

Among those recommended lower extremity orthosis, 7 (20%) never used the device, 10 (29%) used it less than recommended, and 18 (51%) used it as recommended. Of those recommended upper extremity orthosis, 5 (17%) never used the device, 9 (30%) use it less than recommended, and 16 (53%) use it as recommended (Figure 1). The reasons of patients who did not use lower extremity orthoses at all or used less than recommended were device+medical reasons in 1 patient, device-related reasons in 14 patients, functional reasons in 4 patients. In the upper extremity, functional reasons were determined in 6 patients, device-related reasons in 8 patients, and device+medical reasons in 3 patients. Device-related reasons were more common than functional and medical reasons among the reasons for non-compliance with the lower and upper extremity orthosis. This difference was statistically significant in the lower extremity, but not in the upper extremity. No patient was found who left the device for aesthetic-cosmetic reasons (Table 1, Table 2).

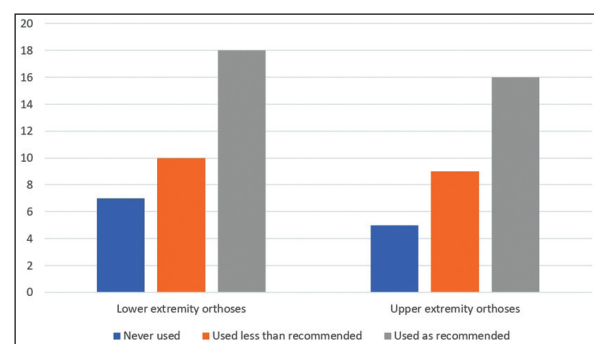


FIGURE 1: Orthosis use status of patients who were recommended lower and upper extremity orthosis.

TABLE 1: The distribution of some sociodemographic and clinical factors in patients recommended lower extremity orthosis and their effect on orthosis usage rate.

	n (%)	Lower extremity OUR	Median (minimum-maximum)	p value
Gender				
Male	12 (34.3)	0.61±0.13	0.87 (0.0-1.0)	0.786
Female	23 (65.7)	0.66±0.08	1.0 (0.0-1.0)	
Educational status				
Primary education	19 (54.3)	0.61±0.10	0.80 (0.0-1.0)	0.891
High school	7 (20.0)	0.67±0.17	1.0 (0.0-1.0)	
University	9 (25.7)	0.68±0.14	1.0 (0.0-1.0)	
What floor is the house				
0	12 (34.3)	0.81±0.09	1.0 (0.01-1.0)	0.242
1	4 (11.4)	0.75±0.25	1.0 (0.0-1.0)	
2	5 (14.3)	0.67±0.18	0.75 (0.0-1.0)	
3	11 (31.4)	0.40±0.13	0.18 (0.0-1.0)	
4	3 (8.6)	0.66±0.33	1.0 (0.0-1.0)	
Is there an elevator in the house				
Yes	12 (34.3)	0.54±0.14	0.75 (0.0-1.0)	0.222
No	23 (65.7)	0.70±0.08	1.0 (0.0-1.0)	
Living place				
Township	7 (20.0)	0.42±0.16	0.5 (0.0-1.0)	0.331
Village	7 (20.0)	0.75±0.14	1.0 (0.0-1.0)	
City	21 (60.0)	0.68±0.09	1.0 (0.0-1.0)	
Diagnosis-etiology				
Cerebral palsy	5 (14.3)	0.80±0.20	1.0 (0.0-1.0)	0.238
Ischemic stroke-hemiplegia	20 (57.1)	0.50±0.11	0.50 (0.0-1.0)	
Spinal cord injury	5 (14.3)	0.60±0.24	1.0 (0.0-1.0)	
Job				
Not working	4 (11.4)	0.62±0.23	0.75 (0.0-1.0)	0.783
Retired	9 (25.7)	0.46±0.16	0.18 (0.0-1.0)	
Housewife	17 (48.6)	0.68±0.10	1.0 (0.0-1.0)	
Officer	2 (5.7)	0.81±0.18	0.81 (0.63-1.0)	
Student	3 (8.6)	0.91±0.08	1.0 (0.75-1.0)	
Side				
Bilateral	10 (28.6)	0.75±0.13	1.0 (0.0-1.0)	0.186
Right	9 (25.7)	0.42±0.15	0.18 (0.0-1.0)	
Left	16 (45.7)	0.70±0.09	0.90 (0.0-1.0)	
Affected limb				
Tetraplegia	4 (11.4)	0.63±0.23	0.75 (0.04-1.0)	0.910
Paraplegia	9 (25.7)	0.71±0.14	1.0 (0.0-1.0)	
Hemiplegia	22 (62.9)	0.62±0.09	0.87 (0.0-1.0)	
FAS Stage				
0	10 (28.6)	0.80±0.10	1.0 (0.04-1.0)	0.399
1	3 (8.6)	0.91±0.08	1.0 (0.75-1.0)	
2	4 (11.4)	0.62±0.23	0.75 (0.0-1.0)	
3	11 (31.4)	0.52±0.15	0.75 (0.0-1.0)	
4	7 (20.0)	0.51±0.16	0.62 (0.0-1.0)	
Orthosis				
AFO	12 (34.3)	0.64±0.12	0.77 (0.0-1.0)	0.744
AFO+inhibitor hand-wrist splint	17 (48.6)	0.61±0.11	1.0 (0.0-1.0)	
KAFO	4 (11.4)	0.87±0.12	1.0 (0.50-1.0)	
KAFO+inhibitor hand-wrist splint	2 (5.7)	0.52±0.47	0.52 (0.04-1.0)	
Reason for non-compliance with orthosis				
Device-related reasons	14 (40.0)	0.40±0.09	0.50 (0.0-1.0)	0.016
Functional reasons	4 (11.4)	0.0±0.0	0.0 (0.0-0.0)	
Walking aid				
Walking stick	6 (17.1)	0.48±0.19	0.46 (0.0-1.0)	0.149
Tripod	6 (17.1)	0.33±0.21	0.004 (0.0-1.0)	
Walker	2 (5.7)	0.50±0.50	0.50 (0.0-1.0)	
None	21 (60.0)	0.79±0.06	1.0 (0.0-1.0)	

OUR: Orthosis usage rate; AFO: Ankle foot orthosis; KAFO: Knee ankle foot orthosis; FAS: Functional ambulation scale.

TABLE 2: The distribution of some sociodemographic and clinical factors in patients recommended upper extremity orthosis and their effect on orthosis usage rate.

	n (%)	Upper extremity OUR	Median (minimum-maximum)	p value
Gender				
Male	10 (33.3)	0.59±0.15	0.87 (0.0-1.0)	0.598
Female	20 (66.7)	0.64±0.09	1.0 (0.0-1.0)	
Educational status				
Primary education	13 (43.3)	0.50±0.12	0.37 (0.0-1.0)	0.186
High school	7 (23.3)	0.53±0.19	0.75 (0.0-1.0)	
University	8 (26.7)	0.81±0.12	1.0 (0.04-1.0)	
What floor is the house				
0	9 (30.0)	0.61±0.15	1.0 (0.0-1.0)	0.933
1	5 (16.7)	0.72±0.16	1.0 (0.027-1.0)	
2	4 (13.3)	0.68±0.23	0.87 (0.0-1.0)	
3	8 (26.7)	0.62±0.16	0.87 (0.0-1.0)	
4	4 (13.3)	0.50±0.28	0.5 (0.0-1.0)	
Living place				
Township	5 (16.7)	0.80±0.19	1.0 (0.01-1.0)	0.117
Village	5 (16.7)	0.90±0.10	1.0 (0.50-1.0)	
City	20 (66.7)	0.52±0.10	0.56 (0.0-1.0)	
Diagnosis-etiology				
Ischemic stroke-hemiplegia	23 (76.7)	0.67±0.08	1.0 (0.0-1.0)	0.700
Traumatic brain injury-hemiplegia	2 (6.7)	0.50±0.50	0.5 (0.0-1.0)	
Hemorrhagic stroke-hemiplegia	4 (13.3)	0.59±0.24	0.68 (0.0-1.0)	
Job				
Retired	9 (30.0)	0.55±0.16	0.75 (0.0-1.0)	0.505
Housewife	18 (60.0)	0.66±0.10	1.0 (0.0-1.0)	
Side				
Bilateral	11 (36.7)	0.50±0.14	0.37 (0.0-1.0)	0.174
Right	18 (60.0)	0.73±0.09	1.0 (0.0-1.0)	
FAS Stage				
0	8 (26.7)	0.73±0.13	1.0 (0.04-1.0)	0.494
1	4 (13.3)	0.93±0.06	1.0 (0.75-1.0)	
2	2 (6.7)	0.50±0.50	0.5 (0.0-1.0)	
3	8 (26.7)	0.50±0.16	0.50 (0.0-1.0)	
4	8 (26.7)	0.52±0.17	0.59 (0.0-1.0)	
Orthosis				
AFO+inhibitor hand-wrist splint	17 (56.7)	0.67±0.10	1.0 (0.0-1.0)	0.914
Inhibitor hand-wrist splint	10 (33.3)	0.56±0.15	0.68 (0.0-1.0)	
KAFO+inhibitor hand-wrist splint	2 (6.7)	0.52±0.47	0.52 (0.04-1.0)	
Walking aid				
Walking stick	5 (16.7)	0.58±0.20	0.75 (0.0-1.0)	0.253
Tripod	6 (20.0)	0.37±0.20	0.13 (0.0-1.0)	
None	19 (63.3)	0.72±0.09	1.0 (0.0-1.0)	
Reason for non-compliance with orthosis				
Functional reasons	6 (20.0)	0.50±0.22	0.50 (0.0-1.0)	0.778
Device-related reasons	8 (26.7)	0.31±0.11	0.22 (0.0-0.75)	
Device-related reasons+medical reasons	3 (10.0)	0.13±0.11	0.04 (0.0-0.38)	

OUR: Orthosis usage rate; AFO: Ankle foot orthosis; KAFO: Knee ankle foot orthosis; FAS: Functional ambulation scale.

Upper extremity OUR was negatively and strongly correlated with disease duration ($\rho=-0.444$, $p=0.014$) and prescribing time of current orthosis ($\rho=-0.586$, $p=0.001$). In addition, upper extremity OUR was positively and strongly correlated with age ($\rho=0.484$, $p=0.007$) (Table 3).

A total of 6 patients think that orthoses are not necessary and do not increase functionality and quality of life. It was determined that 5 of these 6 patients (83%) never used their orthoses. The data regarding the answers given by the patients to the questions evaluating the patients' attitudes towards orthoses are summarized in Table 4 and Table 5.

TABLE 3: Correlation of continuous variables with the orthosis use rate of lower and upper extremity.

	Lower extremity OUR	Upper extremity OUR
Age	-0.195	0.484**
Disease duration	-0.146	-0.444*
Current orthotic prescribing time	-0.301	-0.586**
Physical medicine and rehabilitation session per year	0.245	0.284
Home exercise time (minute/day)	0.121	0.316

*p<0.005; **p<0.01; OUR: Orthosis usage rates.

TABLE 4: Opinions of participants who were recommended lower extremity orthosis about orthosis use.

Questions	I strongly disagree	I do not agree	I'm undecided	I agree	Absolutely I agree
Do you think the use of orthoses is necessary?	1 (2.9%)	3 (8.6%)	8 (22.9%)	9 (25.7%)	14 (40.0%)
Do you think orthoses increase functionality?	1 (2.9%)	3 (8.6%)	10 (28.6%)	10 (28.6%)	11 (31.4%)
Do you think orthoses improve quality of life?	1 (2.9%)	3 (8.6%)	9 (25.7%)	12 (34.3%)	10 (28.6%)

TABLE 5: Opinions of participants who were recommended upper extremity orthosis about orthosis use.

Questions	I strongly disagree	I do not agree	I'm undecided	I agree	Absolutely I agree
Do you think the use of orthoses is necessary?	2 (6.7%)	2 (6.7%)	8 (26.7%)	5 (16.7%)	13 (43.3%)
Do you think orthoses increase functionality?	3 (10.0%)	1 (3.3%)	8 (26.7%)	6 (20.0%)	12 (40.0%)
Do you think orthoses improve quality of life?	2 (6.7%)	2 (6.7%)	8 (26.7%)	6 (20.0%)	12 (40.0%)

DISCUSSION

Although orthoses have many benefits, it is an important problem that a significant portion of patients stop using orthoses. This situation may reduce the effectiveness of treatment and cause economic loss.¹⁰ However, data on the factors affecting the discontinuation of orthosis use are insufficient. This study examined the factors affecting the discontinuation of individuals due to neurological diseases.

Among the reasons for patients to leave their orthoses, it was determined that device-related reasons (such as the device being tight, heavy enough to cause discomfort, difficulty in using, taking a long time to put on and take off), were more common than functional and medical reasons. In our study, no relationship was found between OUR and gender, educational status, which floor of the house, whether there is an elevator in the place where they live, whether they live in a village, district or city, diagnosis-etiology, occupation, affected side (right, left), affected extremity (hemiplegia, paraplegia, tetraplegia), Brunstrom

stage, FAS stage, type of orthosis, whether or not walking aid. According to these results, it may be concluded that the orthoses may be designed better, produced from lighter materials, and not to squeeze the patient's extremities at an uncomfortable level. It should also be manufactured to be easier to put on and take off. Although device-related reasons are more, it has been determined that there are patients who leave the orthosis for functional and medical reasons. Therefore, the physician following the patient could be better comprehensively evaluate the patient's rehabilitative needs, functional status, medical conditions such as spasticity, contracture, loss of strength and put the right indication. These should be taken into account in the prescribing process. In addition, the doctor should follow the patient closely and try to correct a problem with the patient or device.

Similar to the current study, Kültür and Suna, Swinnen et al., and Safaz et al., determined that the most important factor in device abandonment was device-related reasons.^{9,15,17} Rahimi et al., in their study examining the brace compliance in idiopathic scolio-

sis, reported that the patient's age and psychological state, the type, structure, appearance and the wear pattern of the brace affect the compliance.¹⁸ Dilek et al., in their study on 100 patients with cerebral palsy (CP), determined that the type of CP affects the duration of use of the gait ankle-foot orthosis (AFO), but not the duration of use of the night AFO. In addition, they found that the gross motor levels of individuals with CP were not effective during night and gait AFO use. They reported that the level of knowledge of parents about CP rehabilitation affects the duration of walking AFO use, but not the duration of using AFO at night.¹⁹ In the current study, it was determined that the disease type or functional level did not affect orthosis compliance. This difference may be due to the use of different methodologies. In addition, we did not evaluate the rehabilitation knowledge levels of patients or caregivers in our study. This situation can be counted among the limitations of our study. However, one of the strengths of our study is that we examined the relationship between orthosis-related attitudes of patients and orthosis compliance.

Onat et al., in their study of stroke patients, found that older patients used orthoses at a higher rate than younger patients, similar to the current study. They associated this with younger patients, having more functional gains than older patients and older patients, needing more braces.²⁰ In their study of patients using AFOs, McMonagle et al. concluded that healthcare professionals should ensure that patients understand the recommendations for the use of AFOs. In addition, they found that for the use of AFO, it is necessary to evaluate the psychological state of the patients.²¹

It was determined that as the disease duration and orthosis prescription duration increased, the rate of leaving the orthosis increased. Although patients may try to use their orthoses at first, they may stop using the orthosis for various reasons later on.

The importance of patient satisfaction and patient-centered quality of life assessments is increasing.¹⁹ Ghoseiri et al. evaluated user satisfaction with prosthetic and orthotic devices, and services in their clinic. The lowest satisfaction for device satisfaction was the appearance of the device and the highest satisfaction was the good fit of the device. For service

satisfaction, the highest satisfaction was the appropriate level of courtesy and respect by the staff, and the lowest satisfaction was the coordination between the orthotic and prosthetic staff, and the therapists, doctors.²² There are tests such as Quebec User Evaluation of Satisfaction with Assistive Technology (QUEST 2.0), Client Satisfaction with Device Module of the Orthotics and Prosthetic Users' that evaluate orthosis and assistive device satisfaction.^{23,24} However, there were no Turkish versions of such tests when the study was conducted. In our study, we asked 3 questions to evaluate the attitudes of patients about orthotic devices. It has been determined that a significant portion of the patients (83%) who think that orthoses are not necessary and do not increase functionality and quality of life, have never used their orthosis. Therefore, effective patient information and education may increase patients' compliance with the orthosis.

The lack of psychological evaluation in the current study is one of the limitations of the study. In addition, the small number of patients, the absence of long-term follow-ups and a control group, and the lack of spasticity and contracture evaluation can be counted as other limitations of this study. There was a possibility of recall bias in some of the answered questions. In addition, one of the important limitations of the study is that having participants with different diagnoses and different ambulation levels reduces the homogeneity of the study. Analyzing each diagnosis separately would be more appropriate in terms of results. However, we think that our study is important in terms of evaluating both lower and upper extremities together, evaluating patients with spinal cord injury, hemiplegia, CP together, and also considering many patient-related parameters together. We could not find a study in the literature that evaluated the factors affecting patient compliance with both lower and upper extremity orthoses.

CONCLUSION

It has been determined that the most important factors affecting the orthotic compliance of patients using orthoses are device-related reasons. In addition, patients' attitudes towards orthosis, disease duration, age and orthosis prescription duration are also associated with orthosis compliance. These considera-

tions should be considered during prescribing, orthotic manufacture, and patient follow-up. In addition, more comprehensive and advanced studies should be carried out to evaluate the conditions that affect orthosis compliance.

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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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