RESEARCH

Evaluation of caregiver burden and related factors in children with earthquake-related amputation

Depreme bağlı amputasyonu olan çocuklarda bakım veren yükünün ve ilişkili faktörlerin değerlendirilmesi

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Abstract

Purpose: The aim of this study was to assess the potential burden and associated parameters on caregivers of children with earthquake-related amputation.

Materials and Methods: The study includes children (aged 8-18 years) who experienced unilateral lower limb loss due to Kahramanmaraş earthquakes on February 6, 2023, and their caregivers. The functional status, anxiety and depression levels, and degree of dependency in self-care activities of amputee children were evaluated by using the Child Amputee Prosthetic Project-Functional Status Inventory, Revised Child Anxiety and Depression Scale (RCADS)-caregiver and child forms, and self-care domain of the Functional Independence Measure for Children, respectively. In caregivers, caregiver burden, mental health, and quality of life were assessed using the Zarit Caregiver Burden Interview (ZBI), Hospital Anxiety and Depression Scale (HADS), and 12 item Short-Form Health Survey (SF-12).

Results: The study included 29 primary caregivers and 29 pediatric patients with lower extremity amputations. ZBI total scores differed with phantom pain coexistence. ZBI total scores did not differ according to amputation levels. RCADS anxiety scores were negatively correlated with SF-12 PCS scores. A moderate positive correlation was observed between the total scores of HADS and RCADS caregivers.

Conclusion: Earthquake-related lower limb amputation in children causes increased caregiver burden. This burden was found to be independent of the level of amputation. The mental health of the caregivers was associated with the amputee children's anxiety and depression status, which the caregivers themselves reported.

Keywords: Amputation, caregiver burden, child, earthquake

Öz

Amaç: Bu çalışmanın amacı depreme bağlı amputasyonu olan çocukların bakım verenleri üzerindeki potansiyel yükü ve ilişkili parametreleri değerlendirmektir.

Gereç ve Yöntem: Çalışma, 6 Şubat 2023 tarihinde Kahramanmaraş depremleri nedeniyle tek taraflı alt ekstremite kaybı yaşayan çocukları (8-18 yaş) ve onların bakım verenlerini kapsamaktadır. Ampute çocukların fonksiyonel durumları, anksiyete ve depresyon düzeyleri ve öz bakım aktivitelerindeki bağımlılık dereceleri sırasıyla Çocuk Amputelerde Fonksiyonel Durum Belirleme Testi, Çocuk Anksiyete ve Depresyon Ölçeği-Yenilenmiş (ÇADÖ-Y)-bakım veren ve çocuk formları ve Pediatrik Fonksiyonel Bağımsızlık Ölçeği'nin öz bakım alanı kullanılarak değerlendirildi. Bakım verenlerde bakım veren yükü, ruh sağlığı ve yaşam kalitesi sırasıyla Zarit Bakım Verme Yükü Ölçeği (ZBI), Hastane Anksiyete ve Depresyon Ölçeği (HADS), 12 maddeli Sağlık Durum Anketi (SF-12) kullanılarak değerlendirilmiştir.

Bulgular: Çalışmaya 29 birincil bakım veren ve 29 alt ekstremite amputasyonu olan pediatrik hasta dahil edilmiştir. ZBI toplam puanları fantom ağrı birlikteliği ile farklılık göstermiştir. ZBI-toplam puanları amputasyon seviyelerine göre farklılık göstermemiştir. RCADS anksiyete ve SF-12 PCS skorları arasında negatif korelasyon bulunmuştur. HADS ve RCADS bakım verenlerinin toplam puanları arasında orta düzeyde pozitif bir korelasyon gözlenmiştir.

Sonuç: Çocuklarda depreme bağlı alt ekstremite amputasyonu artan bakım veren yüküne neden olmaktadır. Bu yükün amputasyon seviyesinden bağımsız olduğu bulunmuştur. Bakım veren kişilerin mental sağlığı, yine bakım verenlerin değerlendirmesiyle tespit edilen çocuk anksiyete ve depresyon düzeyleri ile ilişkili bulunmuştur. **Anahtar kelimeler**: Amputasyon, bakım veren yükü, cocuk, deprem

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INTRODUCTION

The earthquakes centered in Kahramanmaraş on February 6, 2023, affected an area of approximately 350 square kilometers and resulted in more than 120,000 people sustaining injuries¹. Fractures, compartment syndrome, crush injury, and damage to the vascular, peripheral nerve, and soft tissues are earthquake-related examples of injuries. Amputation(s), including one or more extremities, is one of the most important orthopedic injuries^{2,3}. According to the data of the Turkish Ministry of Health, the total number of amputees within 120 days after the earthquake was 1,956, of which 317 were under the age of 18 and 1,639 were over the age of 184. Morelli et al. reported in their systematic review that the rate of earthquake-related amputation in children ranged between 5.0% and 11.0%5.

Providing care to patients with chronic disabilities affects the social lives, relationships, and economic status of caregivers. Numerous studies have indicated that caring for children with chronic illnesses or disabilities places a substantial burden on caregivers and also causes reduced quality of life6-8. Research findings, including chronic conditions (e.g., cerebral palsy), indicated several factors influenced the caregiver burden. These factors comprised the child's condition (e.g., level of functionality, education, communication abilities) and the caregiver's circumstances (e.g., family education, size, employment status, marital status)9-12. Emotional and psychological factors also contribute to the burden on parents of children with high caregiving needs. The emotional burden arises from the trauma of the child's health status, the responsibility of caregiving, and the uncertainty surrounding the child's future^{13,14}. The emotional and psychological challenges that caregivers face can also impact the child's well-being. This reciprocal relationship highlights the importance of addressing the caregiver's burden to ensure the well-being of both the caregiver and the child14,15.

There is a reciprocal relationship between burden and quality of life. A lower caregiving burden is linked to better mental quality of life in caregivers of amputee patients with type 2 diabetes¹⁶. Research findings in diabetic and war-related amputees showed that the quality of life for caregivers of individuals with lower limb amputations is significantly influenced by various factors, including their physical and mental health, the extent of family and social support available to them, the burden associated with caregiving, and the health status of the amputee¹⁶⁻¹⁸. The burden experienced by caregivers of child amputee patients and their quality of life is multifaceted, encompassing psychological, emotional, and social challenges13-19,20. There are limited studies regarding the burden and quality of life of caregivers of adult individuals with amputations²¹⁻²⁴. However, as far as we are concerned, there is no associated data on children's earthquake-related amputations. Understanding the caregiver burden and its related factors is crucial for developing effective support systems to alleviate caregiver distress and improve overall well-being. The current study aimed to evaluate: (i) the impact of earthquake-related amputation on children's mental and physical health; (ii) the potential burden on caregivers of children with amputations; and (iii) the parameters related to this burden. We hypothesized that caregivers of earthquake-related lower limb amputee children have increased caregiver burden. This burden is associated with various health parameters of both the children and their caregivers.

MATERIALS AND METHODS

Sample and study design

The study was conducted at the Cukurova University Child Wellness Center between March 2024 and August 2024. The Child Wellness Center Project is a project that was established immediately following the earthquake to provide comprehensive, long-term rehabilitation and care for children who have suffered limb loss as a result of the 2023 Kahramanmaraş earthquakes. In this cross-sectional study, amputee children and their primary caregivers were included.

Amputee children and their caregivers were recruited by physiatrists and psychiatrist consecutively during routine evaluation in this center. The center applies strict data recording principles. The inclusion criteria were i) aged between 8 and 18 years, ii) had earthquake-related unilateral lower limb amputation, and iii) duration of prosthetic use > 3 months. Amputee children were excluded if they had i) loss of limb due to other factors before the earthquake, ii) concomitant upper limb or other lower limb amputation, iii) duration of prosthetic use < 3months, and iv) had inability to understand and fill in the questionnaires.

The ethical approval of the study was obtained from the Non-Interventional Clinical Research Ethics Committee of Cukurova University Faculty of Medicine (Date of approval: February 23, 2024, Number: 141/39). Informed consent was obtained from the parents or legal guardians of the participants. The study was conducted in line with the principles of the Declaration of Helsinki.

Procedure

Sociodemographic data of amputee children (gender, age, education), duration of hospitalization (days), amputation characteristics (side, level), pain (residual extremity and phantom), concomitant injuries, duration (months), and frequency of prosthesis usage (hours/day) were recorded. Additionally, the demographic information of primary caregivers (age, gender, education, marital status), socioeconomic conditions (income, employment status, current living situation), caregiving characteristics (duration; hours/day), relation to the patient, another dependent person in the family), presence of earthquake-related injuries, and loss of first-degree relatives were also documented. The number of hours the caregiver spent daily with the child since the post-earthquake period was recorded as the duration of caregiving. In addition to psychological symptoms in caregiver and amputee children, the data regarding burden and health-related quality of life in caregivers, children's physical functional abilities, and the level of independence in self-care activities were collected.

Measures

Zarit Caregiver Burden Interview (ZBI)

The Zarit Caregiver Burden Interview (ZBI) was used to assess the burden experienced by caregivers of children with amputations. Developed by Zarit et al., this 29-item questionnaire assesses the subjective burden perceived by caregivers²⁵. It has undergone several revisions, including a shortened version comprising 22 items. The Turkish validity and reliability study of the 22-item short version of the ZBI was conducted by Özlü et al., which reduced the scale to 19 items by excluding three with factor loadings below 0.50. The Turkish version was determined to be a valid and reliable tool (Cronbach's alpha: 0.83). A higher score indicates a higher caregiver burden²⁶.

Functional Independence Measure for Children (Wee-FIM)

The functional independence of children with amputations in daily self-care activities was evaluated using the self-care domain of the Functional Independence Measure for Children (Wee-FIM). This domain includes six items: eating, grooming, bathing, dressing (both lower and upper body), and toileting (excluding bowel and bladder control). A 7level ordinal rating system evaluates each item from 7 (complete independence) to 1 (total assistance). A rating of six means that the child can perform the activity independently but requires an assistive device or additional time or faces safety concerns while completing it. A rating of five indicates that the child needs a helper to supervise or set up the task. Ratings from four to one reflect that the child requires varying degrees of assistance from another person to complete the activity²⁷.

Child Amputee Prosthetic Project-Functional Status Inventory (CAPP-FSI)

The Child Amputee Prosthetic Project-Functional Status Inventory (CAPP-FSI) was utilized to assess the physical functional abilities of children with amputations. This tool relies on parent-reported measures of the child's everyday behavioral performance²⁸. The inventory includes 34 items related to upper limb activities and six items related to lower limb activities, encompassing daily living tasks, self-care activities, and tasks consistent with the child's developmental status. Higher scores indicate greater independence in performing behaviors and more frequent prosthesis use during these activities²⁸. The current study used only the items on activities for the lower limbs to evaluate how the child engages in various activities.

The Twelve-item Short-Form Health Survey (SF-12)

The twelve-item Short-Form Health Survey (SF-12) was used to evaluate caregivers' health-related quality of life. The survey comprises two main subdimensions: physical health and mental health components. The SF-12 generates two summary measures: the Physical Component Summary (MCS). Higher scores in each health domain indicate a better health-related quality of life²⁹. The Turkish study on the validity and reliability of the SF-12 was conducted by Soylu and Kütük in 2021³⁰.

The Hospital Anxiety and Depression Scale (HADS

HADS implemented to evaluate was the psychological status of caregivers. This scale was developed by Zigmond and Snaith, assesses symptoms of anxiety and depression³¹. It consists of 14 items total, with seven addressing anxiety and seven focusing on symptoms of depression. Responses are evaluated using a four-point Likert scale, scored from 0 to 3. In the original study, scores between 8 and 10 on each subscale were considered borderline cases, while scores 11 and above were classified as definite cases³¹. Aydemir and colleagues conducted a study to examine the validity and reliability of the Turkish version, determining the cutoff score as 10 for the anxiety subscale and 8 for the depression subscale³².

The Revised Child Anxiety and Depression Scale (RCADS)

This scale was used to assess clinical symptoms of anxiety and depression in children with amputations. RCADS is a 47-item self-report questionnaire scored on a 4-point scale (0 = never, 1 = sometimes, 2 =often, and 3 = always). The RCADS provides a total anxiety score (the sum of the five anxiety subscales), a depression score (based on the depression subscale), and an overall score (the sum of all six subscales)33. Additionally, the Revised Child Anxiety and Depression Scale-parent version evaluates parents' reports on adolescents' anxiety and depression symptoms using the same subscales. A high score indicates impaired mental health, reflecting symptoms of anxiety and depression along with an increased frequency of these symptoms. Gormez et al. provided satisfactory evidence that the Turkish RCADS-child version produces valid scores for clinical use among Turkish children³⁴.

Statistical analysis

Descriptive tests were used to determine the frequency, mean±sd, and median (min-max) of the study parameters. The patient sample was divided into two groups according to the level of amputation: i) above-knee (transfemoral + knee disarticulation) and ii) below-knee (transtibial) amputation groups. Pearson's chi-squared/Fisher's exact test were used for comparative analyses according to the data distribution. The Mann-Whitney U-test was used to compare the measurement scores between the groups of amputation levels. The relationship between

caregiver and child sociodemographic parameters and total ZBI score was investigated with the Mann-Whitney U-test. Spearman's correlation analysis was implemented to evaluate the correlation between the study variables. P-values were considered statistically significant as they were less than 0.05.

RESULTS

During the study period, a total of 108 amputee children were being followed up in our center. Of these, 31 children with upper extremity amputation and 14 children with bilateral lower extremity amputation were excluded. Of the 63 children with unilateral lower extremity amputation, 34 children aged 8-18 years were included in the study. A total of 29 children and their caregivers were included in the study, with the exclusion of 5 more amputees due to prosthesis usage time less than 3 months and language problems.

The study included 29 children (15 female, 14 male) with unilateral lower limb amputations and their caregivers. The mean age of amputee children was 13.8 ± 3.2 years. The distribution of amputation levels was found to be transtibial (51.7%), transfemoral (34.5%), and knee disarticulation (13.8%) (Table 1). The mean duration of prosthesis use was 7.6±1.5 months. The patients wore their prostheses for an average of 9.6 ± 4.7 hours per day. Regarding functionality and daily living activities, the mean CAPP-FSI (with prosthesis) and Wee-FIM were 16.6 ± 6.5 and 40.5 ± 2.2 , respectively.

The sociodemographic and evaluation parameters of caregivers are given in Table 2. In the comparative analysis of the variables (WeeFIM, CAPP-FSI with prosthesis, RCADS caregiver and child, ZBI, HADS, SF-12) according to the level of amputation (aboveknee & below-knee), no significant differences were found between the above-knee and below-knee amputation groups (Table 3). Of the caregivers, 22 (75.9%) were receiving support from а relative/partner in terms of caregiving. The mean ZBI total score was 35.3±10.9 (Table 2). Caregiver and child sociodemographic parameters were found to be unrelated to the ZBI total score (p>0.05). ZBI total scores in caregivers of children with phantom pain were significantly different from those who have children without phantom pain (Z=-2.112, p=0.032). The total ZBI scores were not correlated with the Wee-FIM, CAPP-FSI, SF-12, HADS, and RCADSparent/child (p>0.05).

Twenty caregivers (69.0%) and 10 caregivers (34.5%) had depression and anxiety scores on HADS that were above the cutoff, respectively. HADS anxiety scores were negatively correlated with the SF-12 PCS scores (Spearman's rho=-0.453, p=0.014). The mean child and caregiver RCADS-depression scores were 8.5±6.6 and 7.7±4.1, respectively. RCADS anxiety scores were negatively correlated with SF-12 PCS scores (parent; Spearman's rho=-0.518, p=0.004;

child; Spearman's rho=-0.471, p=0.01). The HADS and RCADS caregiver version scores were found to be correlated. There were positive correlations between HADS-depression and RCADS-depression (Spearman's rho=0.463, p=0.01), HADS-anxiety and RCADS-anxiety (Spearman's rho=0.574, p=0.001), as well as HADS-total and the RCADS-total scores (Spearman's rho=0.562, p=0.002).

Ί	able	1.	Socio-a	lemogra	phic,	injur	y-related,	and	clinical	data	of am	putee	children
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	n=29
Age	14 (8-18)
Gender	
Female	15 (51.7%)
Male	14 (48.3%)
Education	
Primary school	5 (17.2%)
Secondary school	11 (37.9%)
High school	13 (44.8%)
Duration of hospitalization (days)	90 (8-300)
Amputation level	
Transtibial	15 (51.7%)
Transfemoral	10 (34.5%)
Knee disarticulation	4 (13.8%)
Amputated side	
Right	15 (51.7%)
Left	14 (48.3%)
Residual extremity pain	15 (51.7%)
NRS-residual extremity pain	4 (2-8)
Phantom limb pain	5 (17.2%)
NRS-Phantom pain	5 (3-7)
Presence of concomitant injuries	21 (72.4%)
Peripheral nerve injuries	13 (44.8%)
Duration of prosthesis use (months)	8 (4-10)
Frequency of prosthesis use (hours/day)	12 (1-14)
Wee-FIM	42 (35-42)
CAPP-FSI (with prosthesis)	19 (0-24)
CAPP-FSI (without prosthesis)	4 (0-24)
RCADS -total anxiety (child version)	31.8±16.5
RCADS -total (child version)	40.3±21
RCADS-total anxiety (caregiver version)	25.8±12.8
RCADS- total (caregiver version)	33.5±15.7

Values are presented in; n (%), mean ± standard deviation, or median (min-max) Wee-FIM: Functional Independence Measure for Children, CAPP-FSI: Child Amputee Prosthetic Project- Functional Status Inventory, RCADS: Revised Child Anxiety and Depression Scales

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	n=29
Age	38.9±9.2
Gender	
Female	17 (58.6%)
Male	12 (41.4%)
Marital status	
Married	4 (13.8%)
Single	12 (41.4%)
Widow/divorced	13 (44.8%)
Education level (years)	11 (5-16)
Monthly income (TL)	10000 (0-70000)
Working status	
Yes	12 (41.4%)
No	17 (58.6%)
Current residential	
Own house	16 (55.2%)
House of a relative	5 (17.2%)
Container	8 (27.6%)
The caregiver's relationship with the patient	
First-degree relative	21 (72.4%)
Close relatives	8 (27.6%)
Existence of other dependents	8 (27.6%)
Number of dependents	1 (1-2)
Earthquake survivor status (+)	24 (82.8%)
Earthquake-related injuries ^a	11 (45.8%)
Loss of 1 st degree relatives ^b	2 (0-3)
Duration of caregiving (hours/day)	9.5±3.2
ZBI total	35.3±10.9
HADS	
Depression	9.3±3.8
Anxiety	8.1±3.4
Total	17.4±6.9
SF-12 PCS	43.2±9.1
SF-12 MCS	40.1±13.3

Table 2. Socio-demographic and evaluation parameters of caregivers

SF-12 MCS Values are presented in; n (%), mean ± standard deviation, or median (min-max)

^aRepresents at least one injury related to the earthquake, ^bRepresents at least one 1st-degree relative lost

TL: Turkish Lira, ZBI: Zarit Caregiver Burden Interview, HADS: Hospital Anxiety and Depression Scale, SF-12: 12-item Short-Form Health Survey, PCS: Physical Component Summary, MCS: Mental Component Summary

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	Amputati	on level	Z	р
	Above-knee	Below-knee		
	n=14	n=15		
Wee-FIM	41 (35-42)	42 (38-42)	-1.271	0.252
CAPP-FSI (with prosthesis)	18 (6-24)	19 (0-24)	132	0.914
RCADS-total (caregiver)	20 (15-56)	36 (12-61)	-1.333	0.186
RCADS-total (child)	36 (12-67)	39 (2-81)	699	0.505
ZBI-total	31 (19-47)	37 (19-61)	-1.269	0.217
HADS	16 (5-31)	18 (10-27)	984	0.331
SF-12 PCS	46 (22-56)	42 (30-54)	-1.004	0.331
SF-12 MCS	34 (21-62)	44 (22-66)	-1.571	0.123

Values are presented in; median (min-max) Wee-FIM: Functional Independence Measure for Children, CAPP-FSI: Child Amputee Prosthetic Project- Functional Status Inventory, RCADS: Revised Child Anxiety and Depression Scales, ZBI: Zarit Caregiver Burden Interview, HADS: Hospital Anxiety and Depression Scale, SF-12: 12-item Short-Form Health Survey, PCS: Physical Component Summary, MCS: Mental Component Summary

DISCUSSION

The current study presents data on the impact of earthquake-related amputation on children's mental and physical health, as well as the burden on caregivers of children with lower limb amputations and burden-related characteristics. Our study has made an important contribution to the literature by demonstrating that this burden affects all patients and their relatives, regardless of the earthquake-related amputation characteristics, the child's level of functional independence in self-care, physical functional capacity, and emotional problems (depression and anxiety).

In the present study, the major finding was a significant burden on caregivers, with a mean ZBI score of 35.3±10.9. The caregiver burden derived from our study results was comparable to that of individuals caring for children with various disabilities^{8,11,35,36}. Kenis Coskun et al. evaluated the caregiver burden of the families of children with cystic fibrosis and primary biliary cirrhosis using ZBI. They reported that this burden was significantly higher in the cystic fibrosis population compared to primary biliary cirrhosis. The mean ZBI scores were 30.5 ± 10.7 and 21.93 ± 8.26 , respectively³⁵. In another study in which the caregiver burdens of children and adolescents with Down syndrome were evaluated, the results were compared with the caregiver burdens of their parents with those without disabilities of the same age group. Accordingly, the mean ZBI score for the study group was 34.58±9.11, whereas, in the control group, a mean of 15.13 ± 7.28 indicates that the caregivers of patients with Down syndrome were more burdened than those of the healthy group³⁶.

Contrary to the existing literature, the level/side of amputation, functional independence in self-care activities, and physical functional ability of children did not relate to caregiver burden in the present study. While direct evidence linking amputation levels to caregiver burden in pediatric patients is sparse, related studies suggest that higher amputation levels and non-ambulatory status can increase caregiver burden^{37,38}. Higher dependency in children, especially those with chronic conditions or special health care needs, leads to increased caregiver burden. The burden is influenced by the child's medical needs, frequency of healthcare visits, and the child's ability to manage their condition³⁹. The availability of supportive resources is an important

factor affecting caregivers' burden¹². In a study by Costa et al., the burden changes of caregivers of patients with type 2 diabetes experiencing lower limb amputation were evaluated. Accordingly, caregivers who received help in care reported lower burden levels at baseline and did not show any change over time²². In our sample, more than three-fourths of caregivers received support from a relative/partner in terms of caregiving. In addition to the high support rate, the current sample's adequate and easy access to health services, which are provided within the project scope, may mitigate the effect of the child's dependency on the caregiver's burden.

The present study results suggested that in the case of phantom limb pain in children, caregivers suffered from a higher burden. While the direct impact of phantom limb pain on caregiver burden is not explicitly detailed in the literature, the significant reduction in quality of life⁴⁰ and increased care needs of those suffering from phantom limb pain⁴¹ suggest a likely increase in caregiver burden. It has been assumed that pain management interventions can be effective in decreasing caregiver burden in earthquake-related amputations.

Interestingly, our findings showed that the burden on caregivers was unrelated to physical and mental health-related quality of life (HRQOL) in caregivers. On the other hand, higher anxiety symptoms in caregivers and children were linked to lower physical HRQOL in caregivers. Our findings suggested that mental health problems might be more associated with the quality of life in caregivers of earthquakerelated amputees. The results of the limited number of studies conducted on caregivers of amputees, in parallel with our study, have drawn attention to the close relationship between mental health and quality of life. In a study including caregivers of patients with type 2 diabetes experiencing lower limb amputation, the practice of physical activity, lower burden, better family functioning, and less traumatic symptoms were found to be predictors for better mental quality of life¹⁶. In another study comprising war-related bilateral lower-limb amputees and their caregivers, history of hospitalization during the preceding year of the study and mental health problems in the amputees have been reported as the most important predicting factors in the caregivers' QOL18. Present results suggested that in order to promote physical quality of life, future intervention programs should consider the presence of anxiety symptoms in the caregiver, as well as in children with amputations.

The responsibilities of caregiving can lead to symptoms such as chronic stress, anxiety, depression, and burnout among caregivers^{42,43}. In the current study, approximately two-thirds of caregivers reported clinically significant symptoms of depression, while one-third experienced clinically significant symptoms of anxiety. The findings indicate that caregiving for amputee patients adversely affects the mental health of caregivers. One of the central emotional challenges in this role is the ongoing requirement to support the child while also addressing their emotional well-being14. Caregivers frequently struggle with feelings of helplessness and grief²⁰. Present results indicated that depressive symptoms represent the most significant emotional challenge for caregivers of children with amputations. The emotional burden of observing a loved one's struggles, along with the trauma from experiences such as earthquakes and the loss of family members, combined with the practical demands of caregiving, can lead to feelings of depression among these caregivers. Furthermore, many patients who undergo limb amputations also experience profound emotional changes⁴⁴. The present findings indicate that the mental health of caregivers and children is closely interconnected. There is clear and consistent evidence that caregivers' anxiety and depression are closely linked to poorer mental health outcomes in children. Multiple studies show that caregiver depression, anxiety, and stress are significantly associated with increased symptoms of anxiety and depression in children and adolescents. This relationship is observed in both general populations and high-stress environments and among families facing chronic illness or poverty45-48. In line with the literature, the present results suggested that in the case of worsened mental health in caregivers, their amputee children have also worsened mental health, or vice versa. It can be assumed that interventions targeting anxiety, in particular, will have positive effects on caregiver-child mental health in amputees.

There are some limitations in the current study, including children with lower extremity limb loss due to earthquake(s) and their caregivers. One of the limitations is the exclusive use of self-report instruments to assess anxiety/depression symptoms and the fact that the children who participated in this study were those who had only earthquake-related lower limb amputations. Additionally, we cannot establish the directionality of associations because of its cross-sectional design. The small sample size restricted the establishment of prominent connections between factors associated with caregiver burden. Despite these limitations, the current study included comprehensive evaluation of earthquake-related parameters, mental health, functionality, and quality of life.

In conclusion, the current study emphasizes the significant burden and mental health challenges faced by caregivers of children who have undergone earthquake-related lower limb amputations. To alleviate this burden, comprehensive medical management for the physical symptoms experienced by amputees, such as phantom limb pain, is essential. Given that mental health issues in both amputees and caregivers substantially affect the caregivers' HRQOL, it is crucial to offer psychological support for both groups. Providing simultaneous care and services aimed at maintaining both mental and physical health for amputees and their caregivers is important for reducing burdens and enhancing caregivers' HRQOL. Considering the increasing incidence of disasters and the long-term implications of pediatric amputation, there is a pressing need for further longitudinal research focused on the caregivers of this population. Future longitudinal studies would help us understand how caregiver burden and related health parameters evolve as children grow.

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