Evaluation of musculoskeletal system in caregivers of rehabilitation patients: A cross-sectional study

Rehabilitasyon hastalarının bakımverenlerinde kas-iskelet sisteminin değerlendirilmesi: Kesitsel bir çalışma

Halime ARIKAN[1], Meral SERTEL[2], Zuhal Şevval GÖKDERE [3]

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***1-**Tokat Gaziosmanpasa University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation.Tokat, Türkiye.*

***2-**Bursa Uludağ University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation. Bursa, Türkiye.*

***3-**Gazi University, Institute of Health Sciences, Department of Physiotherapy and Rehabilitation. Ankara, Türkiye.*

***Sorumlu Yazar / Corresponding Author:** Halime ARIKAN*

e-posta / e-mail: halimearikan92@gmail.com

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Abstract

Musculoskeletal health is an important component of physical health. It was aimed to assess the musculoskeletal system involvement, fatigue, and quality of life among caregivers of various patient groups in this study. The study comprised 55 caregivers, consisting of 37 female and 18 male, with an average age of 41.24±12.25 years. The individuals' musculoskeletal, neck, and low back pains, musculoskeletal discomfort, posture, spinal functionality, low back disability, neck disability, fatigue, and quality of life were assessed using the Numeric Rating Scale, Cornell Musculoskeletal Discomfort Questionnaire, New York Posture Rating Scale, Spine Functional Index, Oswestry Disability Index, Bournemouth Questionnaire, Fatigue Severity Scale, and Short Form-36 questionnaires, respectively. All parameters evaluated were similar among caregivers of orthopedic, pediatric, and neurological patients (p>0.05). Significant correlations were observed among the parameters of musculoskeletal pain, neck pain, low back pain, musculoskeletal discomfort, posture, spinal functionality, neck and low back disability and fatigue severity in individuals (from -0.267 to 0.754). Additionally, significant correlations were found between the subscales of SF-36 and these parameters, ranging from -0.273 to 0.754. The musculoskeletal system is affected in all caregivers, and caregivers across different patient groups exhibit similar effects.

Keywords: Caregiver, low back, musculoskeletal, neck, pain

Özet

Kas-iskelet sağlığı, fiziksel sağlığın önemli bir bileşenidir. Bu çalışmada çeşitli hasta gruplarının bakımverenlerinde kas-iskelet sistemi katılımını, yorgunluk ve yaşam kalitesini değerlendirmek amaçlandı. Çalışmaya yaş ortalaması 41,24±12,25 yıl olan 37 kadın ve 18 erkekten oluşan toplam 55 bakımveren dahil edilmiştir. Bireylerin kas-iskelet, boyun ve bel ağrıları, kas-iskelet rahatsızlığı, postür, omurga fonksiyonelliği, bel sakatlığı, boyun sakatlığı, yorgunluk ve yaşam kalitesi sırasıyla Sayısal Derecelendirme Ölçeği, Cornell Kas-İskelet Rahatsızlığı Anketi, New York Postür Derecelendirme Ölçeği, Omurga Fonksiyon İndeksi, Oswestry Sakatlık İndeksi, Bournemouth Anketi, Yorgunluk Şiddeti Ölçeği ve Kısa Form-36 anketleri kullanılarak değerlendirildi. Değerlendirilen tüm parametreler, ortopedik, pediatrik ve nörolojik hastaların bakımverenleri arasında benzerdi (p>0,05). Bireylerde kas-iskelet ağrısı, boyun ağrısı, bel ağrısı, kas-iskelet rahatsızlığı, postür, omurga fonksiyonelliği, boyun ve bel sakatlığı ve yorgunluk şiddeti parametreleri arasında anlamlı korelasyonlar gözlendi (-0,267 ila 0,754 aralığında). Ayrıca, Kısa Form-36 alt ölçekleri ile bu parametreler arasında -0,273 ila 0,754 aralığında anlamlı korelasyonlar bulundu. Kas-iskelet sistemi tüm bakımverenlerde etkilenmiştir ve farklı hasta gruplarının bakımverenleri benzer etkiler sergilemektedir.

Anahtar Kelimeler: Bakımveren, bel, kas-iskelet, boyun, ağrı

Introduction

The care provided by caregivers can delay or prevent hospitalization (1), reduce the length of stay in the hospital (2), and reduce expenditure on inpatient and long-term care services (3). Nevertheless, it has been demonstrated that delivering thorough care impacts the physical and psychological well-being of caregivers. Unpaid caregivers might experience worse mental health compared to those who are not caregivers (4). In addition, their physical health may be worse (5), they may exhibit unhealthy behaviors (6), and they may experience higher morbidity and mortality compared to non-caregivers (7). It should not be surprising that the decrease in the physical health of the caregiver is an indicator of discontinuation (8).

Musculoskeletal health is essential for maintaining overall physical well-being. Research shows that caregivers might be prone to musculoskeletal symptoms and injuries, possibly due to the physical demands of caregiving. In a study of unpaid caregivers in rural regions, participants reported physical challenges like fatigue, back pain, and headaches associated with caregiving duties (9). Among unpaid caregivers of adults with multiple sclerosis, 31% experienced physical injuries, while 49% reported physical exhaustion due to caregiving (10). Research on unpaid caregivers of paralyzed veterans found that 24% sustained injuries during care, and 30% encountered issues such as muscle strains and bruising (11).

While numerous studies have investigated musculoskeletal disorders, their prevalence, and the affected disease groups among unpaid caregivers from various perspectives (10, 12–16), there is limited research that thoroughly assesses the musculoskeletal system and examines the specific musculoskeletal characteristics of caregivers of rehabilitation patients. Consequently, this study 1) hypothesized that caregivers are notably affected by musculoskeletal issues, and 2) explored whether caregivers of different patient groups experience varying levels of impact.

Material and Method

Individuals

This study was designed as a cross-sectional and descriptive study, aiming to evaluate the musculoskeletal health, fatigue, and quality of life of caregivers of individuals with orthopedic, pediatric, and neurological conditions. Due to the cross-sectional nature of the study, causal relationships between the variables cannot be established, and the findings are intended to provide a descriptive analysis of the parameters evaluated. The data for this study were collected using a structured questionnaire over a six-month period between May 2, 2023, and November 2, 2023. This timeframe included spring, summer, and fall seasons in Turkey, which could potentially introduce seasonal variability in caregiving activities or caregivers' musculoskeletal health, fatigue, and quality of life. For example, increased physical activity during warmer months or environmental factors such as temperature and daylight duration might have influenced the results. No specific measures were implemented to control for potential seasonal effects during the data collection phase. However, the inclusion of participants across different seasons aimed to capture a more diverse range of caregiving experiences and reduce the likelihood of bias related to a single seasonal period. Future studies could address this limitation by employing longitudinal designs or by analyzing seasonal effects more explicitly.

Post-hoc power analysis was performed using G*Power (version 3.1.9.7), with

ORCID:
Halime ARIKAN: 0000-0003-2381-9978;
Meral SERTEL: 0000-0002-7575-9762;
Zuhal Şevval GÖKDERE: 0000-0003-0216-5688

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the effect size evaluated through the Modified Oswestry Disability Index in caregivers. According to the analysis, when the statistical significance of the two-way hypothesis test alpha was taken as 5% and the confidence interval was 95%, the effect size was found to be Modified Oswestry Disability Index and the power of the study (1-β) was found to be 86%. Fifty-five volunteer caregivers participated in the research. The inclusion criteria were: (1) being a family member of the individual they care for (e.g., child, mother, or father), (2) having no physical disabilities, and (3) the ability to understand and complete the questionnaire. Exclusion criteria included individuals under the age of 18, those with a physician-diagnosed history of mental illness or symptoms, and non-family caregivers.

This study's target population consisted of family caregivers providing care to rehabilitation patients in Turkey. The sample was drawn using a non-probabilistic convenience sampling method, as participants were recruited based on their availability and willingness to participate. This method was chosen due to its practicality and accessibility to caregivers within the study's timeframe and resources. While this approach limits the generalizability of the findings to all caregivers, it provides valuable insights into the musculoskeletal health of this specific group.

The participants in this study were divided into three groups based on the type of patient they provided care for: orthopedic, pediatric, and neurological.

Orthopedic group: Caregivers providing care to individuals with musculoskeletal or joint disorders, such as fractures, arthritis, or post-surgical recovery.

Pediatric group: Caregivers supporting children with congenital or acquired conditions, such as cerebral palsy or developmental delays, often requiring long-term care.

Neurological group: Caregivers assisting patients with neurological conditions, such as stroke, multiple sclerosis, or spinal cord injuries.

These groups were selected due to the differing physical and psychological demands associated with caregiving in each context. Participants were recruited through rehabilitation centers and clinics specializing in these patient groups. Group-specific characteristics, such as caregiving duration and patient needs, were analyzed to identify their potential impact on caregivers' musculoskeletal health and quality of life.

All participants provided informed consent before taking part in the study. The ethical approval was obtained from the Clinical Research Ethics Committee of Tokat Gaziosmanpasa University (decision date and no: 13 April 2023, 83116987-271). The study is available on ClinicalTrials.gov (NCT05839795).

Outcome measures

Data for the study were collected with data tools that could be filled in by individuals themselves. In this study, the dependent variables included musculoskeletal-related pain, posture, spinal functionality, low back disability, neck disability, musculoskeletal discomfort, fatigue severity, and quality of life. These variables were assessed using validated scales as described below.

The independent variables were demographic and caregiving-related characteristics, such as age, gender, body mass index (BMI), caregiving duration, patient disease group (orthopedic, pediatric, or neurological), smoking, and alcohol use. These were analyzed to examine their relationship with the dependent variables and identify potential predictors of musculoskeletal system involvement and quality of life among caregivers.

After questioning the sociodemographic information of the individuals, they were asked to fill in the following outcome measures:

Numeric Pain Rating Scale (NPRS): Musculoskeletal-related pain was evaluated using the NPRS, which ranges from 0 (no pain) to 10 (worst possible pain). The score reflects the value reported by the participant on the scale (17). **New York Posture Rating Chart (NPRC):** The NPRC, established in 1958, was used to assess individual posture. This scale evaluates body alignment in the anatomical position by dividing the body into 13 segments and permitting assessment from two viewpoints: anterior and lateral. Scoring is based on a 1-3-5 scale, where 1 indicates severe deviation, 3 signifies minor deviation, and 5 represents correct posture. The total score ranges from 13 to 65, with higher scores reflecting better posture (18).

Spine Functional Index (SFI): The SFI is a 25-item scale developed to evaluate the impact of

spine-related symptoms on functionality. Each item is scored as 0, 0.5, or 1. The total score is expressed as a percentage, with scores closer to 100 indicating normal spinal function (19). The Turkish version of this scale has been validated and its reliability established (20).

Modified Oswestry Disability Index (MODI): The MODI includes 10 questions that address pain intensity, personal care, lifting, walking, sitting, standing, sleeping, social life, travel, and changes in pain over time, with each question providing 6 response options. Participants choose the option that most accurately represents their condition, scoring between 0 and 5 points per question. The total score is presented as a percentage, where higher percentages denote greater functional limitation and lower percentages indicate better functional status (21). The Turkish version of this scale has been validated and its reliability (22).

Bournemouth Questionnaire (BQ): The BQ evaluates several dimensions related to neck pain, including severity, effects on family and social life, depression, anxiety, kinesiophobia, and pain management. It consists of 7 questions, each scored from 0 to 10 (23). The Turkish version has been validated and its reliability tested (24).

Cornell Musculoskeletal Discomfort Questionnaire (CMDQ): The CMDQ assesses musculoskeletal discomfort in 18 regions, focusing on frequency, severity, and disability (25). The Turkish version has been validated and its reliability confirmed (26).

Fatigue Severity Scale (FSS): Fatigue among caregivers was assessed using the FSS. Participants rate their level of agreement with each of the 9 items on a scale from 1 (strongly disagree) to 7 (strongly agree). The total score ranges from 9 to 63, with a score of 36 or higher indicating severe fatigue (27). The Turkish version of the scale has been validated and its reliability confirmed (28).

Short Form-36 (SF-36): The SF-36 is a commonly used generic instrument for evaluating quality of life. It encompasses 8 health dimensions through 36 items, including physical functioning, role limitations (due to physical and emotional issues), social functioning, mental health, vitality, pain, and general health perception (29). The Turkish version of the SF-36 has been validated and its reliability confirmed (30).

Statistical analysis

Statistical analyses were performed using the Statistical Package for Social Sciences (SPSS) version 22.0. Data were reported as mean ± standard deviation (X±SD), median, or percentage (%). The One-Sample Kolmogorov-Smirnov test was employed to determine whether data distribution was parametric or nonparametric. One-Way ANOVA was used for comparing independent groups when parametric test assumptions were satisfied, while the Kruskal-Wallis Test was applied when these assumptions were not met. Fisher's Exact Test and the Chi-Square Test were used for categorical variables. Relationships among continuous variables were evaluated using Pearson correlation analysis. Correlation coefficients were categorized as excellent (0.81–1.00), very good (0.61–0.80), good (0.41–0.60), poor (0.21–0.40), and weak (0.00–0.20) (31). Statistical significance was defined as $p < 0.05$.

Results

Fifty-five individuals with an average age of 41.24±12.25 years were included in this study. Descriptive characteristics of the individuals are listed in Table 1. There was no difference between continuous and categorical variables, except for length of caregiving. Pediatric individuals' caregiving duration was more than other groups.

Table 1: Descriptive characteristics of the individuals

Parameters	Orthopedic (n= 17)	Pediatric (n= 22)	Neurological (n= 16)	p
	Mean±SD	Mean±SD	Mean±SD	
Age (years)	41.29±12.87	39.00±10.90	44.25±13.44	0.435 [α]
Weight (kg)	71.24±12.85	72.68±11.54	72.13±11.52	0.932 [α]
Length (m)	1.70±0.08	1.63±1.10	1.66±0.05	0.054 [α]

BMI (kg/m²)	24.50±3.09	27.26±4.20	26.28±4.18	0.097 α
Caregiving duration (months)	45.53±85.42	118.95±91.91	37.00±47.36	**0.003** α
Parameters	**n (%)**	**n (%)**	**n (%)**	**p**
Gender				
Female	9 (52.9)	18 (81.8)	10 (62.5)	0.145 λ
Male	8 (47.1)	4 (18.2)	6 (37.5)	
Marital condition				
Single	6 (35.3)	2 (9.1)	2 (12.5)	0.115 §
Married	11 (64.7)	20 (90.9)	14 (87.5)	
Educational background				
Primary school	4 (23.5)	8 (36.4)	4 (25.0)	0.670 §
Middle school	3 (17.3)	2 (9.1)	2 (12.5)	
High school	9 (52.9)	10 (45.5)	5 (31.3)	
Associate degree	0 (0)	1 (4.5)	1 (6.3)	
Bachelor degree or above	1 (5.9)	1 (4.5)	4 (25.0)	
Smoking				
Yes	7 (41.2)	5 (22.7)	6 (37.5)	0.424 λ
No	10 (58.8)	17 (77.3)	10 (62.5)	
Alcohol use				
Yes	2 (11.8)	2 (9.1)	1 (6.3)	1.000 §
No	15 (88.2)	20 (90.9)	15 (93.8)	

SD: Standard deviation; α : One-Way ANOVA Test; §: Fisher's Exact Test; λ: Chi-Square Test

It is stated in Table 2 that there was no difference among the groups in terms of musculoskeletal pain, neck pain, low back pain, musculoskeletal discomfort, posture, spinal functionality, neck and low back disability, quality of life and fatigue severity scores.

Table 2: Comparison of musculoskeletal pain, neck pain, low back pain, musculoskeletal discomfort, posture, spinal functionality, neck and low back disability, quality of life and fatigue severity among groups

Parameters	**Orthopedic (n= 17)**	**Pediatric (n= 22)**	**Neurological (n= 16)**	**p**
	Mean±SD	**Mean±SD**	**Mean±SD**	
MP	3.29±2.44	2.77±2.64	3.19±2.43	0.790 α
NP	2.65±2.32	1.91±2.24	3.06±2.52	0.314 α
LBP	3.59±2.85	2.73±2.80	3.31±2.98	0.632 α
CMDQ	39.12±56.89	55.70±89.78	70.34±132.65	0.942 β
NPRS	50.94±10.00	52.45±5.12	54.19±6.86	0.613 β
SFI	74.35±20.45	76.91±19.07	70.13±25.40	0.632 α

MODI	15.18±14.27	18.00±17.09	15.33±15.96	0.822 α
BQ	12.12±13.95	13.18±12.06	15.38±13.81	0.771 α
SF-36 physical functioning	78.53±22.55	76.82±16.44	78.44±24.41	0.959 α
SF-36 role limitations from health problems	78.68±33.00	59.09±35.81	65.63±46.44	0.292 α
SF-36 role limitations from emotional problems	71.57±37.16	57.58±43.86	54.17±46.94	0.459 α
SF-36 energy/ fatigue	54.71±20.88	53.47±19.53	40.94±19.60	0.096 α
SF-36 emotional well-being	60.00±20.98	60.36±18.35	48.00±17.47	0.105 α
SF-36 social functioning	77.21±24.70	73.30±18.21	64.84±32.67	0.359 α
SF-36 bodily pain	73.82±21.98	62.16±22.14	70.16±19.33	0.224 α
SF-36 general health perceptions	60.29±18.58	63.64±18.27	56.88±25.02	0.606 α
FSS	3.79±3.59	3.35±1.90	3.51±2.70	0.971 β

SD: Standard deviation; MP: Musculoskeletal pain; NP: Neck pain; LBP: Low back pain; CMDQ; Cornell Musculoskeletal Discomfort Questionnaire; NPRS: New York Posture Rating Scale; SFI: Spine Functional Index; MODI: Modified Oswestry Disability Index; BQ: Bournemouth Questionnaire; SF-36: Short Form-36; FSS: Fatigue Severity Scale; α : One-Way ANOVA Test; β: Kruskal Wallis Test

There was a significant and poor positive correlation between musculoskeletal pain and BQ scores, as well as between low back pain and BQ scores. Conversely, there was a significant and poor negative correlation between low back pain and NPRS scores, NPRS and MODI scores, and SFI and FSS scores. Significant and strong positive correlations were observed between musculoskeletal pain and neck pain, musculoskeletal pain and low back pain, musculoskeletal pain and CMDQ, musculoskeletal pain and MODI, neck pain and low back pain, neck pain and CMDQ, neck pain and MODI, low back pain and MODI, CMDQ and MODI, CMDQ and BQ, and NPRS and SFI scores. In contrast, there were significant and strong negative correlations between musculoskeletal pain and NPRS, musculoskeletal pain and SFI, neck pain and NPRS, neck pain and SFI, low back pain and SFI, and CMDQ and SFI scores. Additionally, significant and strong positive correlations were found between neck pain and BQ, as well as MODI and BQ scores, while significant and strong negative correlations were observed between NPRS and BQ, SFI and MODI, and SFI and BQ scores (from -0.267 to 0.754) (Table 3).

Table 3: Correlation among musculoskeletal pain, neck pain, low back pain, musculoskeletal discomfort, posture, spinal functionality, neck and low back disability and fatigue severity

	NP	LBP	CMDQ	NPRS	SFI	ODI	BQ	FSS
MP	**0.505****	**0.561****	**0.454****	**-0.446****	**-0.587****	**0.478****	**0.391****	0.153
NP		**0.561****	**0.417****	**-0.562****	**-0.579****	**0.468****	**0.754****	0.145
LBP			0.100	**-0.341****	**-0.522****	**0.446****	**0.306***	0.139
CMDQ				-0.204	**-0.438****	**0.479****	**0.566****	0.185
NPRS					**0.404****	**-0.394****	**-0.608****	-0.078
SFI						**-0.674****	**-0.619****	**-0.267***
MODI							**0.603****	0.160
BQ								0.236

**p< 0.05; **p< 0.001. MP: Musculoskeletal pain; NP: Neck pain; LBP: Low back pain; CMDQ; Cornell Musculoskeletal Discomfort Questionnaire; NPRS: New York Posture Rating Scale; SFI: Spine Functional Index; MODI: Modified Oswestry Disability Index; BQ: Bournemouth Questionnaire; FSS: Fatigue Severity Scale*

A significant and poor positive correlation was observed between NPRS scores and the SF-36 subscales of physical functioning, energy/fatigue, bodily pain, and general health perceptions. In contrast, significant and poor negative correlations were found between musculoskeletal pain and role limitations; musculoskeletal pain and energy/fatigue; neck pain and the SF-36 subscales of physical functioning, role limitations from health problems, energy/fatigue, and bodily pain; CMDQ and the subscales of role limitations from health problems, role limitations from emotional problems, emotional well-being, social functioning, and general health perceptions; MODI and the subscales of energy/fatigue, emotional well-being, and social functioning; and FSS and the subscales of role limitations from health problems, role limitations from emotional problems, emotional well-being, and bodily pain.

A significant and strong positive correlation was observed between SFI and the SF-36 subscales of role limitations from health problems, role limitations from emotional problems, energy/fatigue, emotional well-being, social functioning, and bodily pain. However, significant and strong negative correlations were found between musculoskeletal pain and the SF-36 subscales of physical functioning, bodily pain, and general health perceptions; neck pain and the general health perceptions subscale; CMDQ and the subscales of physical functioning, energy/fatigue, and bodily pain; MODI and the subscales of role limitations from health problems, bodily pain, and general health perceptions; BQ and the subscales of physical functioning, role limitations from health problems, role limitations from emotional problems, energy/fatigue, emotional well-being, social functioning, and general health perceptions; and FSS and the subscales of energy/fatigue and general health perceptions.

Additionally, a significant and very strong positive correlation was observed between SFI and the SF-36 subscales of physical functioning and general health perceptions, while significant and very strong negative correlations were found between MODI and the physical functioning subscale, as well as between BQ and the bodily pain subscale. (-0.273 to 0.754) (Table 4).

Table 4: Correlation of quality of life with other parameters

	PF	RLH	RLE	EF	EW	SF	BP	GHP
MP	**-0.464****	**-0.280***	-0.160	**-0.273***	-0.231	-0.120	**-0.443***	**-0.413****
NP	**-0.386****	**-0.268***	-0.064	**-0.349****	-0.119	-0.117	**-0.382****	**-0.400****
LBP	**-0.368****	-0.233	-0.109	-0.220	-0.121	0.143	-0.218	**-0.334***
CMDQ	**-0.534****	**-0.381****	**-0.274***	**-0.432****	**-0.357****	**-0.333***	**-0.542****	**-0.354****
NPRS	**0.307***	0.245	0.223	**0.288***	0.170	0.122	**0.299***	**0.384****
SFI	**0.754****	**0.552****	**0.428****	**0.506****	**0.452****	**0.517****	**0.579****	**0.640****
MODI	**-0.609****	**-0.444****	-0.219	**-0.321***	**-0.361****	**-0.379****	**-0.549****	**-0.449****
BQ	**-0.506****	**-0.596****	**-0.419****	**-0.556****	**-0.423****	**-0.435****	**-0.606****	**-0.460****
FSS	-0.259	**-0.368****	**-0.360****	**-0.443****	**-0.294***	-0.174	**-0.330***	**-0.533****

**p< 0.05; **p< 0.001. PF: SF-36 physical functioning; RLH: SF-36 role limitations from health problems; RLE: SF-36 role limitations from emotional problems; EF: SF-36 energy/ fatigue; EW: SF-36 emotional well-being; SF: SF-36 social functioning; BP: SF-36 bodily pain; GHP: SF-36 general health perceptions; MP: Musculoskeletal pain; NP: Neck pain; LBP: Low back pain; CMDQ; Cornell Musculoskeletal Discomfort Questionnaire; NPRS: New York Posture Rating Scale; SFI: Spine Functional Index; MODI: Modified Oswestry Disability Index; BQ: Bournemouth Questionnaire; FSS: Fatigue Severity Scale*

Discussion

According to the findings of the current study, while caregivers' musculoskeletal systems and quality of life were impacted, no significant differences were observed in these parameters among caregivers of different patient groups. To the authors' knowledge, this study represents a pioneering effort in comparing the musculoskeletal system, fatigue, and quality of life among caregivers of orthopedic, pediatric, and neurological patients.

It is anticipated that caregivers of orthopedic and neurological individuals would have a shorter caregiving duration compared to caregivers of pediatric individuals. Such a difference is usual, as pediatric individuals are typically diagnosed shortly after birth, particularly in conditions such as cerebral palsy. Studies have reported a higher prevalence of low back pain among caregivers of patients with spinal cord lesions, which is linked to factors including age, gender, duration of care, smoking, and history of regular exercise (32). In the current study, it was found that musculoskeletal system, fatigue, and quality of life parameters were similar among caregiver groups, irrespective of the duration of caregiving or the specific disease group for which care was provided. The caregiving process necessitates caregivers to be physically, emotionally, and mentally energized and well. However, the chronic condition of all patients receiving care may have resulted in similar effects on all caregivers.

The musculoskeletal system components examined in caregivers consistently exhibited well correlations with each other. Although no significant relationship was found with fatigue, this may be attributed to the psychosocial aspects associated with fatigue. These observed correlations highlight the importance of considering the musculoskeletal system as a whole in caregivers' well-being. The performance of repetitive challenging daily tasks, activities involving constant bending and lifting weights, can lead to musculoskeletal disorders in various body parts. A study found that parents of disabled individuals commonly experience pain in the lumbar region (33). However, it's noteworthy that effects in one area may trigger effects in other parts of the body, resembling a chain reaction. The correlation between musculoskeletal system parameters in this study provides support for this phenomenon. In a study evaluating musculoskeletal system symptoms in caregivers of older adults, it was reported that informal caregivers had been working for longer durations, had longer working hours, had fewer opportunities for leave, and lacked caregiving guidelines. The spine was identified as the region with the highest prevalence of musculoskeletal system symptoms, and the likelihood of developing musculoskeletal symptoms increased as the dependency level of the elderly individuals rose (34). Similar to the aforementioned study, it is likely that in the current study as well, being a family caregiver brings certain disadvantages that may contribute to musculoskeletal disorders and influence the development of pain in the lower back, neck, and spine. Another study investigating the effect of a physical exercise program on preventing musculoskeletal disorders in female caregivers of dependent patients highlighted a high prevalence of musculoskeletal disorders among caregivers and reported that the exercise program was effective in reducing pain intensity, lumbar disability, and cervical disability in family caregivers (35). This supports the findings of the current study and reinforces the idea that training and policies should be developed to address potential musculoskeletal disorders among caregivers.

The musculoskeletal system problems experienced by caregivers represent a significant health concern that warrants serious attention. These issues not only hinder the caregiving process but also contribute to a decline in the caregivers' quality of life. Consequently, the quality of care provided may diminish, and caregivers themselves may eventually require care (36). The musculoskeletal system components were found to be related to the subscales of quality of life, ranging from weak to strong relationships. It is plausible that an impact on the musculoskeletal system could detrimentally affect quality of life. Given that the measurements used in the evaluation focus on the musculoskeletal system, it is likely that strong relationships were found with quality of life subscales related to physical functioning, bodily pain, and general health perceptions. A study investigating the effects of low back and neck pain on posture, burnout

levels, and quality of life among formal caregivers of children with disabilities and elderly individuals found that neck pain caused changes in spinal posture, whereas low back pain did not affect spinal posture. Additionally, both low back and neck pain were found to have a diminishing impact on quality of life (37). The duration of caregiving may be considered a factor influencing pain and posture. Therefore, unlike the current study, it could be suggested that low back pain may not have a significant impact on spinal posture. The reduction in quality of life caused by low back and neck pain is similar to the findings of the current study. In a study investigating sleep quality and fatigue among caregivers of individuals with chronic diseases, it was found that caregivers experienced poor sleep quality and moderate levels of fatigue. Additionally, no significant relationship was observed between sleep quality and fatigue (38). In this study, although fatigue did not demonstrate high correlations with musculoskeletal parameters or specific aspects of quality of life, and caregivers' fatigue levels did not reach the threshold for chronic fatigue, it is undeniable that caregivers experience significant fatigue.

The aim of this study was to comprehensively evaluate the musculoskeletal system among individuals caring for rehabilitation patients and to identify which groups of caregivers were more significantly affected. A limitation of this study is that only caregivers of individuals with orthopedic, pediatric, and neurological conditions were included. Additionally, potential confounding factors, such as the presence of chronic diseases among caregivers, were not considered. These factors could have influenced the musculoskeletal health, fatigue, and quality of life outcomes, and their exclusion represents an important limitation in interpreting the results. Further research is needed to encompass caregivers of individuals from a broader range of patient groups. The findings of this study are limited in generalizability due to the inclusion of only caregivers of individuals with orthopedic, pediatric, and neurological conditions. The sample size and the recruitment method, which relied on convenience sampling, also restrict the applicability of the results to a wider population. Therefore, caution should be exercised when generalizing these findings to all caregivers, as they may not fully represent the experiences of caregivers in different cultural, social, or healthcare settings.

Conclusions

This study aimed to comprehensively evaluate the musculoskeletal system in caregivers of rehabilitation patients and determine the extent to which different groups of patients' caregivers are affected. The findings revealed that the musculoskeletal system is impacted in all caregivers, and caregivers across different patient groups demonstrate similar effects.

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