ORIGINAL ARTICLE

Clinical properties and rehabilitation needs of earthquake survivors in a subacute rehabilitation setting

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ABSTRACT

BACKGROUND: This descriptive analysis examines the victims of the February 6, 2023, earthquakes in Kahramanmaraş and Elbistan, Türkiye. It aims to detail the injury profiles related to neuro-musculoskeletal trauma, assess the rehabilitation needs of patients, and propose a comprehensive rehabilitation approach.

METHODS: The study included patients injured in the Kahramanmaraş-centered earthquake on February 6, 2023, who were transported to our hospital based on their rehabilitation needs. Data from patients treated at our hospital were recorded retrospectively. This included demographic information, accompanying pathologies, laboratory findings, rehabilitation programs, and treatments received during their hospital stay. Statistical analyses were conducted to examine the data.

RESULTS: A total of 141 patients with musculoskeletal injuries were admitted due to injuries sustained from the earthquake. The mean age of the participants was 39.76 years, with a slight female predominance (56.7%). The majority of patients sustained injuries while trapped under debris (90.1%), with an average duration of 10 hours under rubble. Fractures were the most common form of injury (53.2%), predominantly affecting the lower extremities. Peripheral nerve injuries were present in 41.1% of patients, and amputations were observed in 30.5%. Complications included compartment syndrome (46.1%), crush syndrome (36.2%), and various infections. Pain was prevalent among patients, with somatic pain being the most reported type. Individualized rehabilitation programs were implemented, incorporating physical therapy, wound care, pain management, and psychosocial support.

CONCLUSION: This study highlights the critical rehabilitation needs of earthquake survivors and emphasizes the importance of early and comprehensive rehabilitation interventions. Multidisciplinary rehabilitation programs were crucial in addressing medical issues, functional limitations, and psychological challenges faced by the survivors. The findings contribute to a deeper understanding of earthquake-related injuries and underscore the significance of well-coordinated rehabilitation strategies in disaster responses.

Keywords: Earthquake injuries; demographic and clinical parameters; rehabilitation.

INTRODUCTION

Earthquakes are devastating disasters that have claimed lives and caused injuries to millions of people historically and continue to do so today. The treatment of earthquake victims is often hindered by the destruction of infrastructure, such as roads, and challenges like inadequate equipment and hospital damage.[1] Big disasters, like earthquakes, result in a consid-

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erable loss of life and leave numerous victims with various disabilities. There is a pressing need for adequate and timely management to reduce mortality and morbidity among those injured in earthquakes, a concern for both rescuers and medical care professionals. Advances in emergency rescue systems have significantly improved the survival rates of victims with severe and multiple-trauma injuries.[1,2]

Injuries from earthquakes frequently result from being trapped under debris, experiencing chronic tissue compression, or falling from heights. Physical injuries can include spinal cord injuries, traumatic brain injuries, limb amputations, fractures, soft tissue injuries, and there are also psychosocial issues to consider, such as post-traumatic stress disorder, anxiety, and depression.[2] However, many survivors face long-term disabilities, necessitating a high level of need for both immediate and prolonged rehabilitation following a disaster. The adequacy of facilities, the surgical techniques employed, the availability of medication and equipment, and the experience of healthcare personnel all significantly impact the quality of surgical and anesthetic care.[3,4] Following initial medical interventions post-earthquake, it is crucial to commence the rehabilitation process during the early stages. Victims requiring a rehabilitation program due to impairments should be referred to physical therapy and rehabilitation centers after receiving surgical treatments.[2]

An earthquake measuring 7.7 on the Richter scale struck eastern and southeastern Türkiye on Monday, February 6, 2023, at 04:17 local time, centered in Kahramanmaraş. According to data from the Turkish Disaster and Emergency Management Presidency (AFAD), it simultaneously affected eleven cities: Kahramanmaraş, Elazığ, Şanlıurfa, Diyarbakır, Gaziantep, Adıyaman, Hatay, Malatya, Adana, Osmaniye, and Kilis. Several aftershocks occurred in the region following the initial earthquake. On February 6, 2023, at 13:24, another earthquake with a magnitude of 7.6 struck Kahramanmaraş, Elbistan. Government data reports that at least 50,783 people lost their lives, and more than 120,000 were injured due to the earthquakes. Drawing on experiences from the Marmara Adapazarı earthquake, disaster response efforts for the Kahramanmaraş earthquake, including the immediate rescue of casualties, distribution of casualties to different regional hospitals, and provision of medical interventions, were promptly organized. Nearly 1,500 patients were referred to Ankara Bilkent City Hospital for surgical or medical interventions.[5] Patients requiring rehabilitation were transferred to our physical medicine and rehabilitation service to address musculoskeletal, neurological, and psychological conditions, aiming to improve their quality of life through our multidisciplinary team approach.

The aim of this study was to evaluate the injury profiles related to neuro-musculoskeletal trauma, assess patients' rehabilitation needs, and propose a rehabilitation approach following this significant earthquake disaster in Türkiye.

MATERIALS AND METHODS

Patients injured in the Kahramanmaraş-centered earthquake on February 6, 2023, and transported to our hospital based on their rehabilitation needs, were included in the study. Data from patients treated at our hospital were recorded retrospectively. Ethics committee approval was obtained from the Ankara Bilkent City Hospital ethics committee before the commencement of the study (E2-23-3843).

The study recorded demographic information and comorbidities of the patients, the nature of earthquake injuries sustained (such as being trapped under debris or falls), and the types of injuries (including fractures, amputations, peripheral nerve injuries, spinal cord injuries, and brain injuries), along with any related complications (such as compartment syndrome, pain, infections, deep vein thrombosis, and neurogenic bladder or bowel). Accompanying pathologies were also documented. The time taken to arrive at the physical therapy and rehabilitation hospital and the duration of stay were noted. Laboratory findings upon admission to the rehabilitation hospital were documented. The presence and intensity of pain in patients were assessed, and the prescribed medications were recorded. Drug prescriptions were managed by the responsible physiatrists of the patients in the wards, and also by consulted physicians from other disciplines (such as algology or psychiatry) when necessary.

Rehabilitation medicine is a branch of medicine dedicated to the diagnosis, prevention, and treatment of disabilities related to the brain, nerves, bones, and muscles. The Physical Medicine and Rehabilitation specialists (physiatrists), as the authors of this paper, aim to enhance and restore functional ability and quality of life to those with physical impairments or disabilities affecting the brain, spinal cord, nerves, bones, joints, ligaments, muscles, and tendons. The physiatrist, serving as the team leader, is responsible for coordinating patient care services with other team members, including physiotherapists, occupational therapists, nurses, vocational therapists, and psychologists, and also organizing consultations from other medical disciplines as needed. Unlike other medical specialties that focus on a medical "cure," the goals of physiatry are to maximize patients' independence in activities of daily living and improve their quality of life.

Therefore, earthquake survivors were hospitalized in our rehabilitation hospital for comprehensive, patient-centered treatment and rehabilitation to improve their functional disability and maximize their quality of life.

The rehabilitation program, addressing the medical, physical, and psychosocial needs of the patients, was tailored based on comprehensive physical, functional, and psychological assessments. These assessments considered each patient's living and environmental conditions, along with the treatments and rehabilitation approaches received during their hospital stay, which were documented.

Statistical Analysis

The statistical analysis was conducted using the Statistical Package for the Social Sciences (SPSS) 25.0 (SPSS Inc., Chicago, IL, USA). The Kolmogorov-Smirnov or Shapiro-Wilk tests were applied to assess the normality of the distribution. Descriptive analyses were performed, presenting means and standard deviations for normally distributed data, medians and interquartile ranges (IQR) for ordinal and non-normally distributed variables, and numbers and percentages for nominal variables. A statistical significance level was set at $p<0.05$.

RESULTS

Demographic Data

In the Ankara Bilkent City Hospital Physical Therapy and Rehabilitation Hospital, 141 patients with musculoskeletal injuries were admitted due to injuries from the earthquake. Rehabilitation needs were identified and addressed within three months following the earthquake. The demographic characteristics of the patients are depicted in Table 1. The mean age of the patients was 39.76±16.23 years. The gender distribution was as follows: 61 (43.3%) male and 80 (56.7%) female.

Among all patients, 61 (43.3%) were unemployed, and 35 (24.8%) were employed. Approximately 41% of the patients had completed high school education, 20.6% had primary education, and 23.4% had university education. The majority of patients were married (50.4%), with first-degree relatives providing care for 44.7% of the patients.

Table 1. Demographic data of the patients

	Mean (SD)	n (%)
Age	39.76 (16.23)	
Gender		
Male		61 (%43.3)
Female		80 (%56.7)
Occupation		
Unemployed		61 (%43.3)
Officer		35 (%24.8)
Employee		25 (%17.7)
Student		11 (%7.8)
Retired		6 (%4.3)
Education level		
Illiterate		10 (%7.1)
Primary school		29 (%20.6)
Secondary school		7 (%5)
High school		58 (%41)
University		33 (%23.4)
Marital status		
Single		70 (%49.6)
Married		71 (%50.4)

Table 2. Types of injuries and causes of injury of the earthquake victims. (Total percentage exceeds 100% due to multiple injuries among some victims)

Diagnosis	n (%)
Fracture	75 (53.2)
Abrasion/superficial wound	73 (51.8)
Compartment syndrome	65 (46.1)
Peripheral nerve injury	58 (41.1)
Crush syndrome	51 (36.2)
Fasciotomy	47 (33.3)
Amputation	43 (30.5)
Flap	32 (22.7)

Physical Assessments

Out of the total, 127 (90.1%) patients were injured by being trapped under debris, and 14 (9.9%) were injured due to falls. The average time spent under debris was 10 (range: 3-36) hours. The mean hospitalization duration was 36.4 days, and the median duration in the intensive care unit was 0 (range: 0-8) days.

Table 2 presents the clinical diagnoses of the patients. The most common injury was fractures, affecting 75 (53.2%) patients, followed by abrasions or superficial wounds in 73 (51.8%) patients, and compartment syndrome in 65 (46.1%) patients. It is important to note that some survivors sustained multiple injuries in various body parts, which is why the total percentage exceeds 100. Specifically, vertebral fractures were observed in 31 (22%) patients, lower extremity fractures in 28 (19.9%), rib fractures in 17 (12.1%), pelvic fractures in 16 (11.3%), and upper extremity fractures in 12 (8.5%). Peripheral nerve injuries were reported in 58 (41.1%) individuals. The most common nerve injuries were to the common peroneal nerve in 18 (12.6%) patients, the brachial plexus nerve in 15% of cases, and the sciatic nerve in 10% of cases, respectively. It is possible for a single patient to have multiple types of peripheral nerve injuries.

Amputations were necessary for 43 patients (30.5%), with the majority involving the lower extremity. Five individuals underwent bilateral extremity amputations, and one patient had three extremity amputations. The most common amputations were transfemoral (n=19), followed by transtibial (n=16), transhumeral (n=5), and transradial (n=2) (Table 3). Additionally, lung injuries were present in 26 (18.4%) patients, brain injuries in 9 (6.4%), spinal cord injuries in 7 (5.0%), and internal organ injuries in 4 (2.8%). Tube thoracotomy was performed in 15 (10.6%) individuals, and 1 (0.7%) patient required percutaneous endoscopic gastrostomy. Pneumonia was diagnosed in 1 (0.7%) patient. Wound infections occurred in 35 (25.4%) patients, pressure sores in 21 (14.9%), deep vein thrombosis in 7 (5.0%), and pulmonary embolism in

Table 3. Level of amputations

Level of amputation	n (%)
Level of amputation	n (%)
Transfemoral	19 (44.2)
Transtibial	16 (37.2)
Transhumeral	6 (14)
Transradial	2 (4.7)
Knee disarticulation	2 (4.7)
Chopart	2 (4.7)
Elbow disarticulation	1 (2.3)
Wrist disarticulation	1 (2.3)
Lisfranc	1 (2.3)
Toe	1 (2.3)

Table 4. Laboratory parameters

	Mean±SD / Median (IQR)	Reference values
Hemoglobin (g/L)	10.6±1.5	13,5-17,2
WBC (x10^9/L)	8827±3847	3,9-10,2
BUN (mg/dl)	30.4±23.9	19-49
Creatinine (mg/dl)	0.55 (0.41-0.68)	0,7-1,3
CK (U/L)	155 (47-705)	32-294
Myoglobin (ng/L)	59.0 (37.2-156.2)	<110
ALP (U/L)	82 (62.2-109.7)	53-128
AST (U/L)	34 (21-63.5)	<35
CRP (mg/L)	22 (10.9-76.1)	0-5

5 (3.5%). The injury profiles for the seven patients diagnosed with spinal cord injuries were diverse: one patient (0.7%) presented with a cauda equina lesion, another (0.7%) had an injury at the L1 level, two patients (1.4%) had injuries at the L2 level classified as AIS D according to the American Spinal Injury Association (ASIA) Impairment Scale, one patient (0.7%) had an injury at the T11 level classified as AIS A, one (0.7%) had an injury at the T6 level classified as AIS B, and another (0.7%) had an injury at the T9 level classified as AIS A. No cases of autonomic dysreflexia as a complication of spinal cord injury were reported.

Upon admission, 46 (32.6%) patients had permanent urinary catheters, a figure that decreased to 9 (6.4%) patients by the time of discharge. Other coexisting conditions included sleeping problems in 46 (32.6%) patients, agitation in 16 (11.3%), neurogenic bladder in 10 (7.1%), urinary system infections in 9 (6.4%), and neurogenic bowel in 7 (5%) cases. Deep vein thrombosis was observed in 7 (5%) patients, while pulmonary thromboembolism occurred in 5 (3.5%) individuals. Psychological support was extended to all patients, with psychiatric consultations required for the 16 (11.3%) patients experiencing agitation. The Functional Ambulation Category (FAC) scores at admission and discharge were, respectively, a median of 0 (range: 0-2) and 4 (range: 3-5), indicating significant improvement following the rehabilitation program ($p<0.001$).

Laboratory Parameters

The average hemoglobin levels in patients were lower, while the median values for C-reactive protein (CRP), creatine phosphokinase (CK), and myoglobin were higher than the normal laboratory ranges (Table 4).

Treatments and Rehabilitation Programs

All patients were enrolled in comprehensive rehabilitation programs, which were organized by the responsible physiatrists. These programs were implemented using a team-based approach, tailored to the specific needs of each earthquake victim.

In the early postoperative period, those who underwent musculoskeletal surgeries and interventions received follow-up care in rehabilitation services. For some patients with multiple fractures, absolute bed rest was prescribed during the healing process, affecting approximately 29.1% of the cohort. Throughout the immobilization period, all patients engaged in range of motion (ROM) and isometric strengthening exercises, alongside appropriate positioning and breathing exercises.

Additional rehabilitation modalities were provided based on individual requirements. Electrotherapy was administered to 44.0% of the patients (n=62), endurance exercises were part of the regimen for 40% (n=57), FES cycling for 39% (n=55), and upper extremity robotic rehabilitation programs for 13.5% (n=19).

For patients with nerve injuries, which constituted 41% of cases, treatments primarily included positioning, early splint applications, electrical stimulation, and exercise programs. Those with extremity amputations (30%, n=43) underwent post-operative wound care, pain management, bandaging for stump shaping, positioning, and exercises to prevent contractures.

While only 12.8% of patients with multiple musculoskeletal injuries reported being pain-free (n=18), the vast majority (88.2%, n=123) experienced pain. Somatic pain was most prevalent (60.3%, n=85), followed by neuropathic pain (41.1%, n=58) and phantom pain (17.7%, n=25). The most commonly utilized drugs for pain management were paracetamol (50.4%, n=71), opioids (41.8%, n=59), gabapentinoids (34.8%, n=49), and non-steroidal anti-inflammatory drugs (NSAIDs) (8.5%, n=12), in that order. In 30 (21.3%) patients, the most commonly used combination for pain management was paracetamol and opioids, followed by a regimen of paracetamol, opioids, and gabapentinoids in 9 (6.4%) survivors.

DISCUSSION

This study offers a demographic analysis and examines the clinical characteristics of patients injured in the 2023 earthquake in Türkiye, who were subsequently referred to the physical medicine and rehabilitation inpatient clinics of a tertiary referral hospital. The patients presented with a range of injuries, predominantly fractures, amputations, spinal cord injuries, and peripheral nerve injuries. The majority were post-operative patients transferred from other surgical departments, such as orthopedics, plastic surgery, and neurosurgery. Rehabilitation clinics accepted patients at the early stages of injury to initiate early rehabilitation programs and alleviate the burden on intensive care units amidst this massive disaster.

The cohort included 141 adult inpatient rehabilitation patients, with an average age of 39.76 years, mirroring the demographic seen in the aftermath of the 2015 Nepal earthquake.[6] The gender distribution revealed a predominance of females, with a 56.7% ratio, which aligns with findings reported in the literature.[7,8] Among the patients, 64.4% had completed high school or university education; half were either employed or students, indicating significant economic loss due to the disaster. Given that the earthquake struck at night while people were asleep in their homes, there was limited opportunity for escape.

A staggering 90.1% of patients were injured under the rubble, a consequence of the nighttime occurrence of the earthquake and the fact that victims were indoors. Historical data on earthquakes suggest that the location of an individual at the time of injury (indoors versus outdoors) significantly influences the injury mechanism.[9] The average duration under the rubble was 10 hours, with extended exposure correlating with increased morbidity and mortality. Comparing the Lushan and Wenchuan earthquakes revealed that the incidence of crush syndrome and amputations was higher in the Wenchuan earthquake. This increase was attributed to the prolonged time before hospital admission compared to the Lushan earthquake, underscoring the importance of rapid rescue efforts in such disasters.[10]

In our rehabilitation clinic, the prevalent conditions included fractures, soft tissue injuries, amputations, spinal cord injuries, traumatic brain injuries, peripheral nerve injuries, and pain. A systematic review examining the physical therapy needs for earthquake injuries within Chinese and Western literature concluded that physical therapy is crucial for treating patients with multisystem injuries, such as fractures, traumatic brain injuries, spinal cord injuries, peripheral nerve injuries, and soft tissue injuries.[11] The majority of patients sustained multiple injuries (77.3%), affecting various body parts including the extremities, head, chest, abdomen, and pelvic region, rather than a single injury, as observed in the Lushan Earthquake in China, 2015.[12] In line with the literature, our rehabilitation clinic assessed each patient for specific injuries and medical issues, implementing individualized, patient-based rehabilitation approaches based on their needs. Due to polytrauma, patients presented with multiple wounds, including abrasions, decubitus ulcers, surgical scars, fasciotomies, and flaps, alongside numerous medical problems associated with these surgical interventions. The rehabilitation process addressed all needs, medical issues, and complications as necessitated by the comprehensive medical rehabilitation approach.

Systematic reviews have highlighted that the lower limbs are the most frequently injured body parts during earthquakes.[13] This study corroborated high incidences of lower limb injuries, both fractures and amputations. While injuries to extremities, including bone fractures and soft tissue lesions, are generally not life-threatening, injuries to the head, chest, and abdominopelvic organ are associated with high mortality rates.[14] Consequently, studies on earthquakes report a predominance of extremity injuries, such as fractures and soft tissue damage, over major organ injuries.

In this study, fractures were the most common type of injury among patients, with a prevalence of 53.2%, comparable to the incidence reported in the Gujarat earthquake in India (51%),[15] the Wenchuan earthquake in China (53.1%),[16] and the Nepal earthquake (66%).[6] Furthermore, a related study focusing on acute orthopedic surgeries associated with the same earthquake identified fractures in 57% of the cases.[17] In their review of earthquake epidemiology, which involved searching several databases, MacKenzie et al. reported that fractures accounted for two-thirds (65%) of all orthopedic injuries.[9] This study also found that fractures of the lower extremity were the most common, consistent with findings in the literature.[15,18] In fact, the rates of lower extremity fractures (22.7%) and vertebral fractures (22%) in our data were comparable. This outcome may be attributed to the nature of our rehabilitation clinic, which tends to receive patients with vertebral fractures and spinal cord injuries from the neurosurgery departments.

Amputations were observed in 30.5% of our patients, aligning with findings from another study on the same earthquake in Türkiye, which highlighted acute orthopedic issues related to crush injuries.[18] Similar to trends observed in Türkiye and the 2010 Haiti earthquake, the lower extremity was the most common site of amputation.[7] The frequency of amputations, in descending order, was transfemoral, transtibial, transhumeral, and transradial. This order matches observations from the Pakistan earthquake;[20] however, it contrasts with reports by Randolph et al.[7] and Kundakçı et al.,[19] who found a higher incidence of transtibial than transfemoral amputations, yet still underscored the predominance of lower limb amputations. Patients who underwent amputations received a holistic rehabilitation approach in our wards. This comprehensive care focused on preserving the range of motion in joints, stretching contracted soft tissues, and strengthening the muscles of both the amputated and healthy limbs. Training in posture, balance, coordination, endurance, weight transfer, verticalization, ambulation, and trunk and core stability, as well as cardiac and pulmonary rehabilitation, were provided to support these survivors. Additionally, efforts to manage pain, ensure stump heal-

ing and maturation, address wound dressing and healing, and combat complications such as peripheral nerve injuries, infections, urinary system issues, and deep venous thrombosis were implemented. Educational and psychological support were also key components of our program. The primary goal was to help amputees achieve independence in daily living, work, and recreational activities, and to prepare them for prosthesis use.

In our study, the incidence of peripheral nerve injuries was notably high at 41% (n=58), with lower limb nerve injuries being the most common, accounting for 22.4% of all peripheral nerve injuries. The most frequent nerve injuries included the common peroneal nerve (n=18, 12.6%), brachial plexus nerve (n=15, 10.5%), and sciatic nerve (n=14, 9.8%). It is common for patients to exhibit multiple types of peripheral nerve injuries following significant disasters. Consistent with previous studies, the highest incidence of peripheral nerve injuries occurred in the lower limbs.[21-23] One patient in our study had a right lower extremity transfemoral amputation, a left lower extremity transtibial amputation, a left upper extremity shoulder disarticulation, and right upper extremity brachial plexus damage. Additionally, five patients presented with several amputations and peripheral nerve injuries. Most of our patients with peripheral nerve injuries also had accompanying fractures, compartment syndrome, related fasciotomies, and amputations. Most nerve injuries were primarily caused by collapsed buildings, flying debris, and direct trauma. Crush injuries result in damage to the body and limbs through prolonged pressure. Studies yielding similar findings have been documented in the literature.[24-26] We observed that 7 (5%) patients suffered from spinal cord injuries, all of whom experienced paraplegia. That prevalence may be attributed to the higher mortality rates among individuals with high-level spinal cord injuries trapped under rubble, possibly due to autonomic dysreflexia or concurrent injuries. Previous research has shown that the percentage of earthquake survivors with tetraplegia ranges from 2% to 9% of all spinal cord injury (SCI) patients.[27-29] Prompt rescue operations, coupled with appropriate triage, evacuation, and acute neurosurgical assessments, can enhance survival rates for individuals with tetraplegia. A recent study involving 15 neurosurgery patients reported that 82.35% of those with spinal cord injuries from the same earthquake had thoracolumbar fractures.[30]

Pain management often becomes a secondary concern in natural disasters, which threaten the lives of many. It has also been noted that medical professionals may not be fully prepared to manage severe emergencies related to pain.[31] However, even under such dire circumstances, establishing a routine for regular pain evaluation—considered the fifth vital sign—is crucial.[32] One study examining acute pain and the frequency of medication use in prehospital mass emergency services after an earthquake in Italy evaluated 958 patients, finding a 34.6% prevalence of pain.[33] Musculoskeletal traumas and wounds were reported to be the most common causes of pain in the first two weeks. Despite the limited availability of painkillers immediately after the disaster, anti-inflammatory drugs were the most commonly used, followed by weak opioids. Adjuvant drugs, such as pregabalin and gabapentin, have been reported to be rarely used.[33] Conversely, the prevalence of musculoskeletal pain was found to be 32.8% among earthquake victims without significant disabilities approximately one year after the disaster.[34] Another study investigating pain related to lower-limb amputation in victims ten years after the 2008 Sichuan earthquake revealed that 90.9% of patients experienced one or more types of amputation-related pain, with phantom limb sensation, phantom limb pain, and residual limb pain being the most commonly reported.[35] To the best of our knowledge, no study in the current literature examines the prevalence of pain among earthquake victims in rehabilitation settings. In our study, most patients reported experiencing pain, with somatic pain being the most prevalent, followed by neuropathic and phantom pains. Unlike findings from the prehospital mass emergency service study, paracetamol and opioids were the most frequently utilized pain management medications in our rehabilitation context. This discrepancy may be attributed to the diverse neuro-musculoskeletal injuries of the survivors included in our study.

Norepinephrine, an important modulator of hematopoietic progenitor mobilization and an inhibitor of bone marrow erythroid cell growth, increases in cases of multiple traumas and directly stimulates the release of interleukin-6 (IL-6).[36] IL-6 enhances hepcidin expression, which leads to iron retention in macrophages, and activates the secretion of C-reactive protein (CRP), contributing to a systemic inflammatory state.[37] The mean hemoglobin value of the patients was lower, while the median CRP, creatine phosphokinase (CK), and myoglobin levels were higher within laboratory ranges in the current study. CK and myoglobin levels increase in conditions such as rhabdomyolysis and crush syndrome. Individuals experiencing multiple traumas, such as those trapped under debris, are more prone to developing crush syndrome and may suffer from severe compartment syndrome.[38] Crush syndrome is linked to systemic complications, notably acute renal failure, more so than compartment syndrome or crush injuries alone. The most common injuries associated with crush syndrome in the Hanshin-Awaji earthquake were pelvic and limb fractures.[39] In this study, most patients sustained multiple traumas, particularly to their lower extremities. Furthermore, 46.1% of the patients developed compartment syndrome, while 36.2% experienced crush syndrome, elucidating the cause of elevated CK and myoglobin levels. Another study related to the acute phase of the same earthquake reported a 17.6% incidence of compartment syndrome and the performance of fasciotomy surgeries.[19]

Limitations

This study has several limitations. A principal limitation is its retrospective design. Moreover, the retrospective nature of the study limited the follow-up period to the duration of the patients' stay in rehabilitation units. Additionally, it may have

been more appropriate to employ combined trauma scoring systems, given that most patients sustained multiple traumas. Our study aimed to outline the characteristics of survivors in a subacute setting at a tertiary rehabilitation hospital. To the best of our knowledge, this is the first study to detail the characteristics and clinical properties of survivors from the 2023 earthquake, as well as their rehabilitation needs and procedures in a subacute rehabilitation setting. The relatively high patient count at a tertiary rehabilitation center, along with the detailed evaluation of neuro-musculoskeletal issues and the application of rehabilitation strategies, enhances the value of our study. It contributes to the earthquake literature by focusing on subacute rehabilitation. We believe that further multicenter rehabilitation data across different 'rehabilitation wards' will validate and strengthen our findings.

CONCLUSION

This study analyzed the demographic, clinical, and psychosocial status of 141 survivors from the 2023 earthquake in Türkiye, managed at the Physical Medicine and Rehabilitation Center of a university hospital. The timing, location, and severity of earthquakes are often unpredictable, and many survivors require rapid medical management. Rehabilitation clinics play a crucial role in treating patients with head trauma, spinal cord injuries, amputations, fractures, and musculoskeletal injuries. It is essential to manage multiple medical problems and residual physical and psychosocial disabilities in each patient as early as possible. Our findings underscore the necessity for early physical rehabilitation, psychosocial intervention, and functional training for patients. Investigating the injury profile and rehabilitation needs of earthquake survivors will have a positive impact on rescue efforts, treatment, and rehabilitation planning for musculoskeletal injuries caused by future disasters.

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ORİJİNAL ÇALIŞMA - *ÖZ*

Subakut rehabilitasyon sürecinde depremzedelerin klinik özellikleri ve rehabilitasyon ihtiyaçları

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AMAÇ: 6 Şubat 2023'te Kahramanmaraş ve Elbistan'da meydana gelen deprem mağdurlarının bu tanımlayıcı analizi, nöro-kasiskelet sistemi travmasına bağlı yaralanma profillerini, hastaların rehabilitasyon ihtiyaçlarını ve bunlara rehabilitasyon yaklaşımı sunmayı amaçlamaktadır.

GEREÇ VE YÖNTEM: Çalışmaya 6 Şubat 2023 tarihinde Kahramanmaraş merkezli depremde yaralanan ve rehabilitasyon ihtiyaçları doğrultusunda hastanemize nakledilen hastalar dahil edildi. Hastanemizde tedavi gören hastaların verileri geriye dönük olarak kaydedildi. Demografik bilgiler ve eşlik eden patolojiler, laboratuvar bulguları kaydedildi. Hastanede kaldıkları süre boyunca rehabilitasyon programı ve aldıkları tedaviler belirlendi. Verilerin analizi için istatistiksel analizler yapıldı.

BULGULAR: Depremden kaynaklanan yaralanmalar nedeniyle kas-iskelet sistemi yaralanması olan 141 hasta değerlendirildi. Katılımcıların ortalama yaşı 39.76 idi ve hafif bir kadın hakimiyeti (%56.7) vardı. Hastaların çoğu, enkaz altında kalmaya bağlı (%90.1) yaralandı ve enkaz altında kalma süresi ortalama 10 saatti. Kırıklar en sık görülen yaralanmalardı (%53.2) ve öncelikle alt ekstremiteleri içeriyordu. Hastaların %41,1'inde periferik sinir yaralanması mevcuttu ve %30.5'inde amputasyon gözlendi. Komplikasyonlar arasında kompartman sendromu (%46.1), ezilme sendromu (%36.2) ve çeşitli enfeksiyonlar yer alıyordu. Hastalar arasında ağrı yaygındı ve en sık görülen tür somatik ağrıydı. Fizik tedavi, yara bakımı, ağrı yönetimi ve psikososyal destek dahil olmak üzere bireysel ihtiyaçlara uygun rehabilitasyon programları uygulandı.

SONUÇ: Bu çalışma, depremzedelerin rehabilitasyon ihtiyaçlarına ışık tutarak kapsamlı ve erken rehabilitasyon müdahalelerinin önemini vurgulamaktadır. Multidisipliner rehabilitasyon programları tıbbi sorunların, fonksiyonel kısıtlamaların ve psikolojik zorlukların ele alınmasında çok önemliydir. Bulgular depreme bağlı yaralanmaların daha derinlemesine anlaşılmasına katkıda bulunmakta ve afet müdahalesinde iyi koordine edilmiş rehabilitasyon stratejilerinin öneminin altını çizmektedir.

Anahtar sözcükler: Deprem yaralanmaları; demografik ve klinik bulgular; rehabilitasyon.

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