

The Sociodemographic and Clinical Characteristics of Occupational Accident Victims Followed in Physical Therapy and Rehabilitation Department of a Tertiary Hospital

Üçüncü Basamak Bir Hastanenin Fiziksel Tıp ve Rehabilitasyon Kliniğinde Takip Edilen İş Kazası Olgularının Sosyodemografik ve Klinik Özellikleri

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ABSTRACT Objective: The aim of this study is to evaluate the sociodemographic, injury and employment characteristics of the patients included in a physical medicine and rehabilitation program after an occupational accident (OA). **Material and Methods:** The study included 102 patients who were admitted to our clinic for a rehabilitation program after an OA between January 2012 and December 2018. Electronic media files in the hospital automation system were retrospectively scanned. We recorded the sociodemographic, injury and employment characteristics for each patient. **Results:** The mean age of 102 patients included in the study was 36.39±10.38 (min: 18, max: 59). One hundred (98%) of them were male, two (2%) were female. 18.6% of the patients are between the ages of 18-25; 42.2% were between the ages of 26-40 and 39.2% were over the age of 40. The mean number of physical therapy sessions was 42.89±25.53 (min: 15, max: 180). OAs mostly occurred in the construction industry, most frequently as a result of falling from a height, followed by sharp object injuries. Of all patients, 48% (n:49) were primary school graduates. It was found that most sequela was observed statistically significantly after upper limb injuries. The most common sequelae was contracture with 45.1% (n: 46). **Conclusion:** The results of our study showed that the primary school graduate young males working in the construction and metal industry sectors were mostly affected by OAs. It was found that many of the patients in need of physical therapy and rehabilitation programs recovered with sequelae despite all treatment applications.

Keywords: Occupational accidents; rehabilitation; complications

ÖZET Amaç: Bu çalışmanın amacı iş kazası sonrası fizik tedavi ve rehabilitasyon programına alınan hastaların sosyodemografik özelliklerine ek olarak, yaralanma ve yaralanmanın gerçekleştiği iş koluna ait verilerin değerlendirilmesidir. **Gereç ve Yöntemler:** Çalışmaya Ocak 2012 ve Aralık 2018 tarihleri arasında kliniğimizde iş kazası sonrası rehabilitasyon için takip edilen 102 hasta dahil edildi. Hastane otomasyon sisteminde bulunan elektronik ortam dosyaları retrospektif olarak tarandı. Her hasta için sosyodemografik özellikleri, yaralanma ve yaralanmanın gerçekleştiği iş koluna ait veriler kayıt altına alındı. **Bulgular:** Çalışmaya dahil edilen 102 hastanın yaş ortalaması 36.39±10.38 (min: 18, maks: 59) idi. Hastaların 100 (%98) ü erkek, 2 (%2)'si kadındı. Hastaların %18,6'sı 18-25 yaş aralığında; %42,2'si 26-40 yaş aralığında ve %39,2'si ise 40 yaş ve üzerinde idi. Hastaların aldıkları ortalama fizik tedavi seans sayısı 42.89±25.53 (min: 15, maks: 180) idi. İş kazaları en fazla inşaat sektöründe görülürken; ilk sırada yüksekten düşme, ikinci sırada kesici-delici alet yaralanmaları yer alıyordu. Tüm kazazedelerin %48 (n:49)'ü ilkökul mezunu idi. En çok sekelin istatistiksel olarak anlamlı şekilde üst ekstremitte yaralanmalarından sonra gözlemlendiği tespit edildi. En sık gözlenen sekel %45,1 (n:46) ile kontraktüdü. **Sonuç:** Çalışmamızın sonuçlarına göre iş kazalarından en çok inşaat ve metal sanayi iş kollarında çalışan, ilkökul mezunu genç erkeklerin etkilendiği görülmüştür. Fizik tedavi ve rehabilitasyon ihtiyacı olan hastaların birçoğunun tüm tedavi uygulamalarına rağmen sekelle iyileştiği tespit edilmiştir.

Anahtar Kelimeler: İş kazaları; rehabilitasyon; komplikasyonlar

According to the International Labour Organization statistics, more than 2.78 million people die as a result of occupational accidents (OA) or work-re-

lated diseases (WRD) per year.¹ In Turkey, OA frequency is 1.78 in 100.000 patients. The number of OAs and related mortality were revealed as 286.068

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and 1405 in Social Security Institution of Turkey (SSIT) statistics, respectively.² Additionally, 374 million non-fatal OAs and WRDs occur each year, many of them resulting in extended absences from work.¹ In addition to substantial economic losses, WRDs and work-related injuries bring along significant individual and social burdens.³ The injuries may cause serious disabilities, workforce losses and even mortalities. Many patients who experienced an OA face numerous problems in the long term period and return-to-work (RTW) may get complicated for them. Our priority is to carry out occupational safety and accident prevention activities systematically to prevent OAs and subsequent financial and emotional damage. In unpreventable situations, physical therapy and rehabilitation applications are important, especially in facilitating RTW and decreasing the morbidities. The longer an injured worker is away from work, the lower possibility of a successful RTW is.⁴ Physical therapy and rehabilitation practices facilitate RTW for the injured workers and help them maintain their functional and cognitive capacity.⁵ The purpose of this study is to increase data related to OAs through a retrospective analysis of the demographic and clinical characteristics of the patients included in a physical therapy and rehabilitation program. Thus, it will be possible to draw attention to the injuries and rehabilitation process after OAs and in order to start rehabilitation programs earlier, to increase the cooperation of the physical medicine and rehabilitation department with orthopedics, plastic and reconstructive surgery and neurosurgery.

MATERIAL AND METHODS

The study included 102 patients who were admitted to our clinic for a rehabilitation program after an OA between January 2012 and December 2018. The study was approved by the Local Ethics Committee of Tokat Gaziosmanpaşa University (20.02.2019/no. 19KA EK-035). It was performed in compliance with the principles of the Declaration of Helsinki. The inclusion criteria of the study were determined as patients who had an OA over the age of 18, whose accident was reported to the SSIT and who were included in a physical therapy and rehabilitation program after an OA. The electronic health records of

the patients in the hospital database were retrospectively scanned. The sociodemographic, injury and employment characteristics of the patients were recorded, symptoms not related to OAs were ignored.

SOCIODEMOGRAPHIC CHARACTERISTICS

This group includes gender, age, marital status and educational levels of the patients. Gender is a categorical variable with two categories: female and male. The age of injured workers is categorized as follows: 18-25 years, 26-40 years, 41 years and above. For providing more reliable information, age groups were used rather than single-age values. Marital status is also a categorical variable with two categories: single and married. Educational status has been assessed in four categories: primary school, secondary school, high school and college.

INJURY CHARACTERISTICS

This group includes bodily location, injury type, cause of injury, need for surgery after injury, presence of sequelae, post-injury ambulation levels and the number of physical therapy treatment sessions. Injury type has five categories: amputations, tendon lacerations, non-vertebral fractures, vertebral fractures and soft-tissue injuries. Bodily location is categorized as follows: upper extremity, lower extremity and axial skeleton. The cause of injury has six categories: falling from a height, sharp object injuries, electric shocks, burning, traffic accidents and chronic mechanical loading.

EMPLOYMENT CHARACTERISTICS

In this group, occupational sectors where the OAs occurred were evaluated. The sectors were divided into five categories: construction industry, textile sector, metal industry, transportation sector and other service industry.

STATISTICAL ANALYSIS

The SPSS 19 (IBM Co., Somers, NY) was used for statistical analysis. Descriptive analysis were made to give information about the general characteristics of the study groups. The data of the continuous variables were given as mean±standard deviation and median [interquartile range]; data for categorical variables were given as n (%). The means of the quanti-

tative variables among the groups were compared by using independent samples t test, One-Way ANOVA for normally distributing data and Kruskal Wallis test for non- normally distributing data. Cross tabulations and the Pearson chi-square Test were used. $p < 0.05$ were considered to be statistically significant to evaluate the relationship between qualitative variables.

RESULTS

One hundred and two patients were involved in the study. The mean age of the patients was 36.39 ± 10.38 years (min: 18, max: 59). One hundred of the patients (98%) were male, two (2%) of the patients were female. The patients were divided into three categories by ages: 19 (18.6%) of the patients were between 18 and 25 years, 43 (42.2%) were between 26 and 40 years, and 40 (39.2%) were 41 years and above. Table 1 shows the sociodemographic characteristics of the patients. The injury and employment characteristics of the patients were shown in Table 2 and Table 3, respectively.

TABLE 1: Distribution of the patients by sociodemographic characteristics.

Variables	n (%)
Gender	
Male	100 (98)
Female	2 (2)
Age	
18-25 years	19 (18.6)
26-40 years	43 (42.2)
41 years and above	40 (39.2)
Marital status	
Married	73 (71.6)
Single	29 (28.4)
Occupational groups	
Construction	55 (53.9)
Metal industry	27 (26.5)
Other services	13 (12.7)
Transportation	5 (4.9)
Textile	2 (2)
Educational level	
Primary school	49 (48)
Secondary school	24 (23.5)
High school	21 (20.6)
College	8 (7.8)

TABLE 2: Distribution of the patients by injury characteristics.

Variables	n (%)
Bodily location of injury	
Upper limb	58 (56.9)
Lower limb	30 (29.4)
Axial skeleton	14 (13.7)
Injury type	
Nonvertebral fracture	43 (42.2)
Tendon laceration	27 (26.5)
Soft-tissue injury	12 (11.8)
Vertebral fracture	10 (9.8)
Amputation	10 (9.8)
Cause of injury	
Sharp object injuries	48 (47.1)
Falling from a height	41 (40.2)
Chronic mechanical loading	5 (4.9)
Traffic accidents	4 (3.9)
Burns	3 (2.9)
Electric shocks	1 (1)
Presence of surgery	
Yes	83 (81.4)
No	19 (18.6)
Sequels	
Joint contracture	46 (45.1)
Neurological deficit	28 (27.5)
No sequel	21 (20.6)
Tissue defect	5 (4.9)
Limb-length discrepancy	1 (1)
Muscle atrophy	1 (1)
Ambulation Levels	
Independent	93 (91.2)
Ambulatory with assistive device (walker, tripod, AFO)	6 (5.9)
Ambulatory with a wheelchair	3 (2.9)

The sharp object injuries with a ratio of 47.1% (n:48), falling from a height with a ratio of 40.2% (n:41) were the most common causes of OAs. The other causes of OAs are shown in Table 2. Ten (9.8%) of the patients had an amputation and all of these patients had an injury with a sharp object in etiology. Eighty-three (81.4%) of the patients included in our study had one or more surgical procedures due to OAs. There was no statistically significant difference among the occupational groups in terms of surgical history ($p: 0.170$) (Table 2, Table 3). All patients with tendon lacerations (n:27) and amputations were operated due to these injuries. Ten patients

TABLE 3: Distribution of variables by occupational groups.

Variables	Occupational groups					p
	Construction n (%)	Textile n (%)	Metal industry n (%)	Transportation n (%)	Other services n (%)	
Educational level						
Primary school	32 (58.2)	0 (0)	10 (37)	3 (60)	4 (30.8)	0.124
Secondary school	11 (20)	1 (50)	9 (33.3)	1 (20)	2 (15.4)	
High school	10 (18.2)	1 (50)	6 (22.2)	1 (20)	3 (23.1)	
Collage	2 (3.6)	0 (0)	2 (7.4)	0 (0)	4 (30.8)	
Bodily location of injury						
Upper limb	26 (47.3)	1 (50)	20 (74.1)	3 (60)	8 (61.5)	0.214
Lower limb	21 (38.2)	0 (0)	5 (18.5)	2 (40)	2 (15.4)	
Axial skeleton	8 (14.5)	1 (50)	2 (7.4)	0 (0)	3 (23.1)	
Injury type						
Nonvertebral fracture	27 (49.1)	1 (50)	6 (22.2)	5 (100)	4 (30.8)	0.048
Tendon rupture	14 (25.5)	0 (0)	9 (33.3)	0 (0)	4 (30.8)	
Soft-tissue injury	5 (9.1)	1 (50)	4 (14.8)	0 (0)	2 (15.4)	
Vertebral fracture	7 (12.7)	0 (0)	1 (3.7)	0 (0)	2 (15.4)	
Amputation	2 (3.6)	0 (0)	7 (25.9)	0 (0)	1 (7.7)	
Cause of injury						
Sharp object injuries	18 (32.7)	1 (50)	23 (85.2)	0 (0)	6 (46.2)	<0.001
Falling from a height	34 (61.8)	0 (0)	1 (3.7)	1 (20)	5 (38.5)	
Chronic mechanic. loading	1 (1.8)	1 (50)	1 (3.7)	0 (0)	2 (15.4)	
Traffic accidents	0 (0)	0 (0)	0 (0)	4 (80)	0 (0)	
Burns	1 (1.8)	0 (0)	2 (7.4)	0 (0)	0 (0)	
Electric shocks	1 (1.8)	0 (0)	0 (0)	0 (0)	0 (0)	
Presence of surgery						
Yes	47 (85.5)	1 (50)	22 (81.5)	5 (100)	8 (61.5)	0.170
No	8 (14.5)	1 (50)	5 (18.5)	0 (0)	0 (0)	
Sequels						
Joint contracture	25 (45.5)	1 (50)	14 (51.9)	1 (20)	5 (38.5)	0.212
Neurological deficit	15 (27.3)	0 (0)	8 (29.6)	4 (80)	1 (7.7)	
No sequel	11 (20)	1 (50)	2 (7.4)	0 (0)	7 (53.8)	
Tissue defect	2 (3.6)	0 (0)	3 (11.1)	0 (0)	0 (0)	
Limb-length discrepancy	1 (1.8)	0 (0)	0 (0)	0 (0)	0 (0)	
Muscle atrophy	1 (1.8)	0 (0)	0 (0)	0 (0)	0 (0)	
Ambulation Levels						
Independent	49 (89.1)	2 (100)	25 (92.6)	4 (80)	13 (100)	0.704
Ambulatory with assitive device	3 (5.5)	0 (0)	2 (7.4)	1 (20)	0 (0)	
Ambulatory with a wheelchair	3 (5.5)	0 (0)	0 (0)	0 (0)	0 (0)	

Chi-square test was used.

had vertebral fractures. Eighty percent of the patients (n:8) with vertebral fractures underwent surgery, while 2 (20%) of them were followed up with a medical corset. Thirty -six (83.7%) of the patients with non-vertebral bone fractures required surgery; 12

(16.3%) of them were treated with a cast/splint. Sequela evaluation revealed that joint contractures were the most common sequela in 46 (45.1%) patients, sensory/motor neurologic deficits were seen in 28 (27.5%) patients. Twenty-one (20.6%) patients re-

covered with no sequela left (Table 2). The number of the patients fully independent and ambulatory without the need for any support was 93 (91.2%). However, three (2.9%) patients were ambulatory with a wheelchair. These three patients had experienced vertebral injuries (Table 2).

The mean number of the physical therapy sessions received by patients was 42.89 ± 25.53 (min:15, max:180). There was no difference among different occupational sectors regarding the duration of the rehabilitation programs ($p: 0,799$). However, the patients who underwent surgery experienced a longer duration of rehabilitation ($p: 0,003$). The patients with

amputation and vertebral fractures required the longest period of rehabilitation (Table 4).

DISCUSSION

The economic cost of OAs and WRDs reaches 3.94% of the world national income. Therefore, if an OA occurs despite all preventive measures, it is important to implement the most appropriate treatments and rehabilitation programs for the patients in the earliest period.⁶ Multidisciplinary approach after an OA is of great importance in the success of treatment. Rehabilitation practices are an important component of this multidisciplinary team. Physical therapy plays a

TABLE 4: Distribution of the number of physical therapy sessions by qualitative variables.

Variables	n (%)	The number of PTS		p
		Mean \pm SD	Median [Min-Max]	
Occupational groups				
Construction	55 (53.9)	45.09 \pm 29.78	30[15-180]	0.877**
Metal industry	27 (26.5)	40.19 \pm 21.01	30[15-90]	
Other services	13 (12.7)	39.23 \pm 14.41	30[30-60]	
Transportation	5 (4.9)	48 \pm 26.83	30[30-90]	
Textile	2 (2)	30 \pm 0	30[30-30]	
Bodily location of injury				
Upper limb	58 (56.9)	42.33 \pm 26.11	30[15-180]	0.096
Lower limb	30 (29.4)	38 \pm 13.49	30[30-60]	
Vertebral skeleton	14 (13.7)	55.71 \pm 37.87	60[15-120]	
Injury type				
Nonvertebral fracture	43 (42.2)	41.51 \pm 26.56 (b)	30[15-180]	0.002
Tendon rupture	27 (26.5)	38.15 \pm 14.69 (b)	30[20-60]	
Soft-tissue injury	12 (11.8)	28.75 \pm 16.25 (b)	30[15-60]	
Vertebral fracture	10 (9.8)	67.5 \pm 36.91 (a)	60[15-120]	
Amputation	10 (9.8)	54 \pm 23.66 (ab)	60[30-90]	
Cause of injury***				
Sharp object injuries	48 (47.1)	40.52 \pm 17.81	30[15-90]	-
Falling from a height	41 (40.2)	47.93 \pm 32.9	30[15-180]	
Chronic mechanical loading	5 (4.9)	30 \pm 18.37	30[15-60]	
Traffic accidents	4 (3.9)	52.5 \pm 28.72	45[30-90]	
Burns	3 (2.9)	25 \pm 8.66	30[15-30]	
Electric shocks	1 (1)	30 \pm 0	30[30-30]	
Presence of surgery				
Yes	83 (81.4)	46.39 \pm 26.39	30[20-180]	0.003**
No	19 (18.6)	27.63 \pm 13.48	30[15-60]	

One-way ANOVA, *:Kruskal Wallis test, **Independent samples t test were used.

PTS: Physical Therapy Sessions.

(ab): The common letter in same column indicates the statistical insignificance.

***: For this variable, p values could not be calculated.

key role in restoring the ability of the affected person to perform daily living activities independently and providing RTW. This study evaluated sociodemographic and clinical characteristics of 102 patients who received physical therapy and rehabilitation after an OA retrospectively.

In their retrospective study, Serinken et al. documented 746 patients who experienced a hand injury after an OA and the mean age of the patients was 27.8 ± 6.1 years (ranged 16 to 46 years). The number of the male patients was 87.2% (n:213) and 57.0% (n:139) of them were between 25 and 34 years of age. Furthermore, the metal industry was the first with 41.4% (n:101), followed by the textile sector with 16.8% (n:41) and mining-construction industry with 14.7% (n:36).⁷

Karakurt et al. attributed several reasons for the male predominance (96.6%) in OAs: 80% of all insured workers in Turkey are male. They work in more dangerous sectors hence they experience more OAs.⁸ Çelik et al. reported that 92.4% of the patients with OA were male, while Erdemli et al. found the ratio to be 73%.^{9,10} SSIT statistics stated that OAs mainly occurred in males (84.2%) in Turkey.²

In our study, the mean age was 36.39 ± 10.38 (min: 18, max: 59). Of 102 patients (100 male; 2 female); 18.6% were between 18 and 25 years of age, 42.2% were between 26 and 40 years and 39.2% were 41 years and above. The frequency of male workers who experienced an OA might stem from several reasons: men are more predominantly involved in working life and dangerous professions. Female workers behave more carefully at work and mainly work as unregistered day laborers.

In the study by Serinken et al., the mean age was lower than our study group.⁷ This may be due to the difference of the region where the study is conducted. Their study was carried out in an industrial region with plenty of job opportunities at earlier ages. Our findings on the mean age, the distribution by age groups, and the age range where OAs are the most prevalent were in close correlation with the literature.¹¹⁻¹³

Low educational levels lead to an increase in OAs because employees with a low level of education accept working in more heavy and dangerous works

and they are more exposed to occupational risks. Low levels of education even prevent recognition of existing occupational risks.¹⁴ In a study by Jafari et al., it was found that workers with a non-academic education were at an increased risk of OAs.¹⁵

Because these individuals had jobs that required a lot of exercise and physical effort. Also they were generally less well prepared to learn safety practices in the workplace or to follow safe working procedures.¹⁶⁻¹⁸

In our study, 48% (n: 49) of the patients were primary school graduates. Only 7.8% (n: 8) were college graduates. In the construction industry, where OAs occur most frequently, 58.2% (n: 32) of the employees were primary school graduates, while 37% (n: 10) of the employees in the industrial sector were primary school graduates. These sectors require specific attention, training, and knowledge. The low education levels of the employees may be the reason why OAs are most frequently seen in these two sectors. Increasing the frequency of vocational training and inspection may be a solution proposal to reduce OAs. In different studies, it was found that the incidence of OAs varies by months and industry.^{8,9} However, in our study, it was found that the applications to our clinic due to OAs did not differ by month. This may be due to the fact that patients who have had an OA apply to the physical therapy clinics for rehabilitation, not immediately after the accident, but for later periods.

Sayhan et al. reported that most of the employees who had an OA work in the manufacturing and construction sectors.¹⁹ Ada et al. found that the employees most frequently injured were the unqualified ones.²⁰ Çelik et al. stated that OAs occur most frequently in the industrial sector (26%) and the construction industry (28.7%).⁹

In our study, 53.9% (n:55) of the patients were in the construction industry. Almost one-quarter of the patients included in the study were employed in the metal industry. These results were consistent with the previous studies. The reason for this distribution may be that the construction industry and metal industry sectors involve dangerous jobs that require high attention.

Schloenfisch et al. and Ulutaşdemir et al. found that the most frequently injured anatomic regions were upper extremities with 40% and 61.75% (n:82) respectively.^{21,22} In our study, 56.9% (n:58) of the injuries were upper extremity injuries, 29.4% (n:30) of them were lower extremity injuries and 13.7% (n:14) were vertebral fractures. This frequency of upper extremity injuries was expected since hands are the most commonly used parts of the body.

Çelik et al. found that lacerations were the most common injuries (36.4%).⁹ Serinken et al. reported that the most common injuries were lacerations, penetrations, amputations and avulsions.⁷ According to SSIT data, sharp object injuries take the first place with 15.2% and crash-related injuries rank number two with 10.5%.² In our study, the most common injury was non-vertebral fractures with 42.2% (n:43) followed by tendon lacerations with 26.5% (n:27).

Akbarzadeh et al. reported that the duration of hospital stay served as a proxy indicator for the severity of the injury.¹¹ In our study, it was found that the patients who underwent surgery after OAs required a longer duration of rehabilitation. The type of injury was decisive in the duration of rehabilitation and vertebral fractures required the longest period of rehabilitation.

The superiority of our study is that it is the first study in the field of physical therapy and rehabilitation analyzing the sociodemographic and clinical characteristics of the victims after an OA.

LIMITATIONS

There are a number of limitations of our study. First, it was a cross-sectional and retrospective study. Due to the design of the study, the precautions taken in the workplace where the patients had an OA and the knowledge levels of the patients about the OAs and work safety could not be evaluated. In addition, our study was single-centered and performed in a tertiary hospital, therefore our data did not cover the entire society. Only patients who needed physical therapy and rehabilitation after an OA were included in the study. Therefore, we do not have any data on overall morbidity and mortality of OAs.

CONCLUSION

The results of our study showed that the primary school graduate young males working in the construction and metal industry sectors were mostly affected by OAs. It was found that many of the patients in need of physical therapy and rehabilitation programs recovered with sequelae despite all treatment applications. For this reason, it is important to take measures to prevent OAs and to increase educations on occupational safety.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

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