Received: 14 Nov 2024 | **Accepted:** 20 Jan 2025 **Genel Tıp Derg. Volume** 35/**Issue** 1 (February),162-166
DOI: 10.54005/geneltip.1585614

ORIGINAL ARTICLE

Immigrant Susceptibility to Hand Injuries in Industrial Work Environments: A Retrospective Analysis

Endüstriyel Çalışma Ortamlarında El Yaralanmalarına Karşı Göçmen Duyarlılığı: Retrospektif Bir Analiz

[1]Demet Acar, [1]Emine Kadıoğlu

[1]Department of Emergency Medicine, University of Health Sciences Konya City Hospital, Konya, Türkiye

Correspondence

Demet Acar , MD
Department of Emergency Medicine, University of Health Sciences Konya City Hospital, Konya, Türkiye

E-Mail: dr_demetacar@hotmail.com

How to cite ?

Acar D, Kadıoğlu E. Immigrant Susceptibility to Hand Injuries in Industrial Work Environments: A Retrospective Analysis. Genel Tıp Derg. 2025;35 (1):162-166

ABSTRACT

Aim: To elucidate the prevalence and demographic characteristics of patients admitted to emergency departments (EDs) with work-related hand injuries and to determine the factors contributing to such injuries and have an impact on the severity of injuries.
Methods: The study spanned from January 2021 to January 2022 and involved patients seeking medical attention for hand injuries at a tertiary ED near an industrial area. Out of a total of 2,153 patients, 946 admitted due to work-related injuries were evaluated. Data on demographics, injury severity, the timing of injuries, the data on immigrant status, occupational hand injury prevalence in local and immigrant populations, and basic data on treatment methods were collected and analyzed.
Results: The study revealed that 31.9% of individuals with hand injuries were migrants. Injuries were more prevalent during the last working days of the week and in the 35-50 age group. The index finger exhibited the highest injury rate. Surgical interventions were required for 63.95% of patients with 32.72% of those identified as immigrants.
Conclusion: The study highlights that hand injuries are more common among immigrants and sheds light on their vulnerability in occupational settings. Factors such as increased risks in industrial jobs, language barriers, and social and cultural adaptation problems contribute to this increased sensitivity. To reduce these inequalities and increase workplace safety, special preventive measures, personal protection method training, as well as frequent repetition of language, social and cultural adaptation training will reduce the severity of hand injuries and injuries due to occupational accidents in the migrant population as well as in the general population.

Keywords: Emergency department, hand injuries, occupational, immigrants

ÖZ

Amaç: Bu çalışmanın amacı, çalışma kaynaklı el yaralanmaları ile acil servislere başvuran hastaların prevalansını ve demografik özelliklerini açıklamak ve bu yaralanmalara katkıda bulunan faktörleri ve yaralanmaların şiddeti üzerindeki etkilerini belirlemektir.
Gereç ve Yöntem: Çalışma, Ocak 2021 ile Ocak 2022 arasında endüstriyel bir bölgeye yakın üçüncü basamak bir AS'de el yaralanması nedeniyle tıbbi yardım talep eden hastaları kapsamıştır. Toplamda 2.153 hasta arasından, iş kazaları nedeniyle başvuran 946 hasta değerlendirilmiştir. Demografik veriler, yaralanma şiddeti, yaralanmaların zamanlaması, göçmenlik durumu, yerel ve göçmen popülasyondaki mesleki el yaralanması prevalansı ve temel tedavi yöntemleri hakkında veriler toplanıp analiz edilmiştir.
Bulgular: Çalışma, el yaralanması yaşayan kişilerin %31,9'unun göçmen olduğunu göstermiştir. Yaralanmaların haftanın son çalışma günlerinde ve 35-50 yaş grubunda daha yaygın olduğu belirlenmiştir. En yüksek yaralanma oranı subjelerin işaret parmağında görülmüştür. Hastaların %63,95'i cerrahi müdahale gerektirmiş ve bunların %32,72'sinin göçmen olduğu tespit edilmiştir.
Sonuç: Çalışma, göçmenler arasında el yaralanmalarının daha yaygın olduğuna dikkat çekmekte ve iş ortamlarında bu grubun hassasiyetini vurgulamaktadır. Endüstriyel alanlardaki artmış riskler, dil bariyerleri ve sosyal ve kültürel uyum sorunları bu hassasiyetin artışına katkıda bulunmaktadır. Bu eşitsizlikleri azaltmak ve iş yeri güvenliğini artırmak için özel önleyici tedbirler, kişisel koruma yöntemleri eğitimi ile dil, sosyal ve kültürel uyum eğitimlerinin sık sık tekrarlanması, hem göçmen popülasyonda hem de genel popülasyonda iş kazalarına bağlı el yaralanmalarının şiddetini azaltacaktır.

Anahtar Kelimeler: Acil Servis, el yaralanmaları, göçmenler, mesleki

Introduction

Hand injuries, which represent a common cause of admissions to the emergency departments (EDs), account for approximately 6.6% to 28.2% of the admissions (1,2). These injuries, which primarily affect young men with a marked tendency towards the dominant hand, are often caused by a variety of sources, including agricultural activities, industrial work accidents, household incidents, assaults, self-harm attempts, and traffic accidents (3,4). Hand injuries affecting agricultural and industrial workers fall within occupational hand injuries or work accidents, constituting a significant portion of cases seen in EDs, particularly in work-related incidents. At present, hand injuries stemming from work accidents constitute 41% of ED admissions for hand injuries (5). Hand injuries encompass a broad spectrum, ranging from minor skin

Peer-Review: Double anonymized - Two External
Plagiarism Checks: Yes - intihal.net
Complaints: geneltip@selcuk.edu.tr

Selcuk University Press
Genel Tıp Dergisi | e-ISSN: 2602-3741
https://dergipark.org.tr/tr/pub/geneltip
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cuts to intricate lacerations involving vessels, nerves, tendons, and bones, and in severe cases, even leading to amputations (2). Hand injuries occurring within domestic settings typically involve soft tissues and manifest as straightforward lacerations. Conversely, hand injuries resulting from work accidents tend to be more severe, resulting in complex injuries such as amputations (6,7).

The increasing immigrant population in recent years has simultaneously increased the representation of immigrants in the labor force, especially due to the increasing migration due to wars. Around the world, immigrants are vulnerable populations facing challenges (8). With the increase in the population of immigrants employed in the industrial sector, there has also been a noticeable increase in the number of immigrants admitted to EDs, especially due to hand injuries caused by work accidents. Because of barriers such as language barriers and adjustment problems they may experience in social and cultural adaptation, immigrants are particularly susceptible to potentially work-related hand injuries. Therefore, the present study aimed to reveal the demographic characteristics of patients admitted to the EDs with work-related hand injuries.

Materials And Methods

Design, population, and settings

The study was carried out complying with the Declaration of Helsinki, and approval was obtained from the local ethics committee of XXX University (Date: 02/03/2023, Protocol no: 03-43).

The study focuses on patients with hand injuries seeking medical attention in the ED of a tertiary trauma hospital located close to an industrial zone in Türkiye, where an average of 700 thousand patient admissions are recorded annually. The research period extends from January 2021 to January 2022. Non-occupational hand injuries due to home accidents were excluded from the study. As occupational hand injuries; Hand injuries caused by both agricultural equipment and industrial construction machinery were included in the study. Of the 2,153 patients who initially presented with hand injuries, 946 patients were included in the study as occupational hand injuries according to the inclusion criteria.

Data collection

A cohort of 946 patients was included in the study, and relevant data were extracted from patient files and the hospital's digital data archives. Additionally, injury prevalence in local and immigrant patients, injury severity, injuries in the dominant hand, timing and day of the injury, the number and specific fingers affected, and the frequency of injuries to particular fingers were examined.

An analysis of the patient's treatment methods was undertaken. Specifically, the focus was on determining whether hand injuries were addressed with simple interventions in ED or necessitated more extensive surgical procedures in the operating room. However, it is important to mention that the study does not provide a detailed breakdown of the specific types of surgeries performed.

Statistical analysis

All statistical analyses were conducted using the RStudio software (version 2023.09.0, RStudio, Inc., Massachusetts, USA). The significance level for the tests is set at 5%. The Chi-Square Homogeneity test is performed for equality of proportions, and the Bonferroni-corrected Chi-Square test is performed for pairwise comparisons.

Results

Only 6.5% of the total study population (62 out of 946) were female. Among the patients, 57.9% (548 out of 946) experienced injuries to their dominant hand. Upon scrutinizing the retrospective hospital registration data of the injured individuals, a notable finding emerged: 31.9% of them were identified as immigrant patients with diverse nationalities, constituting 302 out of the total 946 individuals in the study. Most affected individuals fell within the 35-50 age range, constituting 53.93% of the total study population. (Figure 1).

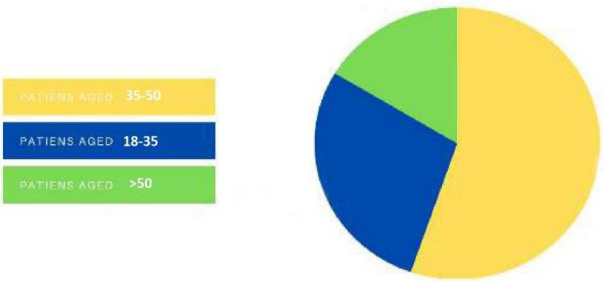

Figure 1. Distribution of patients based on age ranges.

Upon excluding immigrant patients and examining the educational backgrounds of the remaining 644 individuals who received education in Turkey, it was observed that 10.09% were illiterate, 82.45% had completed secondary school, and 6.52% were university graduates. The comparison between illiteracy and university graduation did not yield a significant difference. However, a noteworthy finding was the statistically significant prevalence (82.45%) of individuals with education levels at the secondary school level. Examining injury distribution concerning time intervals revealed that 52.80% of injuries occurred during morning hours. When the distribution of injuries according to time intervals was examined, it was seen that 52.80% of the injuries occurred in the morning hours. In the study, three shift work schedules, 8:00 am-4:00 pm, 4:00 pm-00:00, and 00:00-8:00 am were taken into consideration. When comparing the shift hours where the injury occurred according to the shift hours, the p-value for the chi-square homogeneity test = 0.0000. The injury rate in the 8:00 am-4:00 pm shift is the highest. In pairwise comparison The rate of hand injuries between 8:00 am-4:00 pm (p=0.5280899) and 00:00-8:00 am (p=0.3483146) shifts was significantly higher than the rate of hand injuries in the 4:00 pm-8:00 am (p=0.1235955) shift. (Table 1).

Table 1. Comparison of the time intervals when the injury occurred

The periods where injuries occurred	00:00 pm-8:00 am	08:00 am-4:00 pm	4:00 pm-00:00
Ratio	34.83% (0.3483146)	52.80% (0.5280899)	12.35% (0.1235955)
Dual Comparison	*A	*A	*B

*In comparison between shifts, a chi-square homogeneity test was used. The *p*-value for the chi-square homogeneity test, p=0.0000

In terms of weekly distribution, 51.79% of injuries occurred during the weekend (Friday-Saturday-Sunday), with injuries on Monday-Tuesday-Wednesday-Thursday accounting for 48.21% (Figure 2). Although the augmented workforce during weekdays, including administrative staff, the incidence of injuries was notably higher on weekends compared to weekdays.

The highest injury rate was index finder with 28.75%, followed by thumb with 27.27%. In the Binary comparison of the injury rates of each finger; According to the chi-square homogeneity test, the p-value was calculated as = 0.002724 and there was no significant difference between the thumb (0.2727273), index (0.28752079), middle (0.1522314) and little (0.1818182) fingers. However, the injury rate of the ring finger (0.1257020) was found to be significantly lower than the other fingers (Table 2).

Table 2. Comparison of the most injured fingers

Number of Injured Fingers	Thumb Finger	Index Finger	Middle Finger	Ring Finger	Little Finger
Ratio	27.27% (0.287507)	28.75% (0.2727273)	15.22% (0.1522314)	12.57% (0.125702)	18.18% (0.1818182)
Dual Comparison	*A	*A	*A	* B	*A

*In the Binary comparison of the injury rates of each finger. According to the chi-square homogeneity test, the *p*-value, p=0.002724

Strikingly, the percentage of immigrants presenting with hand injuries due to a work accident to all applicants with a work accident is approximately 31.9%. This indicates that the immigrant population is exposed to these injuries at a rate approximately six times higher.

Upon analyzing the treatment methods, it was observed that 63.95% of patients underwent surgery following consultation with the hand surgery department. Additionally, 22.30% received consultation from the same department, and intervention and treatment were administered by the relevant branch within EDs. Furthermore, 13.74% of patients underwent treatment by an emergency physician without consultation or hospitalization. (Figure 3). Notably, among the patients necessitating surgical intervention (n=604), 32.72% (n: 198) were identified as immigrant patients.

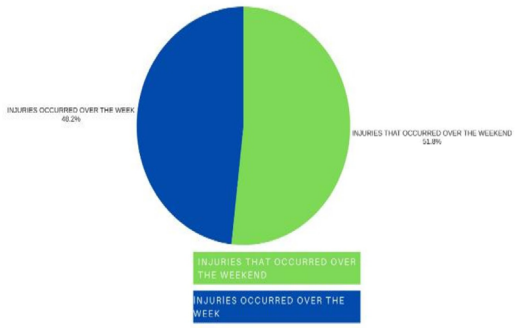

Figure 2: Distribution rate of injuries on days of occurrence (weekdays/weekends)

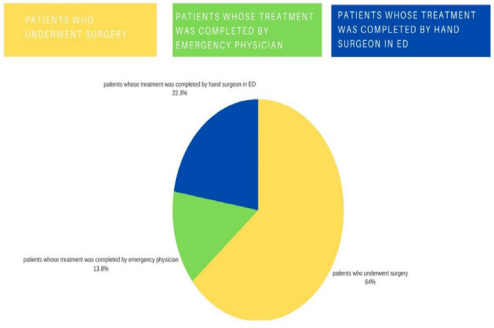

Figure 3. Distribution of treatment methods of patients

Discussion

In light of the data from our study, the observed higher frequency of injuries during the latter part of the week suggests a potential correlation with increased fatigue, underscoring the necessity for systematic rest periods to alleviate occupational hazards. The temporal clustering of injuries within the 08:00-16:00 timeframe corresponds with standard working hours, reflecting the operational patterns of most of the workforce. This observation accentuates the significance of integrating temporal considerations, such as work shift dynamics, when formulating comprehensive occupational safety strategies. While the proportion of female employees among the entire study population was around 46%, a notable finding was that only approximately 6.5% of those presenting with hand injuries were female. The reason for this intriguing discrepancy can be attributed to the fact that female workers are less employed since the patients included were working with heavy industrial machinery and in industries working in shifts. Another conceivable factor might be their more cautious approach when working in hazardous environments than their male counterparts. The key point in our data is that immigrant patients account for 31.9% of hand injuries. This strongly suggests that immigrants are more prone to hand injuries. Possible reasons could be their lack of experience with industrial work, challenges in understanding safety risks due to language issues, and a higher chance of working in risky jobs. However, it's important to note that these are just possible reasons; our data doesn't pinpoint the exact cause.

The heightened frequency of injuries in the dominant hand aligns with the expected outcome, given its primary utilization. Furthermore, the higher frequency of injuries to the thumb and index fingers indicates that these fingers are more vulnerable, likely due to increased usage during work. These findings underscore the importance of task-specific safety protocols and emphasize the necessity for tailored preventive measures aligning with the specific nature of tasks performed by employees.

Demographically, the incidence of hand injuries exhibits notable gender disparities, with a prevalence of 70-87.3% among males and 12.7-30% among females. It would be correct to attribute the reason for this inequality to differences in the employment sector. The age distribution of these injuries is most pronounced in the 21–30 age range, reflecting a demographic peak for occurrences (9-13). Gender ratios for hand injuries are typically in the range of 57-80% for males and 20-43% for females, and the frequency of incidents occurring in the 21-30 age group reflects the trends observed in our country (10-18). These data do not conflict with the data in our study An examination of the age distribution revealed that the most prevalent hand injuries occurred within the 35-50 age range, constituting 55.3% of cases, followed by the 18-35 age range at 28.4%.

Our data indicates that hand injuries occurred more frequently on weekends (Friday-Saturday-Sunday), compared to weekdays (monday-tuesday-wednesday-thursday), constituting 51.8% of cases. This observation aligns with findings from a comprehensive study conducted in China, which similarly concluded that work-related injuries exhibited a higher prevalence among weekend workers (19). The educational landscape of workers engaged in industrial machinery operations within the industrial zone aligns with global trends, where individuals typically attain education at the primary to secondary school level (3,16,20,21).

Despite the valuable insights from this study, some limitations warrant admission. The first limitation is a retrospective study. In particular, the lack of comprehensive data on patients' substance addictions such as smoking and alcohol is striking. Again, the retrospective nature of the study made it difficult to access data on the surgical technique used in patients with operated hand injuries. In addition, the study was restricted by the lack of information about postoperative rehabilitation processes and the duration of absence from work.

Conclusion

It is noteworthy that the incidence of the immigrant population and the severity of injury in the immigrant population are high in the case of admissions to EDs with hand injuries due to work accidents. In addition, the incidence of these injuries increases in the last working days of the week. These events are more common among individuals aged 35-50 years and are less frequent among women.

To reduce the difficulties faced by the immigrant population all over the world due to language barriers, and social and cultural adaptation problems, it is necessary to increase adaptation and training while being employed in risky business lines. To prevent such hand injuries, it is essential to implement preventive measures and provide more training to employees.

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