

## Retrospective Analysis Of Occupational Accidents Attending Emergency Department In Kayseri Province

### Kayseri İlinde Acil Servise Başvuran İş Kazalarının Retrospektif Analizi

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#### ÖZ

**Amaç:** Bu çalışmada acil servise iş kazası olarak başvuran olguların analizi yapılarak son zamanlarda sıkça gündeme gelen iş kazaları konusunda güncel verilere ulaşılması amaçlanmıştır.

**Gereç ve yöntem:** Retrospektif nitelikte olan çalışmada acil servise başvuran tüm yaş gruplarındaki iş kazası olgularının verileri analiz edilmiştir. Ancak trafik kazaları ve gıda zehirlenmeleri değerlendirmeye alınmamıştır.

**Bulgular:** Bu çalışmada 1855 vaka değerlendirilmiştir. Vakaların 1768'i (%95,3) erkek, 87'si (%4,7) kadındı. Yaş ortalaması  $32.81 \pm 9.30$  yılıdır. En çok müracaat %37,7 oran ile 25-34 yaş grubunda saptanmıştır. En çok vaka %18,3 oranla pazartesi günü ve çalışma saatleri içerisinde ise %42,5 oranında 12.00-18.00 saatleri arasında görüldü. En fazla iş kazası metal ve makine sektöründe (%37,7) görüldü. Kaza geçirenlerin yarısından fazlası (%52,5) aynı iş yerinde bir yıl ve daha az zamandır çalışanlardan oluşmuştur. Yaralanma mekanizmalarından en fazla cisim çarpması (%28,1) görülmüş olup en çok yumuşak doku hasarı (%46,7) görüldü. Vakaların %96,9'u ayaktan tedavi edilerek taburcu edilmiştir. Toplamda üç hasta ölümlü sonuçlanmıştır (%0,2).

**Sonuç:** Vakaların çoğunluğu metal ve makine sektöründe görülmekte ve ölümlü iş kazalarının ise büyük bir kısmı inşaat sektöründe görülmektedir. Yaralanmaların büyük kısmı mesleki tecrübesi bir yıl ve altında olanlarda görülmüştür.

**Anahtar Kelimeler:** Acil servis, iş kazaları, iş güvenliği

#### ABSTRACT

**Aim:** In this study it was aimed to reach up to date data on occupational accidents, which have been on the agenda recently by analyzing the cases who applied to the emergency service as work accidents.

**Material and methods:** In this retrospective study the data of occupational accident cases in all age groups who applied to the emergency department were analyzed.

**Results:** In this study, 1855 cases were evaluated. Of the cases, 1768 were male (95.3%) and 87 (4.7%) were female. The average age of the cases was found as  $32.81 \pm 9.30$  years. The most applying group was determined 25-34 years old (37.7%). The occupational accidents happened mostly on monday (18.3%) and between at 12.00-18.00 hours. (42.5%). Occupational accidents occurred most frequently in metal and machinery sectors (37.7%). More than half of accident cases (52.2%) included those who had been working in the same business for one year or less. The most common mechanism of injury was hitting objects (28.1%) and the most common injury was soft tissue injury (46.7%). The majorities of the cases (96.6%) underwent outpatient treatment and were discharged. A total of three cases resulted in death.

**Conclusion:** The majority of the cases are seen in the metal and machinery sector and the majority of fatal work accidents are seen in the construction sector. Most of the injuries were seen in those with a professional experience of one year or less.

**Keywords:** Emergency medicine, occupational injuries, job security

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**Geliş tarihi/Received:** 26.06.2023

**Kabul tarihi/Accepted:** 24.07.2023

## INTRODUCTION

Work is one of the most important elements of human life and besides economic factors, it also affects human health physically and psychologically. In the twentieth century, with the increase in industrialization and the use of machinery, disability rates began to increase due to occupational accidents (1). The fact that more and more employees are exposed to work accidents due to injuries in the workplace has increased the importance of the issue (1). In case of disability, the loss of working power of the person causes psychological wear and financial losses. Even when it comes to death and disability, the family of the person also has financial and moral problems. For these reasons, the main objectives of occupational health and safety should be the work of employees in safe and healthy conditions (2). Most of the patients who had an acute occupational accident are evaluated in the emergency services. This shows that occupational accidents have a special importance for emergency physicians and other employees. This study was carried out in order to examine the demographic characteristics, sectoral distribution, professional experience, injury mechanisms and the results of the cases who applied to the emergency service as a work accident in the province of Kayseri, where industrialization is rapidly increasing.

## MATERIALS AND METHODS

This descriptive study was conducted retrospectively among patients who were evaluated as occupational accidents in the adult emergency department of a tertiary hospital. Patients admitted between 15.07.2015 and 15.01.2016 were evaluated in the study. Cases were evaluated through the hospital information operating system and information was recorded on the data analysis form prepared in advance. Patients registered on the system with the diagnosis of 'Z04.2-Examination and observation after work accident' were included in the study. As limitations of the study, traffic accidents and food poisoning, which are included in the scope of work accidents, were not evaluated. In order to complete the missing information, patients were contacted by telephone. In the study, besides demographic data, analysis of the most frequent occurrence of occupational accidents, distribution by sectors, types of injuries and comparative analyzes of the obtained data were made.

Statistical analysis: Descriptive statistics (frequency, percentage distribution) were used as statistical analysis, and chisquare test was used to compare categorical variables between two groups. Results are given as mean±SD or frequency (percent).  $P < 0.001$  was considered statistically significant at the 95 percent confidence interval.

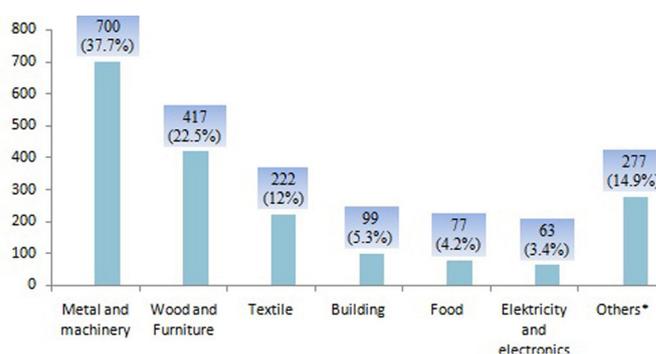
Ethics committee approval: Prior to the study, Erciyes University non interventional clinical research publication ethics committee approval was obtained with the decision number 2016/213 dated 18.03.2016.

## RESULTS

In the study, 1855 occupational accident cases were included in the scope of the research and evaluated. Male patients constituted 95.3% of the cases. The youngest age among the patients is 15 and the highest age is 65. The mean age is  $32.81 \pm 9.30$  years. According to the age ranges, the application rates were as 15-24 years old 21.5%, 25-34 years old 37.5%, 35-44 years 28.9%, 45-54 years 10.4%, 55-65 years old 1.5%. The highest number of applications was between the ages of 25-34 (37.7%) and the least applications were between the ages of 55-65 (1.5%). The distribution of patients who applied to the emergency department after a work accident was investigated. According to these results, it was concluded that there are 18.3% on monday, 17.8% on tuesday, 16.8% on wednesday, 14.7% on thursday, 16.2% on friday, 11.9% on saturday and 4.3% on sunday. According to these results, while the highest number of applications was seen on monday with 18.3%, the least application was seen on sunday with 4.3%.

The times when the patients had an occupational accident were examined in four periods and according to these results, 9.4% cases were seen between 00.00-06.00, 29.9% between 06.00-12.00, 42.5% between 12.00-18.00 and 18.2% between 18.00-24.00. The most common occupational accident was between 12.00-18.00 with a rate of 42.5%. On the other hand, occupational accidents occurred at least between 00.00-06:00 (9.4%) hours.

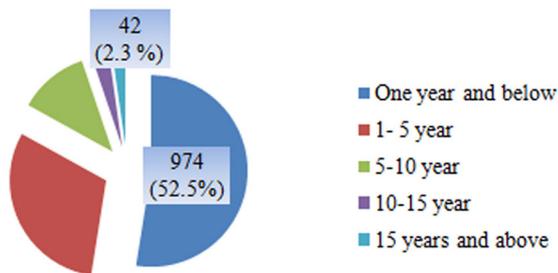
When the distribution is made according to the sectors, the most occupational accidents were seen in the metal and machinery sector (37.7%). It was observed that those who had the least occupational accidents were office workers and desk workers (Figure 1).



**Figure 1.** Distribution of Cases Applying to the Emergency Service as Occupational Accidents by Sectors

\*Glass processing, plastics processing, mining, transportation, agriculture and livestock, etc.

The working time of the patients who had an occupational accident at the same workplace was evaluated and an evaluation was made in five different years. As the number of years spent at the workplace increased, the number of people who had occupational accidents decreased (Figure 2).



**Figure 2.** Distribution of Patients by Working Time in the Same Workplace

The patient group with the highest number of occupational accidents is those who have been working in the same work area for less than one year with a rate of 52.5%. Those who had the least work accident were seen in the group with more experience in the profession, who had been working in the same work area for 15 years or more (2.3%).

The percentages of patients who had a work accident according to the injury mechanisms they were exposed to during the accident and the resulting tissue damage are summarized in Table 1. It was observed that the patients were mostly exposed to injuries in the form of object impact (28.1%). The second most common injury type in patients is stab wounds (24.7%).

Injury mechanisms by sectors were compared and significant results emerged (ChiSquare: 65.725,  $p < 0.001$ ). In the textile industry, injuries such as squeezing and crushing and object impact were more common. In the metal and machinery industry, the most common type of injury was sharps and stab wounds with a rate of 35.1%. Injury mechanisms by sector are summarized in Table 2.

Injuries occurring in patients according to sectors were compared and significant results were obtained (ChiSquare: 103.727,  $p < 0.001$ ). When the textile sector was examined, soft tissue trauma was the most common type of injury with a rate of 52.7%. In the metal and machinery sector, injuries in the form of incisions were seen more with a rate of 43.1%. In the construction sector, fractures and dislocations were seen more than other sectors with a rate of 15.2%. According to the results of the research, the most injured area in occupational accidents was the upper

extremity (54.3%). The lower extremities (21.3%) were in the second rank, and the head and neck region (14.4%) was in the third rank. The least injured area in the patients was the genitourinary area with two patients.

The injured areas were compared according to the injury mechanism and the findings were found to be significant (Chi Square 205.99,  $p < 0.001$ ). Sharps and stab wounds were seen in the upper extremity with a high rate of 87.6%. Likewise, 77.9% of squeezing and crush injuries were seen in the upper extremity. Tissue damage is most common in the lower extremity in falltype injuries, while the rates of impact on other parts of the body are close to each other. Head and neck region were most commonly affected in object impact injuries. All of the electric shocks caused damage to the upper extremity.

**Table 1.** Injury Mechanisms and Distribution Percentages of Caused Damages

	Number of patients (n)	Ratio (%)
<b>Injury Mechanism</b>		
Object Impact*	521	28,1
Sharp Tool Injury	458	24,7
Impingement, Crush Type Injury	380	20,5
Fall	255	13,7
Other Types of Injury**	238	12,8
Electric shock	3	0,2
<b>Incurred Damage</b>		
Hematoma, Abrasion, Soft Tissue Damage	867	46,7
Incision	624	33,6
Fracture and Dislocation	186	10,0
Foreign Body Material in Soft Tissue	133	7,2
Burn	32	1,7
Internal Organ Injury	10	0,5
Amputation	3	0,2

\* Any object falling on the employee, material splashing, chemical contamination, etc.

\*\* Limb sprains and strains, inhalation, heavy lifting, assault, etc.

**Table 2.** Types of Injury Mechanisms by Sector

SECTORS	INJURY MECHANISM					Statistical Data
	Cutting, Drilling Tool n (%)	Compression, Crushing n (%)	Falling n (%)	Object Impact n (%)	Others* n (%)	
Textile	41 (18.5)	63 (28.4)	27 (12.2)	55 (24.8)	36 (16.2)	
Metal and machine	246 (35.1)	149 (21.3)	54 (7.7)	194 (27.7)	57 (8.1)	
Building	8 (8.1)	9 (9.1)	29 (29.3)	43 (43.4)	10 (10.1)	Ki Kare=
Wood and furniture	79 (18.9)	81 (19.4)	53 (12.7)	138 (33.1)	67 (15.8)	65,725,
Food	10 (13.0)	17 (22.1)	22 (28.6)	15 (19.5)	12 (16.9)	p<0,001
Electric and Electronic	14 (22.2)	10 (15.9)	7 (11.1)	14 (22.2)	18 (28.6)	
Others**	60 (21.7)	51 (18.4)	63 (22.7)	62 (22.4)	41 (14.8)	

\* Limb sprains and strains, inhalation, heavy lifting, assault, etc.  
\*\* Glass processing, plastics processing, mining, shipping, agriculture and livestock, etc.

**Table 3.** Treatment Results of Cases Presenting to the Emergency Service as a Work Accident

Conclusion	Number of patients (n)	Ratio(%)
Outpatients discharged	1798	96.9
Patients admitted to the service for surgical Intervention	33	1.8
Patients referred to another center	11	0.6
Patients admitted to the service for follow up	10	0.5
Deceased patients	3	0.2
Electric and Electronic	14 (22.2)	10 (15.9)
Others**	60 (21.7)	51 (18.4)

A total of 1855 patients were evaluated in the study and 1798 (96.9%) of them were discharged after being treated as an outpatient (Table 3).

When the treatment distribution of the applicants according to the sectors is compared, the outpatient treatment and discharge rate in sectors other than the construction sector is over 95%. The majority of patients hospitalized for surgical purposes were seen in the metal and machinery and construction sector. In total three patients resulted in death. All three patients who died were seen in the construction industry with fall from height type injuries.

## DISCUSSION

This study was carried out to evaluate the results of the retrospective analysis of occupational accident cases admitted to the emergency department and to compare them with the literature.

When the sociodemographic characteristics of the patients were examined, it was concluded that the mean age was  $32.81 \pm 9.30$  years. In a similar study conducted by Karakurt et al. in Adana, the mean age was found to be  $32.80 \pm 8.47$  years (1). Age groups were examined under five headings and the highest rate of occupational accidents was seen in the 25-34 age group with a rate of 37.4%. In studies conducted in Turkey and around the world, age groups were classified at different intervals and the age range with the most frequent occupational accidents was found to be similar to this study (3,4). The reason why occupational accidents are mostly seen in the young and middle age group is that the working workforce is at this age the most.

In the study, 95.3% of the cases who had an occupational accident were male. In the studies conducted, Karakurt et al. 96.5% (1), Celik et al. 93% (5), Sayhan et al. (6) found

a rate of 92%. In a Singapore study, ZhiXuNg et al. (7) 95.4%, and in a study conducted in the United States (USA), Konda et al. (8) observed that there were 99% male cases. In a study by Serinken et al. on the textile sector, female patients were found to be more common with a rate of 76.2% (9). The reason for the difference in this study may be the high number of female employees in the textile sector. The fact that men are employed in heavier jobs than women also increases the male rate in accidents.

Professional experience or experience gained in the place of work reduces the rate of work accidents. According to the annual statistics of the Social Security Institution (SSI), more than half of the occupational accident cases in 2013 and 2014 were seen in the employees working in the same workplace for one year or less. This was followed by 1-5 years, 5-10 years, and the least work accident was seen in those who worked for 10 years or more (10). In this study, very close values were obtained and it was observed that the highest number of occupational accidents occurred in those who worked in one year or less (52.5%). In a study conducted by Breslin et al. in the USA, occupational accidents were observed more frequently in those who worked for less than six months and in those who worked parttime (11). In a study conducted by Holizki et al., it was observed that 10% of new recruits had an occupational accident in the first week and 10% within the first three weeks (12). In Turkey, Serinken et al. (9) reported that 50.4% of the cases were determined by Çolak et al. (13), on the other hand, stated that 47% of them were seen in the first month after starting the study. When the results of the study and other studies were compared, similar results were obtained and it was concluded that inexperience is a very important factor in the occurrence of occupational accidents.

When the distribution of work accidents according to days was made, it was seen that the most occurred on monday (18.3%) and the least on sunday (4.3%). In a study conducted by Villanueva and Garcia in Spain, it was observed that the highest number of work accidents was on monday (19%) (14). In studies conducted in Turkey, Çolak et al. (9) monday (17.6%), Serinken et al. (13) on monday (22.5%), and in the study by Ulutaşdemir et al. (15) Monday (37.8%) was found to be the day with the highest number of occupational accidents. In some studies, it has been observed that there are fewer occupational accidents at the weekend (6,16). The majority of work accidents occur on mondays. We are faced with the problem of adaptation caused by resuming work on mondays. Villanueva et al. in their study, they stated that the distraction, hasteness and adaptation problems of the workers were mostly on mondays (14). The reason for the low number of occupational accidents on the weekend is related to the holiday

and the decrease in the number of employees and this is an expected result.

Considering the time of occurrence of occupational accidents, many studies show that there are more cases during daylight hours (5,6,15,17). In this study, the most cases were seen between 12:00-18:00 with a rate of 42.5%. Most of the cases were seen during working hours during the daytime as in other similar studies. According to the data of the social security institution, the most occupational accidents occurred between 08:00 and 18:00, and they were mostly concentrated between 11:00 and 12:00 (10). In a study conducted in Singapore, 71% of occupational accident cases were observed during daylight hours (7). In another study by Serinken et al., injuries related to occupational accidents were seen 35.5% in the morning, 30.8% in the afternoon and 29.5% in the evening (16). Kekeç et al. reported in their study that the majority of work accident cases occur in the afternoon and evening (18).

According to the results of the studies, while some of the occupational accidents are seen more frequently in the morning hours, some of them are common in the afternoon. While the lack of sleep and lack of motivation of the employee in the morning hours may be effective, work accidents caused by hunger and fatigue increase towards the noon hours. Employees can feel sluggish when approaching break time. In this study, the intensity was in the afternoon. The drowsiness and fatigue that comes to the employee after the meal reduces motivation. At the same time, it can be said that the lack of motivation after a long break may also be effective. In the evening, the tiredness of the day and the laziness and haste that come with the end of the work increase the accident rate. Employees need to be more careful, especially at the beginning of work, after lunch and break and close to the end of work. It is very important that they pay attention to their sleep patterns and start work rested. Care should be taken not to eat heavy meals during meal breaks. By creating short breaks in the workplace, rest and motivation can be increased.

According to the analysis made in the study, the most occupational accidents were seen in the metal and machinery sector (37.7%). As in this study, there are similar studies showing that the sector with the highest number of occupational accidents is the metal and machinery sector (9.15). In a study by Sayhan et al. in Turkey, the rate of occupational accidents was found to be 40.1% in the construction sector and 24.9% in the production sector (6). In general, when the studies and statistics on work accidents are examined, more work accidents are seen in the

metal and machinery, construction, textile and furniture sectors. The reason for this may be the high density of workers in these sectors. In addition, it may be possible that security measures, especially in the construction sector, are not taken sufficiently.

In this study, the mechanisms of injury and the damage that occurred in the analysis of occupational accidents in the emergency room were examined. The mechanisms that caused the most injuries were object strikes and stab wounds. Although different results are obtained according to the work area and type of work, in many studies, injuries such as object strikes, sharps, squeezing, and falling are in the foreground (3-6,9).

The types of injuries also vary according to the sectors. In this study, the highest number of sharps injuries (35.1%) in the metal and machinery sector, the highest number of compression and crush injuries in the textile sector (28.4%), the highest number of object impact injuries (43.4%) in the construction sector and fall type injuries (29.3%) were observed. Types of injuries vary according to work areas. In a study conducted by Çolak et al. on the construction industry, 45.1% of falls and 37.9% of blunt injuries were observed (13). A study by Konda et al. in the USA in 2013 showed that the highest number of fatal occupational accidents were in the construction industry and 57% of this was due to falling from a height. The highest fall was observed in roof workers (93%) (8). In a study conducted by Serinken et al. in the textile industry, the highest number of sharp and stab wounds was seen (55.6%) (9). In some sectors, multiple injuries can be seen more prominently. Especially in the mining sector, many workers suffer multiple injuries in injuries caused by dents and the mortality of such injuries is high.

In this study, injuries in occupational accident cases admitted to the emergency department of our hospital were examined and it was observed that 46.7% soft tissue trauma, 33.6% incision, 10% fracture, 7.2% soft tissue foreign body material. In some studies, mostly incision and open wound damage were observed (5,9,12,16). Amputation rates were also found to be high in many studies (12,16,18). In this study, a total of three amputation cases were seen at a rate of 0.2%. This difference between the studies may be related to the fact that the centers where the study was conducted were at different levels and that there were studies specific to only certain work areas and injuries.

The patients evaluated in the study were classified according to the areas of damage to the body, with the highest injury in the upper extremity (54.3%), the second

most common in the lower extremity (21.3%) and the third in the head and neck region (14.4%). Similar results have been obtained in studies on occupational accidents in our country. In these studies, the ranking according to the frequency of the injured areas is similar (1.4-6.18). In a study conducted in Singapore, unlike many other studies, head and neck injuries were found at a rate of 34.3% and then upper extremity injuries (21%) (7). The reason for this difference in the study may be due to the difference in the work areas and occupational accidents in the place where the research was conducted. In many studies, upper extremity injuries are at the forefront. Employees use their hands the most during work. Therefore, it is an expected result that the most injuries are seen in the upper extremities. Considering the studies, the importance of the use of protective equipment such as gloves, glasses and helmets is revealed. It is predicted that there will be a decrease in occupational accidents if the employees use their hands more carefully and use the protective equipment more carefully during work.

The first place of application for occupational accidents is mostly emergency services. While most of the applications were discharged with outpatient treatment, the number of patients who were hospitalized for followup or surgical intervention was not to be underestimated. In this study, 1855 patients were evaluated and 96.9% of them were discharged with outpatient treatment. In similar studies, a rate of 70-95% discharge was observed (1.4-6.9). Considering the hospitalization rates, it was 25.8% (1) in the study of Karakurt et al., 15.7% in the study of Kekeç et al. (6), and 27.9% in the study of Sayhan et al. (18). hospitalizations were given. In this study, the rate of hospitalized patients was 2.3%.

The mortality rate of the cases who applied to the emergency department as a work accident was 0.2% in this study. A total of three patients died during the study. All three patients were working in the construction industry and suffered multiple organ injuries after falling from a height. In studies conducted in Turkey and in the world, the share of the construction sector in fatal work accidents is high. In the study conducted by Çolak et al. on construction workers, 54.9% of those who resulted in death died at the scene and 39.2% in the hospital (13).

## CONCLUSION

It has been found out in many studies conducted in our country and in the world in which people and times, in which sector and work area, and which type of injuries are most common. Considering these studies, measures to prevent occupational accidents should be increased.

**Acknowledgments:** We would like to thank Prof. Dr. Vesile Şenol for her contributions to the study.

**Conflict of Interest:** The authors declared no conflict of interest.

**Statement of Financial Support:** The authors has declared no financial support.

**Ethical Statement:** Erciyes University non interventional clinical research publication ethics committee approval was obtained with the decision number 2016/213 dated 18.03.2016.

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