



CORPUS PUBLISHERS

Current Research in Emergency Medicine (CREM)

ISSN: 2832-5699

Volume 3, Issue 1, 2023

Article Information

Received date : 26 December, 2022

Published date: 31 January, 2023

*Corresponding author

Dr. Feras H. Abuzeyad, MD, Emergency Medicine, King Hamad University Hospital, building 2435, Road 2835, Block 228, P.O Box 24343, Busaiteen, Kingdom of Bahrain

DOI: 10.54026/CREM/1048

Key Words

Occupational Injury; Emergency Department; International Labour Organization; ICU; Fracture; Bahrain; Medical Records; Rehabilitation; Personal Protective Equipment (PPE).

Distributed under: Creative Commons CC-BY 4.0

Research Article

Occupational Injuries in the Emergency Department: Single Center Study

Feras H Abuzeyad^{1*}, Moonis Farooq¹, Shadi Sammour¹, Yasser Chomayil¹, Luma Bashmi², Priya Das², Almas Malik¹, Nawal Maklay¹

¹Department of Emergency Medicine, King Hamad University Hospital, building 2345, Road 2835, Block 228, P. O. Box 24343, Busaiteen, Kingdom of Bahrain

²Department of Scientific Research & Development, King Hamad University Hospital, building 2345, Road 2835, Block 228, P. O. Box 24343, Busaiteen, Kingdom of Bahrain

Abstract

Objectives: Occupational or work-related injuries are frequently seen in the Emergency Department (ED). In this single center study, we aimed to explore the pattern of Occupational Injuries (OIs) that presented to an academic ED, so as to assess the extent to which the workers are protected from work-related hazards and risks in the region.

Setting: This was a retrospective cohort study involving patients who attended an academic ED at King Hamad University Hospital (KHUH) in the Kingdom of Bahrain from January 2017 to December 2020 after an OI.

Participants: Data of 404 participants were collected after they fulfilled the inclusion criteria.

Results: OI incidence was significantly higher among males (88.1% $p = 0.000$) and non-Bahrainis (58.2%, $p = 0.000$). Most of the injuries (48.2%) were associated with work in the fields of manufacturing, construction, and transport. Slipping/tripping was the most frequent mechanism of injury at work (22.5%). OIs were more likely to occur on Sundays (19.3%) and during the morning hours 7:00 a.m. to 3:00 p.m. (54.0%, $p = 0.000$). Among those who do a job that requires wearing Personal Protective Equipment (PPE), a significantly low number of workers were wearing it at the time of injury ($p = 0.03$). The mean length of the stay for admitted cases in the hospital was 8.15 ± 11.23 (range: 1–64) days. Rehabilitation was required in 33.9% cases.

Conclusion: The mortality was very low, and most patients were discharged after treatment in the ED, with a low percentage requiring admission. However, the days of work lost were significant, representing a high socioeconomic burden. A significant relationship between the injury and not using PPE was found, stressing the fact that the enforcement of strict safety regulations and the use of PPE should be mandatory. Further studies are needed to determine the true burden of work-related injuries in Bahrain with a focus on prevention strategies.

Introduction

Occupational or work-related injuries are frequently seen in the Emergency Department (ED) [1-4], however a limited information on such injuries are available in the emergency medicine literature. The International Labour Organization (ILO) defined occupational injury (OI) as “any personal injury, disease or death resulting from an occupational accident; an occupational injury is therefore distinct from an occupational disease, which is a disease contracted as a result of an exposure over a period of time to risk factors arising from work activity” [5], and such injuries can include minor, major or fatal, with severities determined by diverse factors [6]. The World Health Organization listed the OI presented to the ED in its OI pyramid [7], with estimation of 151 employees sustain work-related injuries every 15 seconds [8], and an annual OI of about 300 million; of which 350,000 are mortalities [3]. This caused a huge economic burden as it accounts for about 4% of the global annual Gross Domestic Product (GDP) [9]. It is highly essential to assess the types of fatal and non-fatal occupational injuries which will aid in assessment of the work-related risks to which employees are exposed. In Middle Eastern countries, most of the OIs occur in the petrochemical and construction fields and mainly involve the expatriates [10]. The average fatal OI rate in the Gulf Cooperation Council (GCC) countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates) range from 5.9 to 9.8 per 100,000 workers [11]. In this single center study, we aimed to explore the characteristics and pattern of OIs presented to an academic ED.

Occupational injuries pose a significant burden on healthcare involving major morbidity and mortality which is preventable. Several minor to major trauma related to work related injuries are seen in the emergency department. A cross-sectional study that aims to explore the characteristics and pattern of OIs will facilitate in developing preventive strategies.

Methodology

Study Design

This was a retrospective cohort study and involved patients who attended an academic ED at King Hamad University Hospital (KHUH) in the Kingdom of Bahrain from January 2017 to December 2020 after an Occupational injury. Electronic medical records (EMR) of the patients fulfilling the inclusion criteria were accessed. A standardized data excel sheet was used to collect and review patient's demographics and characteristics. The following variables were collected: gender, age, nationality, type of work, place of occurrence, mechanism of injury, wearing protective equipment, time of presentation, injured body part, transportation mode, triage level. Also, we studied the following

outcomes; discharge status (with or without follow), activation of trauma team, hospitalization, Discharge Against Medical Advice (DAMA), procedures performed, length of stay in Intensive Care Unit (ICU), rehabilitation, disability, type of injury, and mortalities. Also, the work time lost was calculated and this included the given sick leaves, the hospital length of stay for admitted cases, and the rehabilitation period. SPSS V 25.0 was used for all statistical analysis. Descriptive statistics was used to compute frequencies, mean and SD. Chi square tests were used to assess the significant differences for categorical data and non- parametric tests were used for numerical data. All the testes were two sided and a p value < 0.05 was considered statistically significant.

Results

Out of the 415 patients, 11 were excluded as their data was not available in the EMR, and 404 patients were included in the final data analysis.

The incidence of OI was significantly higher among the males as compared to females (88.1 % vs 11.9%, p = 0.000). Non- Bahrainis reported more incidences of OIs (58.2 %, p = 0.000). Significantly a greater number of Bahraini females reported OI as compared to non- Bahraini females (23.1% vs 3.8 %, p = 0.000); majority of injuries being occurred on the public street (19, 39.6%). Most common mechanism of injury among the construction workers was fall from a height (27, 47.4%) followed by being struck by machinery (caught-in-machinery) (9, 15.8%) and struck by a heavy object (including falling objects) (7, 12.3%). Most common mechanism of injury among the manufacturing workers was being struck by machinery (caught-in-machinery) (22, 31.4%) and being struck by heavy object (including falling objects) (16, 22.9%). Electricians (technicians) reported more with slipping/tripping (7, 35.0%) and fall from height (4, 20.0%). Least number of incidents were reported on Fridays (7.4%) and the highest incidents being on Sundays (19.3%). Majority of the patients (63.9%) reached the hospital on their own; 29.7% were brought in by ambulance. Presentation to the ED for these OIs was more common (54.0% p=0.000) during the morning hours 07:00-15:00. Upper extremities were the most common site of injury among the study group (47.3%) with fracture/dislocation being the most frequent type of injury (45.3%). Thirty-one (54.4%) construction workers and 46 (65.7%) manufacturing workers were reported with injury in upper extremity. Whereas injury in the lower extremities were reported more among electrical workers (11, 55.0%) and those involved in transport (11, 64.7%). Majority of the patients (61.1%) were triaged under category 5 as per the Manchester Triage System. Trauma team was activated in 4.7% of the cases (Table 1).

Table 1: Demographics

Gender	
Male	356 (88.1%)
Female	48 (11.9%)
Age (Years)	
>18-29	120 (29.7%)
30-39	140 (34.7%)
40-49	89 (22.0%)
50-59	46 (11.4%)
>60	9 (2.2%)
Nationality	
Bahraini	169 (41.8%)
Non- Bahraini	235 (58.2%)
Type of work	
Manufacturing	70 (17.3%)
Construction	57 (14.1%)
Transport	68 (16.8%)
Education	17 (4.2%)
Electricity (Technician)	20 (5.0%)
Fishing	1 (0.2%)
Farming	1 (0.2%)

Woodwork	9 (2.2%)
Airport staff	46 (11.4%)
Office work	36 (8.9%)
Hospitality/General Services	27 (6.7%)
Healthcare	8 (2.0%)
Security	7 (1.7%)
Others: specify	5 (1.2%)
Mechanic/Car Mechanic	4 (1.0%)
Missing Data	28 (6.9%)
Place of occurrence	
Public street	98 (24.3%)
Factory/Plant	77 (19.1%)
Construction site	54 (13.4%)
School/College	15 (3.7%)
Service establishment e.g. hotel, restaurant, store, garage	59 (14.6%)
Airport	66 (16.3%)
Missing Data	19 (4.7%)
Office	9 (2.2%)
Private Home	4 (1.0%)
Other: specify	3 (0.7%)
Mechanism of injury	
Fall from height	50 (12.4%)
Motor vehicle accident: Driver	59 (14.6%)
Motor vehicle accident: Passenger	18 (4.5%)
Motor vehicle accident: Pedestrian	11 (2.7%)
Struck by heavy object (including falling objects)	85 (21.0%)
Machinery (caught-in-machinery)	53 (13.1%)
Slipped/Tripped (including fall from own height while walking)	91 (22.5%)
Foreign body	3 (0.7%)
Contact with sharp object e.g. knife, glass	19 (4.7%)
Burns (including chemical)	9 (2.2%)
Excessive heat	1 (0.2%)
Missing Data	2 (0.5%)
Others: specify	3 (0.7%)
Day of presentation	
Sunday	78 (19.3%)
Monday	66 (16.3%)
Tuesday	74 (18.3%)
Wednesday	52 (12.9%)
Thursday	58 (14.4%)
Friday (weekend)	30 (7.4%)
Saturday	46 (11.4%)
Brought by:	
Self (walk-in)	258 (63.9%)
Relative/Friend	26 (6.4%)



Ambulance	120 (29.7%)
ED Time of presentation	
Morning: 07:00-15:00	223 (55.1%)
Afternoon/Evening: 15:00-23:00	121 (30.0%)
Night: 23:00-07:00	60 (14.9%)
Triage level	
1	5 (1.2%)
2	7 (1.7%)
3	28 (6.9%)
4	117 (29.0%)
5	247 (61.1%)
Injured body part	
Head and neck	90 (22.3%)
Chest (Anterior / Posterior)	33 (8.2%)
Upper extremities	191 (47.3%)
Abdomen and pelvis	13 (3.2%)
Lower extremities	178 (44.1%)
Spine	42 (10.4%)
Internal Organ injury	10 (2.5%)
Other: specify	-
Trauma team activated	
Yes	19 (4.7%)
No	385 (95.3%)
Type of injury	
Soft tissue injury (Abrasion and contusion)	139 (34.4%)
Sprain/Strain	90 (22.3%)
Cut wound/Laceration	128 (31.7%)
Amputation	11 (2.7%)
Fracture/dislocation	183 (45.3%)
Isolated head injury	8 (2.0%)
Burns	10 (2.5%)
Ocular injury	4 (1.0%)
Multiple organ injuries	6 (1.5%)

Among the type of work that required wearing protective equipment, a significantly lower number of workers had worn them during the time of injury ($p=0.03$) (Table 2).

Table 2: Type of work and their adherence to wearing protective equipment at the time of injury

	Wearing Protective Equipment			
	No	Yes	Missing Data	Not applicable
Construction	22 (38.6%)	3 (5.3%)	31 (54.4%)	1 (1.8%)
Manufacturing	18 (25.7%)	8 (11.4%)	43 (61.4%)	1 (1.4%)
Transport	22 (32.4%)	16 (23.5%)	21 (30.9%)	9 (13.2%)
Electrician (Technician)	7 (35.0%)	1 (5.0%)	11 (55.0%)	1 (5.0%)

Chi square $p = 0.003$

The majority of the patients (67.5%) were not admitted; only 2.2% of the patients were admitted to the ICU with mean length of 6.86 ± 7.41 days stay at ICU. The most

prominent cause of ICU admission was 'fracture and soft tissue injury'. 'Fracture' being the most common type of injury, most of the patients were admitted under orthopedic specialty (26.7%). Wound closure (29.5%) and back slab/cast (30.7%) were the most common procedures that the participants underwent.

Mean length of stay in hospital was 8.15 ± 11.23 (Range 1- 64) days. Mean number of sick leaves given were 19.18 ± 29.63 (Range 1- 227) days. The mean cost involved in patient care was 961.3 ± 1881.3 BHD (Bahraini Dinar). Orthopedic and general surgery admissions were associated with higher cost (2474.4 ± 2409.9 & 3487.9 ± 3580.7 BHD respectively), more length of stay at hospital (8.6 ± 11.3 & 9.8 ± 13.9) and a greater number of sick leaves (38.1 ± 42.5 & 21.9 ± 27.5) being granted as compared to admissions to other specialties; however, the difference was not significant. Only one male patient died who had a fall from a height with soft tissue injury, fracture and isolated severe head injury (Table 3).

Table 3: Clinical demographics

Disposition	
Admission	129 (31.9%)
Discharge	273 (67.5%)
DAMA	2 (0.4%)
If Admission	
ICU	9 (2.2%)
Ward	113 (27.9%)
OT	7 (1.7%)
Not Admitted	275 (68.0%)
Admitted Under	
Orthopedic	108 (26.7%)
General surgery	11 (2.7%)
Plastic surgery	7 (1.7%)
Ophthalmology	-
ENT	-
Not Admitted	275 (68.0%)
Neurosurgery	3 (0.7%)
Others: specify	-
Discharged without follow up	106 (26.2%)
Discharged with follow up	169 (41.8%)
Orthopedic	155 (38.3%)
General surgery	2 (0.4%)
Plastic surgery	6 (1.4%)
Ophthalmology	2 (0.4%)
ENT	2 (0.4%)
Mixed	2 (0.4%)
Others: specify	-
Procedure	
Wound/Laceration closure	119 (29.5%)
Open reduction and internal fixation	82 (20.3%)
Exploratory laparotomy	1 (0.2%)
Craniotomy	-
Closed reduction	24 (5.9%)
External fixation	11 (2.7%)
Back slab/cast	124 (30.7%)
Thoracotomy	3 (0.7%)
Others: specify	-

ICU Length of Stay	
Number of days	6.86 ± 7.41
None	395 (97.7%)
Hospital Length of Stay	
Number of days	8.15 ± 11.23
None	273 (67.5%)
Death	
Yes	1 (0.2%)
No	403 (99.8%)
Sick Leaves Given (From All Specialties Including ED)	
Yes	308 (76.2%)
Mean number of days	19.18 ± 29.63
No	96 (23.8%)
Cost	
Cost (BHD/patient)	2555.3 ± 5002.3
Rehabilitation Needed	
Yes	137 (33.9%)
No	267 (66.1%)

Rehabilitation was required in nearly 40% cases, and only one case of death was reported. Sick leaves were given to 76.2% cases with a mean length of 19.18 ± 29.63 days. More number of sick leaves were granted for orthopedic admissions (38.13 ± 42.5) followed by general surgery admissions (21.90 ± 27.5); however, there was no significant differences (Table 3).

One hundred out of 137 patients who required rehabilitation had a fracture. As expected, the patients who required rehabilitation involved more cost (1996.0 ± 2320.9 vs 430.4 ± 1331.8 BHD, p= 0.000), more hospital length of stay (10.7 ± 12.7 vs 4.13 ± 6.76 days, p = 0.000) and were granted more sick leaves (34.3 ± 36.7 vs 11.3 ± 21.4 days, p= 0.000) (Table 4).

Table 4: Difference in total cost, length of stay and sick leaves granted among the rehabilitated versus non-rehabilitated patients.

	Rehabilitation		P Value
	Yes	No	
Hospital Cost (BHD)	1996.0 ± 2320.9	430.4 ± 1331.8	0.000
Length of stay (days)	10.7 ± 12.7	4.13 ± 6.76	0.000
Sick leaves (days)	34.3 ± 36.7	11.3 ± 21.4	0.000

Discussion

OIs pose a significant burden on healthcare. Many studies have been done to find the cause and to find preventive measures in these injuries, however only a few have been done in the setting of an ED [1,12-14, 21-25]. Data on occupational injuries are essential for planning preventive measures. The current study had higher male predominance, this is consistent with other studies done in the emergency setting [1,10, 12-15]. The injuries were more prevalent in a younger age group and this trend is observed in most studies and has not changed much [1,10,12-15]. More than 50% of the patients were non- Bahraini, which was in line with other GCC states where the work force employed consists mainly of immigrant workers and hence a higher number in the work-related injuries group [10,15-19]. Most of the injuries occurred at a public street as road traffic accidents where the workers were injured while going to work or returning from the work site (factory/plant). This is in contrast with most studies where the place of occurrence was mostly factory or construction site [13-15,17]. A study done in Brazil did find public streets as one of the most common places of occurrence of work-related injuries in line with our findings [20]. Most of the injuries occurred on Sunday (the first day of the week in Bahrain) during the

morning to afternoon hours. This is contrast with a study done in Saudi Arabia [17] which shares common cultural features and also has Sunday as the first working day of the week, where they found that most OIs occurred on Friday, which is a weekend. A study done in Turkey did find results similar to our study where the injuries occurred mostly during weekdays [25].

Most of the workers were triaged as category 5 according to Manchester triage system implying that these injuries were minor. However, most studies on OI in the ED have not used or studied the triage systems mostly used in the EDs like CTAS, MTS or ESI to categorize the injury [13, 14, 23, 24]. Future studies need to examine the appropriate triage for OI especially in the ED [1]. Consistent with previous studies where the upper extremity was the most commonly injured part, we also found the same to be true in this study [12-17, 21]. Unlike most studies where soft tissue injury or wound and laceration was most common type of injury [13, 14, 20, 21] we found fracture/dislocation to be the most common type of injury and similar results were reported in studies done in Egypt [22] and India [23, 24]. The most frequent specialty consulted was orthopedics; this is true since most of the injuries were fracture/dislocation and this is also observed in a study done in an ED in the United States [1]. The most procedures done was back slab and cast application followed by open reduction and internal fixation. This is in line with a study done in Qatar where open reduction and internal fixation was the most common procedure done for OIs [10]. Most of the patients were discharged after treatment from the ED, which is in line with studies done in OI in ED where the admission rate was low [12, 14, 21, 24]. The reason may be that most of the injuries were minor and did not require admission; other studies have found a high admission rate [24,26], however these studies focused only on major OIs. The average length of stay for admitted patient was 8 days; other studies have also reported similar length of stay [10, 19, 26]. We found that manufacturing sector was the most commonly involved place of injury and this is in line with other studies [14, 15, 22] while other studies in GCC countries have reported construction sector as the most common place of OI [10,16,17]. The high number in manufacturing sector may be due to the fact that more people are employed in this sector in Bahrain.

The most common mechanism of injury was slip or trip which has not been reported as the most common mechanism of injury [18, 22]. This could be due to workers not wearing slip-resistant foot wear which can substantially reduce the risk of slip, trips and falls [30]. Road traffic accidents was also one the most common mechanism of injury, which occurred mostly to workers in transit to the workplace, pointing to the fact workers are at risk of injury even when not at work; similar results in this context are observed in other studies [20, 27,29]. Most of our patient came to the ED themselves and around 30% came by ambulance in contrast with a study where only 12% came by ambulance [19, 31]. We found a significant relationship between OIs and the lack of use of Personal Protective Equipment (PPE) especially in the construction sector, which is line with other studies where workers not using or wearing PPE were more prone to injuries [10, 15, 22, 33]. The reasons could be non-availability of PPE, absence of orientation, or lack of training [34].

Less than 35% of our patients required rehabilitation, which implies that injuries were not significant to cause loss or decrease in function, follow up of such patients after rehabilitation is one of the areas where further studies should be done, and rehabilitation itself is a major factor which can influence early return of work [10, 35, 36]. We found that a significant number of days were lost at work because of the OIs and this is similar to the findings in other studies [15, 22, 28] emphasizing the fact that OI can lead to loss of work days and can be of monetary loss to the employers, insurances and hospitals. We reported only one death in our study however we cannot generalize this as reason of overall low mortality due to OI since this was a single center study, other studies have also reported low mortality rates due to OIs [10, 20, 21].

Limitations

The study has several limitations. First, it is a single-center study, so the results do not represent all OIs in Bahrain. Second, the study group included only patients who were registered in the ED and whose claims have been accepted as OIs by the insurance office at the hospital. Hence, the cases of OIs could be higher than what was reported. Third, because the study was retrospective and cross-sectional, some data were missed, such as data on wearing protective measures and the type of occupations held by those who were injured.



Conclusion

This is a single academic ED study focusing on patients presented with OIs. The most common area involved was upper limb with slipping and tripping as the most common mechanism of injury. Mortality rates were very low as most of the patients were discharged after treatment from ED only and a low percentage required admission. However, the work days lost were significant, posing a high socioeconomic burden. A significant correlation between the injury and not using PPE was found, stressing the fact that implementation and enforcement of strict safety regulations and use of PPE should be mandatory. Whether ED should be the place to educate workers on the use of PPE needs further studies. Further studies are needed to determine the true burden of OIs in Bahrain with a focus on prevention strategies. The creation of an integrated OI registry in a small nation like Bahrain is possible and recommended for the purposes of focusing on prevention programs and tracking their effectiveness.

Ethical Approval: The study was a retrospective study and the investigators collected data from hospital records, hence it was exempted from ethical approval [Hospital's Institutional Review Board (KHUH IRB # 20-351)].

Contributorship statement:

- Authors who have made substantial contributions to conception and design: Dr. Feras H. Abuzeyad, Dr. Moonis Farooq and Dr. Shadi Sammour
- Authors who have made substantial contributions to acquisition of data: Dr. Feras H. Abuzeyad, Dr. Yasser Chomayil, Dr. Almas Malik, Dr. Nawal Maklay
- Authors who have made substantial contributions to data analysis and interpretation of data: Dr. Feras H. Abuzeyad, Dr. Yasser Chomayil, Dr. Priya Das
- Authors involved in drafting the manuscript or revising it critically for important intellectual content: Dr. Feras H. Abuzeyad, Dr. Moonis Farooq, Ms. Luma Bashmi, Dr. Priya Das, and Dr. Yasser Chomayil.
- All authors have given final approval of the manuscript version to be published.

Competing interests: The authors declare that they have no competing interests

Funding: The authors declare that they have had no financial or material support

Data sharing statement: The data will be shared upon request.

References

- Tadros A, Sharon M, Chill N, Dragan S, Rowell J, et al. (2018) Emergency department visits for work-related injuries. *Am J Emerg Med* 36(8): 1455-1458.
- Østerlund AH, Lander F, Nielsen K, Kines P, Möller J, et al. (2017) Transient risk factors of acute occupational injuries: a case-crossover study in two Danish emergency departments. *Scand J Work Environ Health* 43(3): 217-225.
- Varacallo M, Knoblauch DK (2022) Occupational Injuries and Workers' Compensation Management Strategies. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing, USA.
- Gurbuz S, Aydogan MS, Colak C, Turtay MG, Oguzturk H, et al. (2016) Long-term analysis of patients admitted to the emergency room as a result of occupational accidents. *Biomedical Research* 27(3): 740-744.
- Lagerlöf E, Broberg E (2020) Occupational injuries and diseases. In: Occupational Hazards in the Health Professions. (1st Edition), CRC Press, USA, p. 11-27.
- Khanzode VV, Maiti J, Ray PK (2012) Occupational injury and accident research: A comprehensive review. *Safety science* 50(5): 1355-1367.
- Sears JM, Bowman SM (2016) State trauma registries as a resource for occupational injury surveillance and research: lessons from Washington State, 1998-2009. *Public Health Rep* 131(6): 791-799.
- ILO (International Labour Organization), (2013) "ILO Calls for Urgent Global Action to Fight Occupational Diseases." ILO, Switzerland.
- ILO (International Labour Organization), (2021) International newsletter on Occupational Health and Safety.
- Al-Thani H, El-Menyar A, Abdelrahman H, Zarour A, Consunji R, et al. (2014) Workplace-related traumatic injuries: insights from a rapidly developing Middle Eastern country. *J Environ Public Health* 2014: 430832.
- Hämäläinen P, Leena Saarela KL, Takala J (2009) Global trend according to estimated number of occupational accidents and fatal work-related diseases at region and country level. *J Safety Res* 40(2): 125-139.
- Jackson LL (2001) Non-fatal occupational injuries and illnesses treated in hospital emergency departments in the United States. *Inj Prev* 7(suppl 1): i21-i26.
- Regina DL, Kanagalakshmi V, Alex RG (2020) Profile, risk factors and outcome of occupational injuries reported to the emergency department in a tertiary care hospital in South India. *J Family Med Prim Care* 9(11): 5684-5688.
- Hakkoymaz H, Öztürk C, Okyay RA, Gedik MS, Kilci AI, et al. (2020) Evaluation of occupational accidents in a tertiary emergency department introduction. *Eurasian J Emerg Med* 19(2): 121-126.
- Al-Fajjam SM, Samir AM (2018) Work-Related Accidents Referred to Industrial Medical Center, Kuwait, From 2015 To 2017. *Egyptian Journal of Occupational Medicine*. 42(2): 285-302.
- Abbas M, Kashif M, Balkhyour M, Ahmad I, Saeed R (2018) Trends in occupational injuries and diseases among Saudi and non-Saudi insured workers. *Eastern Mediterranean health journal* 24(10): 1010.
- Abbas M, Saeed R (2021) Epidemiology of occupational injuries among insured workers in Saudi Arabia between 2004 and 2016. *Arh Hig Rada Toksikol* 72(1): 42-52.
- Al-Rubaei FR, Al-Maniri A (2011) Work related injuries in an oil field in Oman. *Oman medical journal*. 26(5): 315-318.
- Barss P, Addley K, Grivna M, Stanculescu C, Abu-Zidan F (2009) Occupational injury in the United Arab Emirates: epidemiology and prevention. *Occupational medicine*. 59(7): 493-498.
- Mascarenhas MD, Freitas MG, Monteiro RA, Silva MM, Malta DC, et al. (2015) Emergency room visits for work-related injuries: characteristics and associated factors-capitals and the Federal District, Brazil, 2011. *Ciência & Saúde Coletiva* 20(3): 667-678.
- Ozkan S, Kilic S, Durukan P, Akdur O, Vardar A, et al. (2010) Occupational injuries admitted to the Emergency Department. *Ulus Travma Acil Cerrahi Derg* 16(3): 241-247.
- Awadalla NJ, Kamel EA (2011) Non-Fatal Occupational Injuries Suez Governorate, Egypt: Causes and Consequences Analysis. *Egyptian Journal of Occupational Medicine* 35(1): 119-141.
- Ragavi AI, Jisha JS, Sanjay M, Hazra D, Abhilash KP (2021) Spectrum of occupational injuries presenting to the emergency department. *Indian J Occup Environ Med* 25(1): 39-41.
- Ragvi I, Jisha JS, Abhilash KP (2020) Profile and outcome of patients with occupational injuries presenting to Emergency Department. *Journal of Emergency Medicine* 58(4): 716.
- Sayhan MB, Sayhan ES, Yemeni S, Oguz S (2013) Occupational injuries admitted to the emergency department. *J Pak Med Assoc* 63(2): 179-184.
- Ng ZX, Teo LT, Go KT, Yeo YT, Chiu MT (2010) Major workplace related accidents in Singapore: A major trauma centre's experience. *Ann Acad Med Singap* 39(12): 920-927.
- Perry MJ, Sun BX, Zhang HX, Wang X, Christiani D (2005) Emergency department surveillance of occupational injuries in Shanghai's Putuo District, People's Republic of China. *Ann of epidemiol* 15(5): 351-357.
- Bhandari R, Marsh SM, Reichard AA, Tonozzi TR (2016) Characterizing emergency department patients who reported work-related injuries and illnesses. *Am J Ind Med* 59(8): 610-620.
- Mock C, Adjei S, Acheampong F, DeRoo L, Simpson K (2005) Occupational injuries in Ghana. *International journal of occupational and environmental health* 11(3): 238-245.
- Bell JL, Collins JW, Wolf L, Grönqvist R, Chiou S (2008) Evaluation of a comprehensive slip, trip and fall prevention programme for hospital employees. *Ergonomics* 51(12): 1906-1925.
- Williams JM, Higgins D, Furbee PM, Prescott JE (1997) Work-related injuries in a rural emergency department population. *Acad Emerg Med* 4(4): 277-281.



32. Sehsah R, El-Gilany AH, Ibrahim AM (2020) Personal protective equipment (PPE) use and its relation to accidents among construction workers. *La Medicina del lavoro*. 111(4): 285-295.
33. Alemu AA, Yitayew M, Azazeh A, Kebede S (2020) Utilization of personal protective equipment and associated factors among building construction workers in Addis Ababa, Ethiopia, 2019. *BMC Public Health* 20(1): 1-7.
34. Bae SW, Lee MY, Park SW, Lee G, Leigh JH (2021) Satisfying medical and rehabilitation needs positively influences returning to work after a work-related injury: an analysis of national panel data from 2018 to 2019. *BMC public health* 21(1): 2017.
35. MacEachen E, Clarke J, Franche RL, Irvin E (2006) Workplace-based Return to Work Literature Review G. Systematic review of the qualitative literature on return to work after injury. *Scand J Work Environ Health* 32(4): 257-269.
36. (2013) Mackway-Jones K, Marsden J, Windle J (Editors.) *Emergency triage: Manchester triage group, (3rd Edition)* John Wiley & Sons, USA.