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Occupational injuries of upper extremities among workers in industries of Yazd, Iran (2015-2016)

Seyed Houssein Saeed-Banadaky[1*], Hamid Pahlavanhosseini[2], Moslem Dehghanizadeh[3], Amir Houshang Mehrparvar[4]

1- Assistant Prof., of Hand Surgery, Trauma Research Center, Shahid Sadoughi University of Medical Sciences, Yazd, Iran.
2- Assistant Prof., of Orthopedic Specialist, Trauma Research Center, Shahid Sadoughi University of Medical Sciences, Yazd, Iran.
3- PhD Students of Occupational Therapy, School of Rehabilitation Sciences, Iran University of Medical Sciences, Tehran, Iran.
4- Professor, Occupational Medicine Specialist, Industrial Diseases Research Center, Shahid Sadoughi University of Medical Sciences, Yazd, Iran.

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*** Corresponding author:**
Seyed Houssein Saeed-Banadaky,
E-mail:
h.saeed.b@gmail.com

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Abstract

Background: Upper extremity injuries can induce disability and lead to lost workdays. Given the importance of occupational injuries as one of the main causes of upper extremity injuries, this study was conducted to evaluate these kinds of injuries with regard to the age of the injured workers, degree of disability and lost workdays in the city of Yazd.

Materials and Methods: In this cross-sectional study, 55 workers with occupational upper extremity injuries were recruited during 2015 to 2016 in Yazd. Data recorded in the labor office of Yazd were collected. The characteristics of the injuries were also collected using the Quick DASH questionnaire. Descriptive statistics were used to report the results. Statistical analyses were carried out using SPSS (version 16) software.

Results: Mean Quick DASH (disabilities of the Arm, Shoulder and Hand) score was 60 ± 21.3. Lost workdays of more than 6 months were observed in 52.7% of the cases.

Conclusion: This study showed a large number of lost workdays and high levels of disability in individuals with occupational upper extremity injuries.

Keywords: Occupational Injuries, Upper Extremity, Disability Evaluation.

Introduction

Upper extremity injuries may occur at home, public places, and occupational settings or may be caused by accidents or during wars. The relative prevalence of the etiology varies in different countries. In countries where safety principles are observed in the workplace, the most common cause of upper extremity injuries is home activities. In a study in Sweden, the most common cause of upper extremity injuries was recreational activities (1). In developing countries, the main cause of upper extremity injuries is occupational or industrial activities. An occupational upper extremity injury is caused by trauma to hand, wrist, or other parts of the upper extremity as a result of working with a high-risk device in the workplace (2). In some cases, these injuries may lead to amputation. The annual prevalence of occupational upper extremity injuries in European countries was estimated to be between 6.6% and 28.6% (3). This kind of trauma is a leading cause of disability as well. Since upper extremities are the most important part of the body in the interaction with the physical environment and play an important role in the individual's quality of life, prevention, early diagnosis and treatment of these

injuries is of great importance (4). Some studies have reported upper extremity injuries as the most frequent occupational injuries (5).

In this study, workers with upper extremity injuries were assessed in terms of the degree of disability, the function of upper extremity and the time required for return to work after the injuries were assessed.

Materials and Methods

This was a cross-sectional study on workers with occupational accidents during a 2-year period from 2015 to 2016 in the city of Yazd according to the data recorded in the labor office of Yazd.

Yazd is an industrial city in central Iran, and a considerable number of individuals with upper extremity injuries are admitted to hospitals every year. At first, a list of workers with recorded occupational upper extremity injuries in the labor office or the social security office of Yazd from 2015 to 2016 was extracted. Inclusion criteria were: injury to upper extremities consisting a superficial soft tissue, tendons, muscles or bones, injury caused in the workplace due to an occupational activity that has led to hospitalization, and the worker was still working in the same factory. Exclusion criteria were: non-traumatic injuries and burns. Among 85 recorded files of occupational accidents leading to hospitalization, 63 fulfilled the inclusion and exclusion criteria and 55 ones were accepted to enter the study and were selected for further examinations. Those who were accepted to enter the study were invited to refer to the hospital for further examinations.

The disabilities of the Arm, Shoulder and Hand (Quick DASH) questionnaire with approved validity and reliability based on responses within the full-length DASH was used to collect data (6). Ebrahimzadeh et al. assessed the validity and reliability of the Persian version of the shortened disabilities of the arm, shoulder and hand (Quick-DASH) questionnaire in patients with upper extremity conditions. Cronbach's alpha was found to be 0.90, and ICC was obtained to be 0.89. Convergent validity was confirmed, as the Spearman correlation between the Quick-DASH and MHOQ was 0.67 and ranged from 0.24 to 0.56 between the subscales of the SF-36 and Quick-DASH (7). The Quick DASH questionnaire examines the ability of a patient to perform certain upper extremity activities. It contains 11 items that measure an individual's ability to complete tasks, absorb forces, and the severity of symptoms. The Quick DASH tool uses a 5-point Likert scale from which the patient can select an appropriate number corresponding to his/her severity level/ function level. At least 10 of the 11 items must be completed for a score to be calculated. The assigned values for all completed responses are simply summed and averaged, producing a score out of five. This value is then transformed to a score out of 100 by subtracting one and multiplying by 25.

Quick DASH Disability/Symptom Score: $\left(\frac{sum\ of\ \ n\ \ responses-1}{n}\right) * 25$ (where n is the number of complete response)

This transformation is done to make the scores easier to compare to other measures scaled on a 0-100 scale. A higher score indicates greater disability.

A researcher-designed questionnaire was used to collect data about the time of the accidents, workstation situation during the accident, medical data and post-accident information. Injuries were divided into four groups according to the severity of the injury to the extremities: Group 1: superficial soft tissue injuries; group 2: deep injuries involving tendons and muscles without fractures; group 3: injuries with fracture; group 4: injuries leading to amputation.

The results of the Kolmogorov–Smirnov test showed that the data were normally distributed. Descriptive statistics were used to report the results. Significance was set at $p < 0.05$, and confidence interval was 95%. Statistical analyses were carried out using version 16 of the SPSS software.

The study was approved by the ethics committee of Shahid Sadoughi University of Medical Sciences by the number P/17/1/112633.

Results

Data from Fifty-five patients were analyzed. Mean age of the subjects was 35.01±9.28 years. Figure 1 shows the distribution of the injuries according to age groups. Fifty-one individuals (93%) were males and four (7%) were females. In 35 cases, injury was occurred in the right extremity, 28 cases in the left and 8 cases in both extremities. The most common industries caused by accidents were in metal (18.2%), ceramic, and food industries. Most of the injured individuals were device operators (61.8%). Most injuries occurred in the morning shift (50.9%) and the frequency was higher in the first hours of the shift (36.4%) in comparison with the late hours of the shift (29.1%). Totally, 63 injured extremities were observed in 55 cases. Figure 2 shows the frequency distribution of the injuries according to the severity of injury.

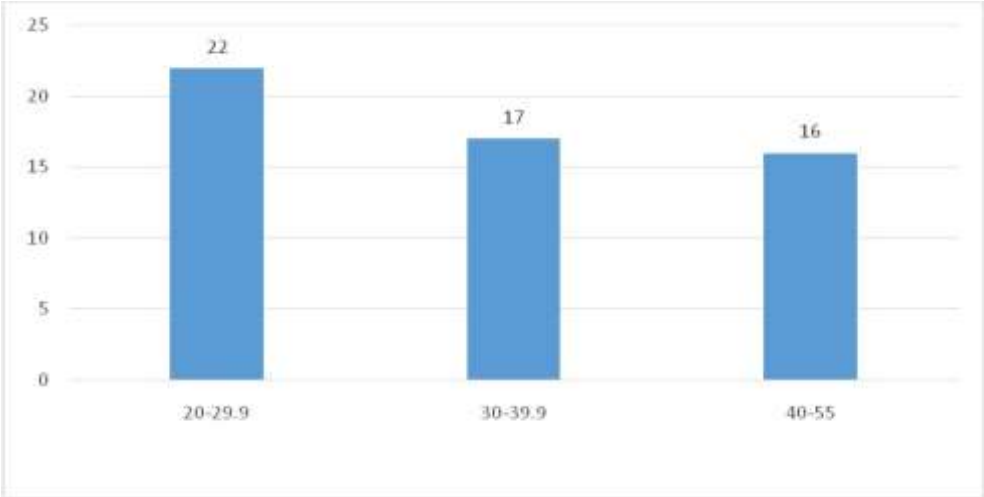

Figure 1: Frequency distribution of the injuries according to age groups

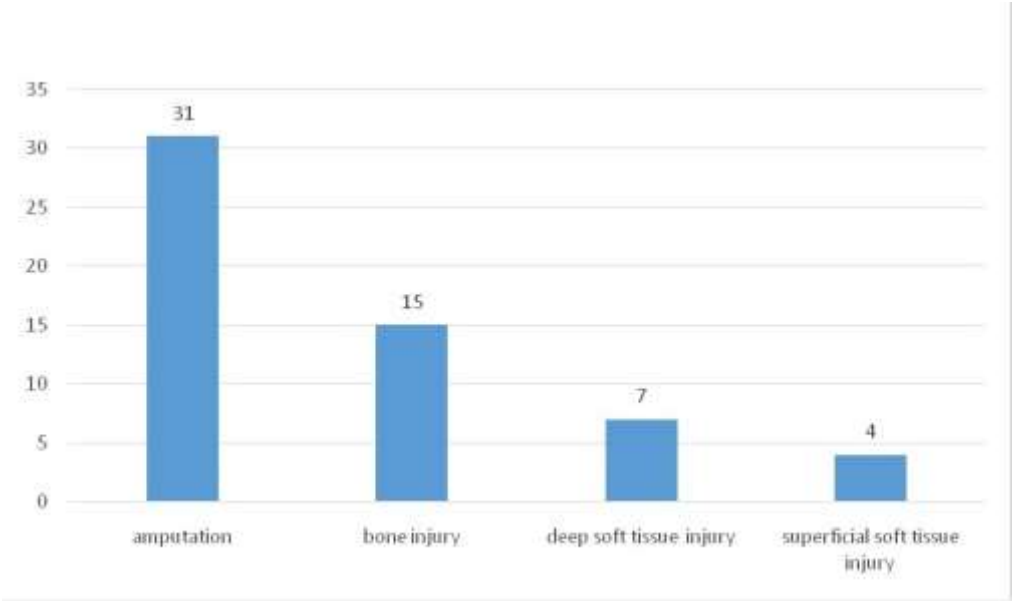

Figure 2: Frequency distribution of injuries according to the severity of injury

In 10.9% of cases there was an accompanying injury mostly in the trunk (7.3%) and lower extremities (3.6%). Mean Quick DASH score was 60 ± 21.3 (range: 20.2 – 95.4). Table 1 shows the frequency distribution of the injuries according to the duration of hospitalization and disability. Totally, 18.2% of the injured individuals were permanently disabled and 50.9% of the individuals needed permanent job modification.

Table 1: Frequency distribution of the injuries according to the duration of hospitalization and disability

Duration of hospitalization	Number	Percent
Less than 1 week	30	54.5
1 to 4 weeks	20	36.4
More than 1 month	5	9.1
Duration of disability		
Less than 1 month	3	5.5
1-3 months	12	21.8
3-6 months	11	20
More than 6 months	29	52.7

Discussion

In this study, workers with occupational injuries to upper extremities were assessed. It seems that in our country, the prevalence of these injuries is high (1, 5, 8-9). The highest frequency was observed in 20-30 years old age group, and the mean age of the subjects was higher than the studies conducted by Maghsoudipour et al (10) and Akram et al (11), but lower than Samant et al (12), Rosberg et al. and Sorock et al (13,14) studies. In the present study, metal industry, followed by ceramic and food

industries, were the industries with the highest numbers of cases of injury. Yazd province is one of the most important industrial provinces of the country and one of the tile and ceramic industrial poles in the country. There are over 22 tile factories in this province. Other studies found different industries as the most common cause of injury, e.g. construction and manufacturing industries in Skov et al. study (15), software, furniture and plastic industries in Jiang et al. study (16), and industries containing machinery, carpet, construction and agriculture industries in Qin et al. study (17). The variability of industries in different countries explains this difference.

In the current study, more than 50% of the injuries had led to amputation, and some injuries were accompanied with injuries to other parts, especially the trunk and lower extremities. Trybusm et al. found that upper extremity injuries were much more severe in occupational accidents (18). Davas et al. found that 53.2% of occupational upper extremity injuries led to amputation, which was consistent with the results of the current study (19). Samant et al. found that 41% of all cases of upper extremity amputations were due to occupational causes, among which 95% of amputations were in fingers (12).

The results of the current study were in agreement with some previous studies and showed that a considerable number of occupational upper extremity injuries involve amputation, which is the most severe injury and disabling.

In the current study, the high score of the Quick DASH 60 showed a high disability due to occupational upper extremity injuries. Cakir et al. found a strong relationship between the severity of injury and time to return to work and DASH scores (20). Kadzeilski et al., in a study on 51 cases with finger injuries, found a mean DASH score of 12, which was inconsistent with the results of the current study (21). This low score as compared with our study, can be explained by the fact that they assessed only finger injuries, but we assessed upper extremity injuries, which certainly causes more disability cases. Lindquist et al. reported a DASH score of 15 among 26 occupationally injured individuals. They also assessed only workers working with wood saw, which mostly injures fingers (22).

In the current study, a high disability period (a long duration before return to work), and a high number of cases requiring permanent job modification was observed, which is high as compared with previous studies (23-26). Marty et al. found that occupational upper extremity injuries were the cause of 25% of time lost and 20% of permanent disabilities. They found that the mean lost workdays was 22 days, which was lower than our study (8). Skov et al found that 46% and 69% of injuries led to disability and sick leave, respectively (15). Zyluk et al found the mean sick leave duration to be 4.4 months, and 13% of individuals required permanent job modification (24).

This study had some limitations. We could not assess all injuries in the aforementioned period, because some individuals did not agree to enter the study. The study suffers from recall bias, which could not have been controlled.

Conclusion

This study showed that occupational upper extremity injuries mostly involve young age groups. The disability and sick leave duration due to these injuries (mostly amputations) is high. It is recommended that more studies be conducted to assess the direct and indirect costs of the injuries. Also, longitudinal studies are needed to show the necessity of implementing prevention programs.

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Conflict of interest: None declared.

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