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국가 산업재해 보상 보험 시스템 자료를 기반으로 한 수부 손상의 분석 및 해석

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Analysis and Interpretation of Hand Injuries Based on Data from the National Industrial Accident Compensation Insurance System

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Purpose: Like other countries, Korea has a high incidence of hand injuries due to industrial accidents. In this study, the social demographic characteristics of hand injuries treated with industrial insurance in Korea and some related occupational factors were analyzed. The evaluation of the dynamics and trends of hand injuries including the association with related factors were conducted.

Methods: Based on the 2018 Industrial Accident Insurance Panel Survey data provided by the Korea Workers' Compensation and Welfare Service, a retrospective review was conducted on all hand injuries cases treated with industrial insurance between January 2018 and December 2018.

Results: This review identified a total of 983 cases of hand trauma. The most common age group is 51 to 60 years (36.1%). Of those who surveyed, 61.1% had a length of employment of less than 1 year, and fractures were the most common types of injuries. Amputations were the more frequent injury in the longer working group.

Conclusion: In this study, the number of patients treated using industrial accident insurance was the highest among those with less than 6 months of work experience. In addition, in patients with long working periods, more severe injuries such as severe amputation were observed. Therefore, it is necessary to introduce a precise education program to prevent severe injuries suitable for skilled workers. The findings in this study are significant in providing insight into the current state of Korea's industrial accidents and enabling appropriate preventive measures to be taken.

Keywords: Hand Injuries, Amputation, Occupational injury

INTRODUCTION

The hand is an essential organ, and agility and dexterity are crucial to daily life. This is especially true for manual workers and craftsmen who rely on their hands for a living. Occupational hand injuries refer to all hand injuries suffered by manual workers on duty. The incidence reported in the literature for traumatic hand injuries varies from 57.4 to about 700 per 100,000 [1,2]. Finger injuries are the

most common among various upper limb injuries, which include injuries to fingers, wrists, forearms and elbows, and shoulders. According to an analysis of the National Electronic Injury Surveillance System database in the United States, 444 finger injuries per 100,000 people were reported, twice as many as the 181 and 200 wrist and shoulder injuries, respectively [3]. In Korea, according to the 2018 Industrial Accident Insurance Corporation panel survey, 983 out of 3,294 industrial accident patients (29.8%) had injuries to their hands.

Patients with particularly severe injuries tend to take longer to return to work. The aftereffects of hand trauma can be serious and lengthy. It may take patients several months to regain hand function, resume job satisfaction, and enjoy the same quality of life as prior to the injuries. Acute or permanent loss of hand function is caused by acute hand injury, which generally requires sick leave or leave and may require lifelong care due to permanent disability [4]. In addition, the economic and social impacts of these temporary or permanent disabilities on the loss of production hours are a great burden to the community. This is because the Insurance Corporation has to pay hospital fees, 70% of the original salary, and compensation for additional disabilities during the treatment period for workers injured. Therefore, it is important to consider the impact of hand injuries on social costs.

According to the “Long-term fiscal prospects for 2020-2060,” recently released by the Ministry of Strategy and Finance [5], the red light is on for industrial accident insurance. As hand surgeons, we began to think about how to reduce the cost of insurance spending when treating hand injured patients. To find out about this, we searched for research papers on the epidemiology of hand trauma patients, but no papers have been studied in republic of Korea. Therefore, this paper is meaningful in seeking preventive measures through the understanding of epidemiology of industrial hand injuries, and in order to prevent the resulting social cost expenditure.

MATERIALS AND METHODS

This study was conducted based on the survey data of the Industrial Accident Insurance Panel provided by the Korea Labor Welfare Corporation. The Industrial Accident Insurance Panel Survey has been conducted since 2013 in order to collect objective data and information on workers who have experienced industrial accidents. From the fifth year survey data of the first cohort, the National Statistical Office acquired national approval statistics qualification (approval No., 439001), and conducts survey quality management and diagnosis based on the ‘Statistical

Office Quality Management Manual.’

We conducted a retrospective review on all patients treated with industrial insurance between January 2018 and December 2018. Among them, patients other than hand injuries were excluded. During the actual industrial insurance panel survey, patient demographics, education level, marital status, work location, length of employment, length of medical care, and types of injury were reviewed.

In order to see if there is a difference in incidence rate according to age, educational background, and marital status in industrial hand injury patients, we classified the patient group with the following criteria. Age groups were classified into < 40 years, 40s, 50s, and ≥ 60 years.

Education level was classified into middle school, high school, or college level. Marital status was classified into single or married. In addition, it was intended to check the difference in incidence rates by region to determine if there was an imbalance between cities in the occurrence of industrial hand injury.

In order to understand the correlation between the degree of industrial hand injury, the workplace environment, and the level of worker's proficiency and the severity of injuries, we have organized the differences between the length of employment, the length of medical care, the types of injuries according to the period of employment and defined each criterion as follows. Length of employment was classified into less than 6 months, 6 months to 1 year, 1 to 5 years, or more than 5 years. Length of medical care (from start to end of industrial insurance coverage) was classified into less than 6 months, 6 months to 1 year, or more than 1 year. Types of injuries were divided into fractures, contusions, amputations, simple lacerations, deep lacerations, and burns or frostbite.

Statistical analysis included ratio comparisons with chi-square tests (IBM SPSS Statistics ver. 25; IBM Corp., Armonk, NY, USA). The p-value of < 0.05 was considered statistically significant and the relative risk of the 95% confidence interval was calculated.

RESULTS

This review identified a total of 983 cases of hand trauma out of 3,294 industrial patients in 2018. The majority of the patients (84.8%) were male (Table 1). The most common age group was 51 to 60 years (n = 355, 36%). The age groups > 60s and 41 to 50 years were fairly comparable at 20.0% (n = 197) and 21.5% (n = 211), respectively.

As to education level, high school graduates accounted for 49.0% (n = 482) of those surveyed, while college graduates or

higher were at 19.9% ($n = 196$). Six hundred and thirty of those surveyed (64.1%) were married.

Gyeonggi-Do had the largest number of industrial accidents with 32.9% ($n = 323$), and Busan/Ulsan/Gyeongnam had the second-largest number (Table 2). In total, 61.1% of those surveyed had a length of employment of less than 1 year and 0% had employment of more than 5 years (Table 3). Of the types of injuries reported, fractures were the most common at 42.5%, and amputations were the second-most common (Table 4).

Fractures were the most common injury for all groups, and we have confirmed that overall injuries occur at the highest frequency in workers who have worked for less than 6 months (Table 5). In addition, while the incidence of hand injuries decreases for workers with a working period of more than 6 months, it increases again when the working period reaches more than 1 year (Fig. 1A). Amputation was the most common in groups of workers with more than 1 year of work. The study also found that workers with relatively high proficiency for more than 1 year were more likely to suffer serious injury, such

as amputation (Fig. 1B).

DISCUSSION

We found that patients with long employment periods had a higher incidence of severe hand injuries, including amputation. The relationship between the frequency of amputation and the length of work experience of injured patients was different from expected. According to our study, fractures were the most common among the injuries, regardless of the duration of employment. However, it was confirmed that the proportion of amputation occurrences in workers over 1 year increased. It was also found that among the amputation injuries, workers had a higher incidence of accidents for more than 1 year than workers under 6 months. It is generally believed that the longer a worker's career with improving their work skill, the lower the frequency of industrial accidents. However, the study found that workers with a relatively high level of proficiency over 1

Table 1. Dermographics of work-related hand injury

Characteristic	Data
Sex	
Male	834 (84.8)
Female	149 (15.2)
Age group (yr)	
< 40	220 (22.4)
41–50	211 (21.5)
51–60	355 (36.1)
> 60	197 (20.0)
Marital status	
Married	630 (64.1)
Single or divorced	353 (35.9)
Education level	
Middle school	305 (31.0)
High school	482 (49.0)
University and above	196 (19.9)

Values are presented as number (%).

Table 2. Location of the injured workers

Location	Data
Seoul/Gangwon	141 (14.3)
Gyeonggi	323 (32.9)
Chungcheong/Sejong/Daejeon	
Gwangju/Jeolla	85 (8.6)
Daegu/Gyeongbuk	115 (11.7)
Busan/Ulsan/Gyeongnam	203 (20.7)

Values are presented as number (%).

Table 3. Working period

Working period	Data
≤ 6 Mo	505 (51.4)
> 6 Mo, ≤ 1 yr	95 (9.7)
> 1 Yr, ≤ 5 yr	383 (39.0)
> 5 Yr	0 (0)

Values are presented as number (%).

Table 4. Type of injuries

Type of injuries	Data
Fracture	418 (42.5)
Amputation	293 (29.8)
Deep laceration	215 (21.9)
Burns and frostbite	20 (2.0)
Laceration	18 (1.8)
Contusion	14 (1.4)
Others	5 (0.5)

Values are presented as number (%).

Table 5. Correlation between working period and type of injuries

Type of injuries	≤ 6 Mo	> 6 Mo, ≤ 1 yr	> 1 yr
Fracture	236	33	149
Contusion	6	4	4
Amputation	127	26	140
Laceration	12	1	5
Deep laceration	111	27	77
Burns and frostbite	10	3	7
Others	3	1	1

Values are presented as number only.

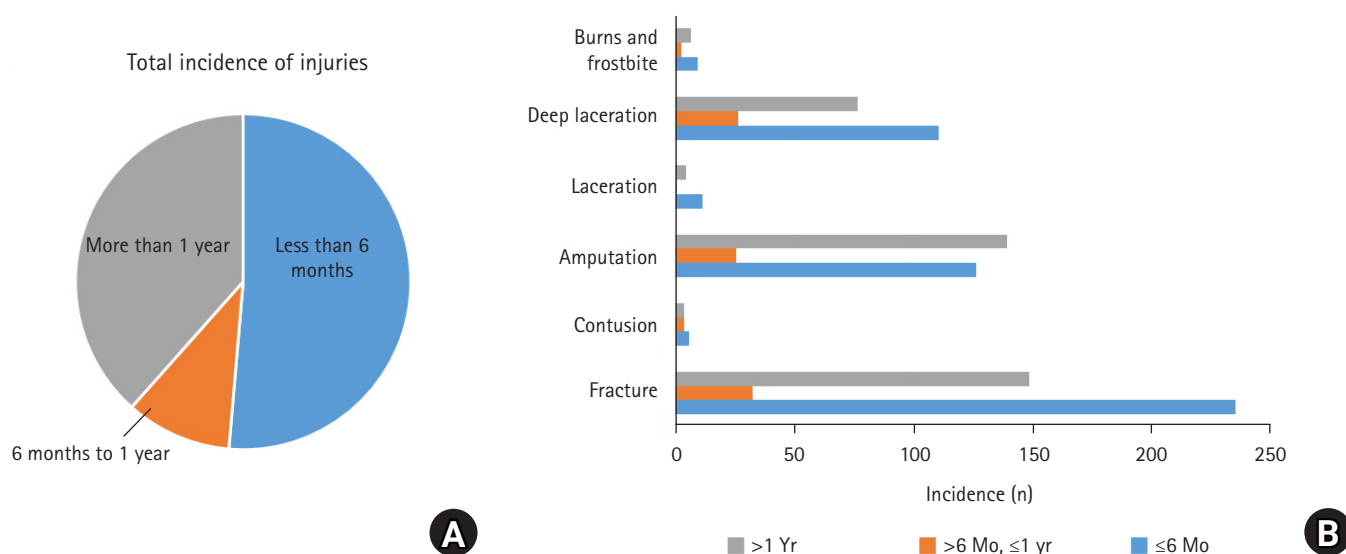


Fig. 1. (A) The incidence of hand injuries decreases for workers with a working period of more than 6 months; however, it increases again when the working period reaches more than 1 year. (B) Workers with relatively high proficiency for more than 1 year were more likely to suffer serious injuries, such as amputation.

year have more frequent cases of serious injury, which can be seen as an interesting result [6]. There are two possible reasons for this result. First, this is presumed to be due to the fact that the more experienced the workers are, the less cautious they are with their work, resulting in serious amputations rather than fractures in the event of an accident. Second, the higher the proficiency, the more likely it is that workers will be exposed to more intensive work [7]. Therefore, it is recommended that workers maintain ongoing safety training regardless of the length of their work experience.

Looking at the injured by age, 20.0% of all injured workers were identified as workers aged 60 years or older (Table 1). Considering that Korea's retirement age is 60 years; it is meaningful that the total number of injuries accounted for by elderly workers aged 60 years or older who remain at industrial sites exceeds 20%. It is analyzed that the incidence of industrial accidents is high for this reason, because they are frequently exposed to dangerous work sites such as construction sites without obtaining a stable job after retirement [8]. This is because the number of cases of industrial accidents has increased as elderly people are concentrated in jobs with a high risk of injury [9,10]. In general, older workers are more prone to serious injuries than younger workers [7]. In addition, even the same injuries often result in severe sequelae in elderly people [11,12]. Therefore, we believe that the improvement of the working environment for the elderly should take precedence. Therefore, in order to promote the employment of the elderly in the future, companies will need to reorganize the system to strengthen

safety measures for the elderly.

It is a common assumption that young men of lower education level are particularly prone to occupational injuries [13,14]. Men are more likely to perform hard labor than women and therefore have an increased risk of injury at the workplace [15,16]. In addition, young workers with lower education level are generally unfamiliar with their jobs and can be reckless. All these factors contribute to the assumption of a higher chance for occupational injuries to those young men with lower education level [16]. However, our study shows otherwise; over 70% of the patients with hand injuries were high school graduates. Therefore, it can be seen that the cause of industrial accidents is not significantly related to the level of education.

Also, since it is a retrospective study, there is a possibility that there is a recall bias. This study was only targeting patients who applied for industrial accident insurance among patients with industrial accidents. The government educates that if you get hurt or sick while working, you should apply for industrial accident insurance. However, in many cases, workers' compensation insurance is not covered. This is because there is a coexistence of workers' compensation claims, the difficulty and length of the processing process, and the fear of penalties at the company. Among the industrial accident patients, those who did not apply for industrial accident insurance are inevitably omitted, so there is a limitation that the panel data does not reflect all industrial accident patients.

CONCLUSION

In this study, we describe hand injury dynamics in 983 patients based on 2018 data from the Korea Workers' Compensation and Welfare Service. During the period, the number of patients treated using industrial accident insurance was the highest among those with less than 6 months of work experience and the incidence increases again in workers over 1 year. Patients with long work histories had more severe injuries, such as amputation. Therefore, it is necessary to introduce training programs to prevent severe injuries suitable for skilled workers. The findings in this study are significant in providing insight into the current state of Korea's industrial accidents, identifying individuals at risk, and enabling appropriate preventive measures to be taken contributing to reducing the incidence of severe hand injuries and resulting social cost expenditure.

CONFLICTS OF INTEREST

The authors have nothing to disclose.

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국가 산업재해 보상 보험 시스템을 기반으로 한 수부 손상의 분석 및 해석

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목적: 본 연구에서는 한국에서 산업재해보험으로 치료되는 수부 손상들의 사회적, 인구통계학적 특성 및 관련 직업 요인을 분석 및 수부외상의 역학관계와 경향에 대해 평가하고 이를 보고하고자 한다.

방법: 근로복지공단에서 2018년 1월부터 12월까지 산업재해보험으로 처리된 모든 수부 손상에 대해 후향적으로 검토하였고, 성별, 연령, 교육수준, 사회경제적 지위, 지역 및 취업 기간에 대한 분석 및 손상 종류, 정도 등에 대해 조사하였다.

결과: 총 983건의 수부 손상 중 가장 흔한 연령층은 51-60세(36.1%)였다. 조사대상의 61.1%가 취업 기간이 1년 미만이었으며 골절이 가장 흔한 상해의 유형이었다. 절단 손상은 취업 기간이 긴 집단에서 빈번하게 발생하였다.

결론: 취업 기간이 긴 환자 군에서 오히려 중증의 손상인 절단 손상 발생률이 높았다. 따라서 미숙련 노동자 뿐 아니라 숙련된 노동자를 대상으로 포함하는 중증손상 예방교육 프로그램 도입이 필요 할 것으로 생각된다.

색인단어: 수부 손상, 절단, 산업재해

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