



# Epidemiology of Traumatic Fingertip Amputation of Hand in Ardabil Northwest Iran; A Cross-Sectional Study

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## Research Article

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## Abstract

**Background:** Amputation is one of the major medical problems that have always been unfortunate for the patient and his/her companions imposing burden on community and the health system. This study aims to determine the epidemiology and treatment outcomes of traumatic fingertip amputation of the hand in patients referred to Fatemi Hospital in Ardabil, Northwest Iran.

**Methods:** 230 patients were included in this study referred to Fatemi Hospital in Ardabil with traumatic fingertip amputations between March 2018 and March 2020. All admitted patients were extracted from the archive of hospital medical information system.

**Results:** Men and agriculture activities were significantly more prone to accidents. Most accidents occur in the workplace and during working hours. Sensory disturbances, infection, movement limitation, and deformity were the main complications following treatment procedures.

**Conclusion:** Rate of amputations was significantly prevalent in men working especially in agriculture, which needs more investigation.

**Keywords:** Amputation; Traumatic; Finger Injuries; Epidemiology

## Introduction

Skeletal organs are essential parts of the body whose defects or loss do not endanger human life but have many adverse effects on life quality. People with such disabilities experience many problems in their everyday work. In addition to affecting people's function, amputation can also have negative psychological effects. because of its cosmetic and economic consequences [1]. Traumatic injuries of the fingertips are among the most common acute injuries of the upper limbs [2]. Occupational injuries and diabetes are the most common causes of amputation. Other factors, such as

traffic accidents, also account for a high number of cases [3]. Appropriate and satisfactory treatment in case of injury or amputation should pursue the following goals:

- The length of the finger should be maintained.
- The finger pulp should be adequately and appropriately covered with soft tissue.
- The sensation of the finger should be as close to normal as possible
- The joints of the finger should be functional [4].

Our main goal was to determine the epidemiology of the hand distal phalangeal amputations in Fatemi Hospital

in Ardabil (Northern Iran). The secondary objectives were to determine the parameters surrounding occupation and the complications of the injury and treatment.

## Materials and Methods

This study was conducted as a cross-sectional study at Ardabil University of Medical Sciences (ethics registration ID: "IR.ARUMS.REC.1399.252"). All patients were included with traumatic distal phalanx amputation referred to Fatemi Hospital in Ardabil from March 2018 to March 2020.

The data of all traumatic cases of fingertip amputation were extracted from the hospital medical records archives. Patients were called for postoperative follow-up. Patient information including age, gender, occupation, residence, cause of amputation, type of operation and complications were collected in a researcher-made checklist. The results are expressed as mean and standard deviation for quantitative variables and percentages for qualitative variables. Independent t-test and chi-square have been utilized to analyze these data. Statistical analysis was performed using SPSS version 16.

## Results

A total of 230 patients were investigated, including 199 (86.5%) male cases with a mean age of  $37.3 \pm 18.3$  years and

31 (13.5%) females with a mean age of  $43.1 \pm 17.2$  years (P-value = 0.09). Their demographic data is described in Table 1.

Gender	Male	Female
	N(%)	N(%)
<b>Residence</b>		
City	111 (48.3)	10 (4.3)
Village	88 (38.3)	21 (9.1)
<b>Occupation</b>		
Farmer	58 (25.2)	-
Industrial services	60 (26.1)	-
Employee	6 (2.6)	-
Non-industrial services	29 (12.6)	-
Worker	13 (5.7)	-
Unemployed	33 (14.3)	5(2.2)
Housewife	-	26 (11.3)

**Table 1:** Demographic information of the patients.

In this study, the causes of amputation were divided into four main categories, shown in Table 2 by patients' occupations.

Occupation	Crush Injury	Sharp Cut	Motor Vehicle Accident	Non-occupational	Total
Farmer	25(43.1%)	29(50%)	-	4(6.9%)	58(25.2%)
Industrial services	22(36.6%)	35(58.3%)	-	3(5%)	60(26.1%)
Employee	2(33.3%)	2(33.3%)	-	2(33.3%)	6(2.6%)
Non-industrial services	10(34.5%)	14(48.3%)	1(3.4%)	4(13.8%)	29(12.6%)
Worker	4(30.8%)	8(61.5%)	1(7.7%)	-	13(5.6%)
Unemployed	27(71%)	-	7(18.4%)	4(10.5%)	38(16.5%)
Housewife	9(34.6%)	15(57.7%)	2(7.7%)	-	26(11.3%)
Total	99(43%)	103(44.8%)	11(4.8%)	17(7.4%)	230(100%)

**Table 2:** Causes of amputation according to patients' occupations.

Traumas were categorized into four general groups: crushing injuries, cutting with a sharp object, cutting with a non-sharp object, and traffic accidents. Two types of surgery were used to treat patients: primary stump repair with or without full-thickness skin graft and V-Y advancement flap

application. Complications of trauma and operation were also divided into four categories: sensory disturbance, infection, movement limitation, and deformity. Table 3 provides some information about the type of trauma, type of operation, and their complications.

	Sensory Disturbance	Infection	Movement Limitation	Deformity
	N (%)	N (%)	N (%)	N (%)
<b>Type of Trauma</b>				
<b>Crush Injury</b>	31 (31.3)	29 (29.3)	40 (40.4)	33 (33.3)
<b>Sharp Cut</b>	54 (46.5)	51 (43.9)	48 (41.3)	40 (34.4)
<b>Non-Occupational Causes</b>	1 (25)	1 (25)	2 (50)	2 (50)
<b>Motor Vehicle Accident</b>	1 (9.1)	1 (9.1)	8 (72.7)	5 (45.5)
<b>Total</b>	87 (37.8)	82 (35.6)	98 (42.6)	80 (34.7)
<b>P-Value</b>	0.03	0.06	0.27	0.81
<b>Type of Procedure</b>				
<b>Primary Stump Repair</b>	70 (38.4)	74 (40.6)	79 (43.4)	68 (37.3)
<b>V-Y Plasty</b>	17 (35.4)	8 (16.6)	19 (39.6)	13 (27.1)
<b>P-Value</b>	0.05	0.009	0.1	0.3

\* A patient may have more than one complication.

**Table 3:** Relationship between type of trauma, type of operation and their complications.

According to the treatment options, sensory disorders were described as pain, tingling and numbness by patients. Table 4 shows the sensory disturbance in treatment options.

	Total	Pain	Tingling	Numbness
Primary stump repair	182	36 (19.8%)	32 (17.6%)	17 (9.3%)
V-Y plasty	48	10 (20.8%)	7 (14.6%)	3 (6.25%)

\*A patient may have more than one complication.

**Table 4:** Sensory disorders following treatment methods.

Out of the 230 patients, 25 were under 15 years of age. Nineteen of them lost a finger due to crush injury, including stuck in an iron door and the bike chain.

## Discussion

A two-year study of patients referred to the hospital found that men were six times more likely than women to have hand distal phalanx amputations, which could be related to the type of occupation for men in the society. The vast majority of amputations in other countries, such as France and the US, also occurred in male cases [5].

Occupation-related injuries are always the most common cause of amputation, especially traumatic hand amputation [6,7]. In the current study, the majority of patients were farmers and industrial worker forces. In other studies, agriculture, mining, turning and casting were introduced

as the most dangerous occupations [8,9]. There are various operative methods for treating amputation of the fingertips, leaving the fingertip for secondary healing, primary stump repair, full-thickness skin grafting, and flap reconstruction. [10,11].

Some complications may occur after fingertip amputation, such as delayed wound healing, nail deformity, skin hypersensitivity, pain, cold intolerance, infection, and flap loss [10,12]. In the current study, complications like infection, deformity, movement limitation and sensory disturbance were reported, and generally such complications were detected less in V-Y plasty technique. Because this study had primarily an exploratory goal to describe traumatic hand injuries, it had limitations in assessing risk factors. One of this study's limitations is the loss of the control group, which is recommended for future researches based on our findings. Failure to use accurate risk questionnaires has been another limitation due to the lack of previous evidence on risk factors. Also, it is suggested that future research should also pay attention to patients' mental state and job sensitivity and risks, as tasks that are more sensitive and difficult are more prone to be harmful. Even the mental state and anxiety of individuals while working can be influential.

## Conclusion

Rate of amputation seems to be significant in job-related injuries; the quality of job status and life of the affected group of patients would be influenced. Some occupations, such as agriculture, have a higher risk of injury.

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