

THE PATTERN OF FINGERTIP INJURIES IN KUMASI, GHANA

E.K. Tano, BSc, MBChB, FWACS, Department of Surgery, Komfo Anokye Teaching Hospital, Kumasi, Ghana, **E.J.K. Adu**, BSc MBChB, FWACS, FGCS, Department of Surgery, School of Medicine and Dentistry, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana, **J.B. Yiadom**, Department of Emergency Medicine, Trauma Registry, Komfo Anokye Teaching Hospital, Kumasi, Ghana and **A.D.B. Buunaaim**, MMed, FCS(ECSA)-Ortho, Department of Surgery, School of Medicine and Health Sciences, University for Development Studies, Tamale, Ghana

Correspondence to: Dr. Emile Kouakou Tano, Department of Surgery, Komfo Anokye Teaching Hospital, Kumasi, Ghana. Email: kanot2001@yahoo.com

ABSTRACT

Background: The severity of fingertip injuries depends on the mechanism of injury to the soft tissue and bones.

Objective: To document the incidence, mechanism, category of fingertip injuries, their management and outcome at Komfo Anokye Teaching Hospital (KATH), in Kumasi, Ghana.

Design: A prospective study of patients with fingertip injuries presenting at KATH, from February 2017 to January 2018 was undertaken.

Methods: Selected patients underwent conservative and surgical treatment depending on their injuries. Surgical treatment involved shortening and primary closure, skin grafting or using flaps. Conservative management involved debridement and wound dressing.

Results: The mean age of the patients was 26.9 years. Thirty two (52.4%) of the patients were males. The most common cause of injury was crush 28 (47.5%), due to door and machine mangling injuries. Fifty six percent of the injuries occurred at home. The most common digit involved was the middle finger. Thirty seven percent of the fingertip injuries involved only the pulp. There was a statistically significant difference (P - value = 0.04) between the type of treatment and aesthetic outcomes. There was no statistically significant difference between length, shape, colour, and appearance of finger and the type of treatment.

Conclusion: Fingertip injuries accounted for 34% of hand injuries presenting at KATH, in Kumasi. Crush and blunt injuries involving the pulp of the fingers predominate. Most of these injuries were managed conservatively. Majority of patients were satisfied with the length, shape, colour and aesthetic outcome of the fingertip.

Key words: Crush injury, Fingertip, Blunt injury, Conservative, Machine mangling

INTRODUCTION

A sensate, mobile and stable fingertip is essential for the optimum function of the hand as a whole. It's one of the commonly looked at part of the body making it very important for clinicians to ensure a good functional and aesthetic outcome of fingertip injuries (1).

The fingertip is the section of the finger that is distal to the insertions of the flexor and extensor tendons (2). The anatomy of this region include; the glabrous skin, the perionychium (nail complex), subcutaneous fat which contains fibrous septae, nerves, arteries and distal phalanx (3,4). The nail complex is made up of sterile matrix, germinal

matrix, hyponychium, paronychium, eponychial fold and the nail plate (5).

Fingertip injuries are responsible for most of the visits to emergency units worldwide. Approximately 4.8 million yearly visits to emergency departments have been attributable to hand and fingertip injuries (6). The severity to nerve, vessels, soft tissues and bones is largely dependent on the mechanism of injury to the fingertip.

Fingertip injuries are one of the commonest causes of significant morbidity within workplaces in Africa (7). These injuries are also incidental to the type of household chores, particularly in the kitchen. Treatment employed in managing

finger tip injuries include debridement, skin grafting, shortening of bone and primary closure, healing by secondary intention, and coverage with either a local flap or a regional flap (3). Although there is a publication on hand injuries at Komfo Anokye Teaching Hospital (8) in Ghana, it did not document the patterns and incidence of fingertip injuries specifically.

The purpose of this study was to document the incidence, mechanism, categories of fingertip injuries, their management and outcome at Komfo Anokye Teaching Hospital in Kumasi, Ghana.

MATERIALS AND METHODS

A prospective study of patients with fingertip injuries attending the Accident and Emergency Department of the Komfo Anokye Teaching Hospital (KATH), in Kumasi, Ghana from February 2017 to January 2018. Data was collected within 6 months and patients followed-up for 6 months. Patients were screened to determine their eligibility to participate in the study at the triage section of the Accident and Emergency Department as well as the reconstructive plastic and burns outpatient unit of KATH. Ethical clearance was obtained from the ethical and review board of the KATH.

Patients from one year and above presenting with fingertip injuries at KATH and gave consent to be part of the study were included. Patients with hand injuries not involving the fingers, polytrauma patients, fingertip injured patients with diabetes mellitus, sickle cell disease and smokers were excluded from the study.

Treatment methods: Fingertip injuries amenable to conservative treatment was employed in injuries without exposed bone and fingertip injuries with bone exposed that is less than 2 mm of soft tissue covering the bone. A few millimeters of the bone was nibbled away to allow good cover of the soft tissue. The use of flaps was in fingertip injuries with skin loss causing exposure of the underlying bone or tendon and in injuries with the need for preservation of length of the digit.

For both conservative and use of flaps as treatment modalities, patients were given general, regional or local anaesthesia in the form

of digital block with 1% plain xylocaine at a dose not exceeding 3mg/kg. Tourniquet was applied to the arm when necessary and optical loupes were used. Conservative treatment of fingertip injuries involves using of dressing only or minimal debridement and dressing. Dressing was done using Vaseline and coban bandage on alternate days. Patients had early close follow up within the first two weeks looking for post procedure complications such as pain, bleeding, flap necrosis, infection and gangrene.

The study employed both descriptive and inferential statistics in analyzing the data. Information on socio-demographics and clinical presentation of patients were presented using percentages and frequencies, means, standard deviation pie chart, tables. All analysis in this report was narrowed to cases that were reported at the emergency department and reconstructive plastic surgery and burns unit outpatient department during the study period. Statistical significance was set at the standard p-value of 0.05 with a 95% confidence interval. All analysis was carried out using STATA 15.0 version statistical software.

RESULTS

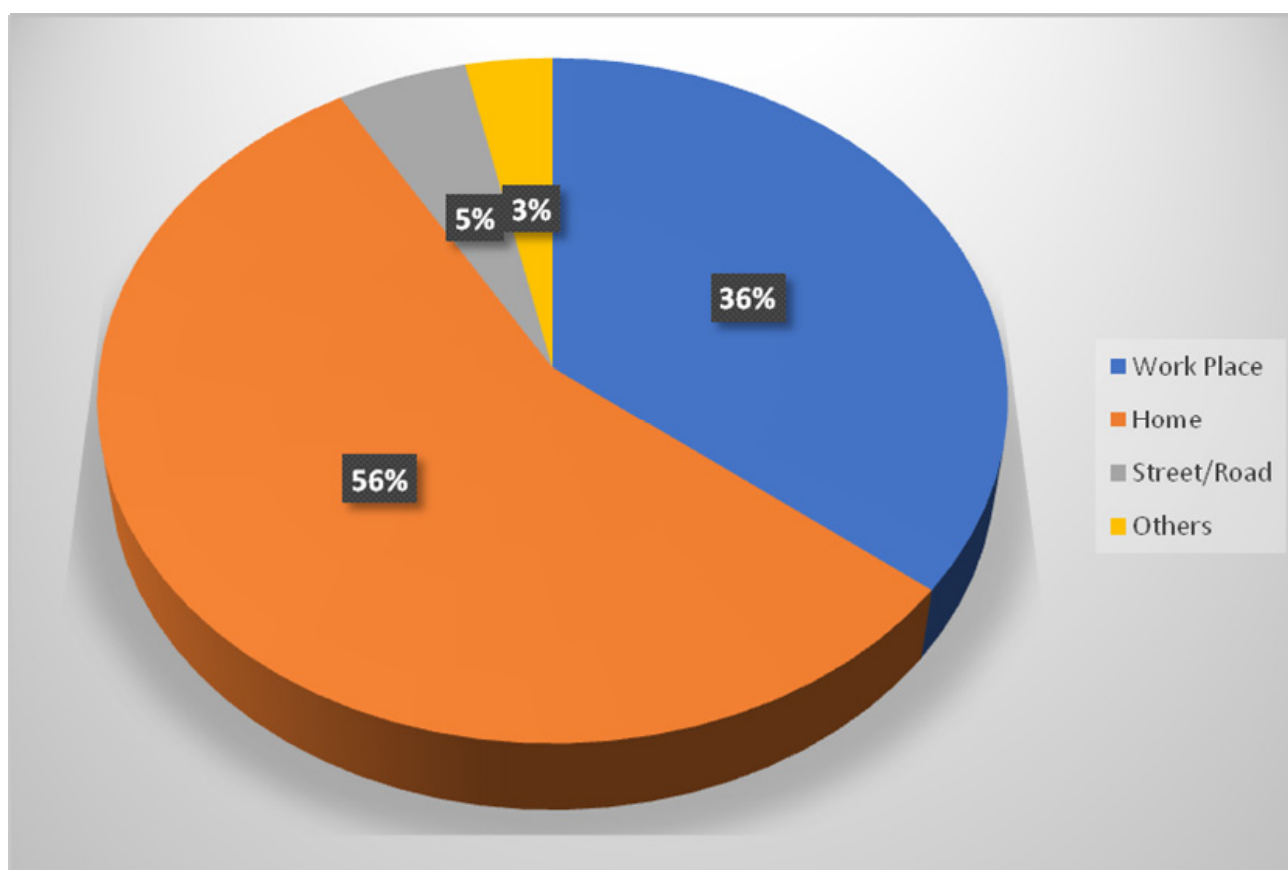
Demographic characteristics of patients: Sixty five out of 192 patients (34%) with hand injuries attending the Accident and Emergency Department of KATH presented with fingertip injuries during the study period. Of the 65 patients with fingertip injuries, 59 completed the follow-up and were selected for analysis; however, six were lost to follow-up and excluded in the analysis.

The incidence of fingertip injury in Kumasi (KATH) was 65 (34%) of patients coming with hand injuries. The mean age of the patients was 26.9 ± 17.5 years. The male: female ratio was 7:5. For educational level among patients, almost half of the patients, 29 (49.2%) were primary/Junior High School (JHS) leavers. More than half, 42 (71.2%) of the patients were single and 12 (22.0%) were married (Table 1). Home (56%) was the most common place where the fingertip injuries occurred, followed by the workplace with (36%) (Figure 1).

Table 1
Demographic characteristics of the patients

Variables	Frequency (N=59)	(%)
Age (years, mean \pm SD)	26.9 \pm 17.5	
Gender		
Male	32	54.2
Female	27	45.8
Educational background		
Preschool	17	28.8
Primary/JHS	29	49.2
Secondary	9	15.3
Tertiary	4	6.8
Marital status		
Single	42	71.2
Married	12	22.0
Divorced	4	6.8

Figure 1
Distribution of place of injury



Clinical presentation of patients: The most common cause of injury was crush injury 28 (47.5%), most of them were door and machine mangling injuries. Blunt and sharp object injuries constituted 24

(40.7%) and 7 (11.9%) respectively. Three quarters of the blunt injuries were pestle-mortar injuries. The majority of digit involved in the injury was middle finger 27 (45.8%), followed by ring and

index 12 (20.3%) and 11 (18.6) respectively. Also, the little finger 3 (5.1%) was the least involved in the injury. More than half of the injuries involved

the right hand 36 (61.0%). The right hand 55 (93.2%) was the most dominant hand (Table 2).

Table 2
Clinical presentation of patients with fingertip injury

Variables	Frequency (N=59)	(%)
Aetiology of injury		
Crush injury	28	47.5
Blunt injury	24	40.7
Sharp objects	7	11.9
Type of digit involved		
Thumb	6	10.2
Index	11	18.6
Middle	27	45.8
Ring	12	20.3
Little	3	5.1
Hand involved		
Left	23	39.0
Right	36	61.0
Dominant hand		
Left	4	6.8
Right	55	93.2

Type of fingertip injury: The Allen's classification of fingertip injuries 2 was used to access the fingertips injuries as follows:

Type 1: Injuries involving pulp only.

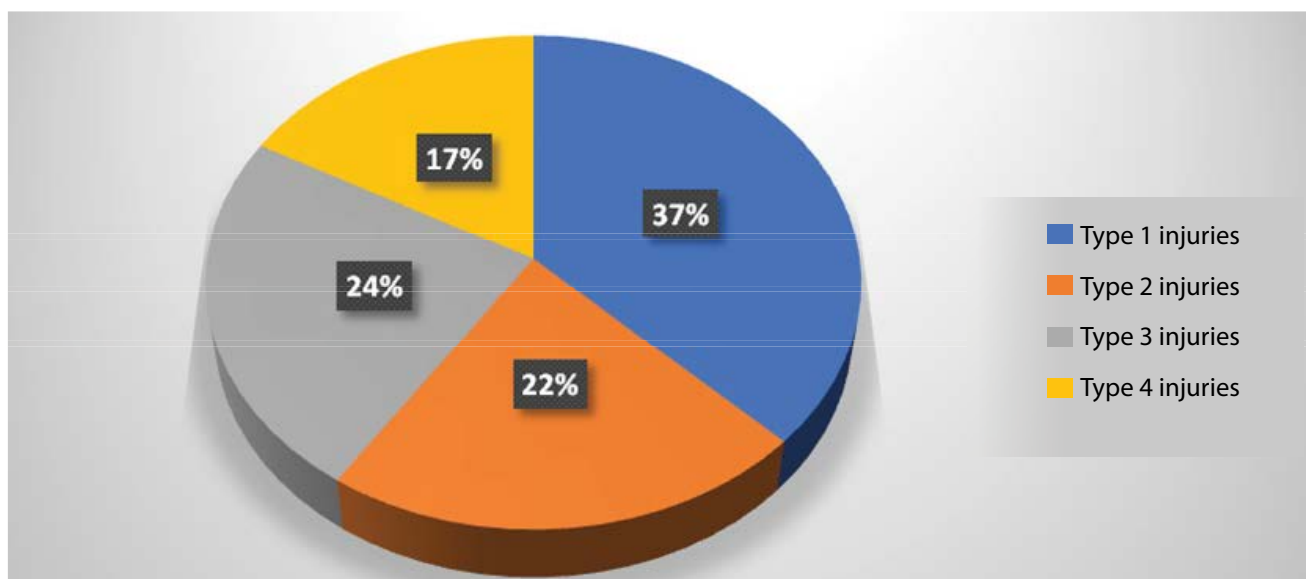
Type 2: Injuries involving the pulp and nail bed.

Type 3: injuries involving partial loss of distal phalanx.

Type 4: Injuries proximal to the lunula.

Using the Allen's classification of fingertip injuries, Type 1 constituted the majority (37%), followed by Type 3 (24%), Type 2 (22%) and Type 4(17%) (Figure 2).

Figure 2
Allen's classification of fingertip injuries



Aesthetic outcome: An assessment of the aesthetic outcome reveals that, less than half 27(46.0%) were unsatisfied with the length of the finger. Twenty six (44.1%) and 29(49.2%) were not satisfied with the

shape of the finger and colour of finger respectively. More than half 34(58.0%) of the patients were not satisfied with the shape of their nail. (Table 3).

Table 3
Satisfaction with aesthetic outcome after treatment

Variables	Yes No. (%)	No No. (%)
Length of the finger	32 (54.2)	27 (45.8)
Shape	33 (55.9)	26 (44.1)
Appearance	30 (50.9)	29 (49.2)
Colour	25 (42.4)	34 (57.6)
Nail shape	25 (42.4)	34 (57.6)

Type of treatment and aesthetic outcome: The Chi square test was conducted to show if there is a relationship between type of treatment and aesthetic outcomes. There was no statistical significance difference between type of treatment and aesthetic outcome except nail shape ($p=0.04$).

Majority of the patients who were treated with flap were dissatisfied with aesthetic outcome of the finger length 8(66.7%), shape 7(48.3%), appearance 7(58.3%), colour 9(75.0%), nail shape 10(83.3%) (Table 4).

Table 4
Relationship between type of treatment and aesthetic outcomes

Variables	Treatment		Chi square value	P-value
	Flap	Conservative		
Length of finger			2.6521	0.10
Satisfied	4 (33.3)	28 (59.6)		
Dissatisfied	8 (66.7)	19 (40.4)		
Shape			1.2437	0.265
Satisfied	5 (41.7)	28 (59.6)		
Dissatisfied	7 (48.3)	19 (40.4)		
Appearance			0.5080	0.476
Satisfied	5 (41.7)	25 (53.2)		
Dissatisfied	7 (58.3)	22 (46.8)		
Colour			1.8619	0.172
Satisfied	3 (25.0)	22 (46.8)		
Dissatisfied	9 (75.0)	25 (53.2)		
Nail shape			4.0766	0.043
Satisfied	2 (16.7)	23 (48.9)		
Dissatisfied	10 (83.3)	24 (51.1)		

DISCUSSION

A substantial majority of the patients (71.2%) were in the age group of 15 years and above. The majority of the patients were males (52.4%). Comparing these demographic findings with earlier studies,

Sanjay and Tiwari (2007) reported a mean age of 34.6 (± 22.1). In their retrospective evaluation of 150 patients presenting with fingertip injuries treated by different methods found consistent reports on the gender of the patients with majority of the patients being males (68%)(9). The male

dominance could be due to increased exposure of males to occupational hazards than females. Alexander *et al.*, (2017) in their study comprising 240 patients from a tertiary care center had more males (80%) presenting with nail bed injuries compared to females.

Yorlets *et al* (10) reported a mean age of 37.3 years (range 1-66 years) in his study which was inconsistent with findings of this present study. Most of the injuries presented in this study occurred in the home followed by injury at the workplace. Yorlets *et al* (10) in their descriptive study on fingertip injuries in children, found consistent results in which the most common injuries occurred at home.

The most prevalent cause of injury in this study was crush injury; most of them were door crush and machine mangling. Less than half of patients (40.7%) presented with blunt injuries and (11.9%) of them with sharp objects injuries. This study further reveals that three quarters of the blunt injuries were from pestle-mortar injuries. The middle finger (45.8%) was the commonest digit involved, with the index finger (18.6%) being the least involved. The right hand was observed to be involved in most of the injuries and was recorded to be the dominant hand among (61.0%) of the patients in this present study.

These injury findings are inconsistent with results from a study by Joseph and Fetter-Zarzeka (2002) (11) on fingertip injuries in children. The findings of their study revealed that lacerations accounted for 30% of the injuries whilst fractures accounted for only 16%. The inconsistencies with this study could be attributable to the age category of their study subjects. The findings of their study further revealed that the thumb was the most frequently injured part of the hand with fingertip injury involved in 21% of the cases (10). Ootes *et al.* (12) further disagrees in their study and found out that the most frequent region of injury was the index finger accounting for 38.4%, with injuries including finger lacerations, lower arm fractures and wrist fractures. The place of injury, the home as the commonest place of injury was consistent with the findings of this present study. Evans and Bernadis (13) in 2000 concluded in their study that the Allen's classification of fingertip injuries separates the injury into the three basic aspects of the fingertip; bone, nail and pulp and this provides an accurate description of the injury without resorting to lengthy description.

Based on the Allen's classification of fingertip injuries, Type 1 characterized by injuries involving the pulp only accounted for majority of the injuries

in this study; followed by Type 3 injuries involving partial loss of distal phalanx, Type 2 injuries involving the pulp and nail bed and Type 4 injuries characterized by injuries to the proximal to the lunula of the finger.

Majority (40.7%) of the patients were not satisfied with the shape of their fingernail. The findings of Sanjay *et al.*, (2007) in their retrospective study on fingertip injury are consistent with the findings of the current study. In their study, there was preservation of finger contour and length and there was preservation of sensation and healing without any significant complications associated with them (10).

The findings of this study further show that most of the patients (75%) were satisfied with both the aesthetic and functional overall treatment; only 25% of them were not satisfied with the treatment. This is consistent with a case review published Lou *et al* (14) in 2019. Their study found out that though the width and length of the new fingertips were less than those of the contralateral fingertips, there was satisfaction of almost all the patients with the cosmetic and functional outcomes of their regenerated finger (14). Meanwhile, with the exception of nail shape in which statistically significant difference (P - value = 0.04) was identified between the type of treatment and aesthetic outcomes in patients, there was no statistically significant association between the rest of the aesthetic outcomes (length, shape, colour, and appearance of finger) and the type of treatment. This observation is inconsistent with reports from a functional and aesthetic reconstruction of fingertip and pulp defects with pivot flaps by Ni *et al* (15), in which all patients were satisfied with the appearance of the reconstructed fingertips.

CONCLUSION

Finger tip injuries accounted for 34% of hand injuries presenting at Komfo Anokye Teaching Hospital, in Kumasi. Crush and blunt injuries resulting from trapping of fingers by heavy objects, machine mangling and pestle-mortar injuries, involving the pulp of the fingers predominate. Most of these injuries were managed conservatively with more than half of the patients satisfied with aesthetic outcome of the length, shape and color of the fingertip.

It is recommended that further study to improve the aesthetic and functional outcomes using flaps should be undertaken.

Conflict of interest: None.

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