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# Hand Machinery Injuries Presentation and Management (Omdurman Teaching Hospital)

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This prospective descriptive cross sectional hospital base study carried out in a single plastic surgery unit at OTH in the period from sep 2012- sep2013.

A total of 106 MH injured patients were enrolled in this study; Evaluation is purely clinical and radiological. Initial management included general assessment of the patient status, wash of the wound with antiseptic, careful limited initial debridement, elevation of the hand, antibiotic and anti tetanus prophylaxis. Beside exploration of the wound with proper surgical management according to the injury ranging from minimal stitching, V.Y flap, skin graft, vessel, nerve, tendon repair to bone fixation .with severely crushed hand a limited stitching and waiting for 48 h before a second look.

*Keywords:* *grinder, finger, amputation, crush, palm.*

*GJMR-I Classification :* *NLMC Code: WO 700*

HANDMACHINERYINJURIESPRESENTATIONANDMANAGEMENTOMDURMANTEACHINGHOSPITAL

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# Hand Machinery Injuries Presentation and Management (Omdurman Teaching Hospital)

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The study revealed that the right hand dominance was prevalent in 97.2% and was the most affected (64.1%). The mean age of the study group 25 years with male to female ratio of 4:1. Among named machines, Grinder injury is the commonest represent about (36.8%); followed by plastic machine 8.7%. The most involve part of the hand is the middle finger 14.2% , index 10.4% and thumb 8.5% .Highest percentage of fractures found in the middle finger 15.1% . Skin loss was seen mainly in index finger 4.7%.

Concerning the management at tertiary hospital, minimal stitching constitutes 55.7% followed by V.Y flap 7.5%. Amputation in MHI is of great significance of P- value < 0.03, at initial discharge from ER; thumb represent (2.8%), and index (4.7)%

*Conclusion:* Severe hand injury in form of finger amputation, skin loss, nerve and arterial injuries are more common in age below 25 years.

Grinder and plastic machines are the commonest cause of MHI among named machines.

*Keywords: grinder, finger, amputation, crush, palm.*

## I. Introduction

Design and function of the hand is an amazing work of anatomic engineering for the effective functions of the hand. Therefore any injury to the underlying structures of the hand carries a potential risk of serious handicap. To reduce this risk, even the smallest hand injuries require proper medical evaluation. The goal with injuries to hand is rapid and accurate entail evaluation and treatment, in other words, once an injury occurs, the Doctor strives to begin medical treatment quickly. So short and long term effects on the hand can be minimized.

## II. Result

A total number of 106 patients present with MHI were studied. The common age group is below age of 25 years see Fig. (1).

Affection of the hand regarding job shows the following, the most affected categories are labors by35.8%and free workers by17% while engineers shows the minimal 1.9% and the remaining jobs affected by(28.2%) see Fig. (2).

The right hand is the dominant hand by 97.2% while the left represent only 2,8% see table (1).

There are four types of machines were studied while the remaining put under the name of (others) represent 37.7% each of them represent less than 3%. Grinder injury affect 36.8% while (plastic, saw, car machine) affection in about 25.5% table (2).

The right hand involved in 64.1% while the Lt hand account for 34% ,both hand equal to 1,9% see Fig. (3).

More disappointing to see loss of all fingers but fortunately enough seen in about (0.9%) see Fig (41).
No patient discharge with hand amputation.

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*Tables and figures*

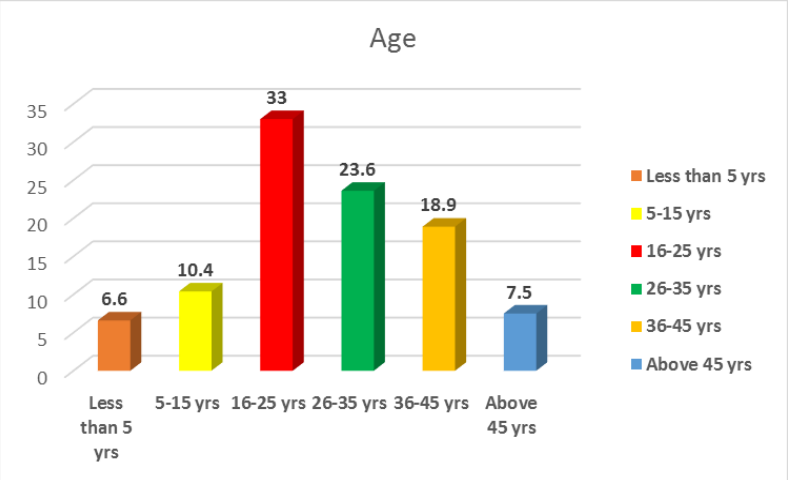


*Figure 1 :* Age

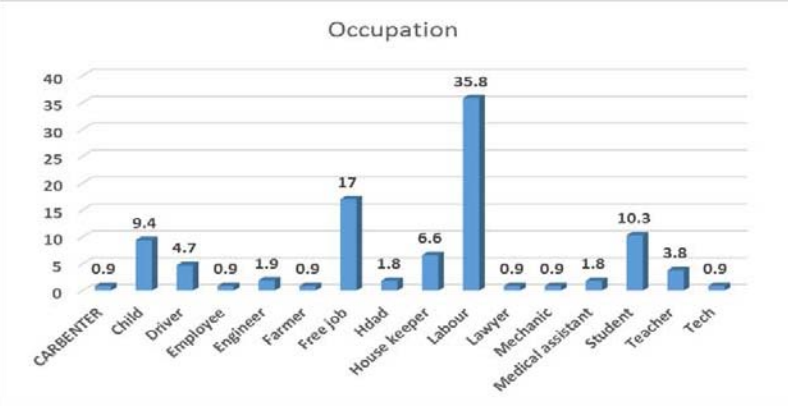


*Figure 2 :* Occupation

*Table 1:* Hand Dominance

| | Frequency | Percent |
|---|---|---|
| Rt | 103 | 97.2 |
| Lt | 3 | 2.8 |
| Total | 106 | 100.0 |

*Table 2 :* Type of Machine

| | Frequency | Percent |
|---|---|---|
| Saw | 9 | 8.5 |
| Plastic machine | 9 | 8.5 |
| Car machine | 9 | 8.5 |
| Grinder | 39 | 36.8 |
| Others | 40 | 37.7 |
| Total | 106 | 100 |

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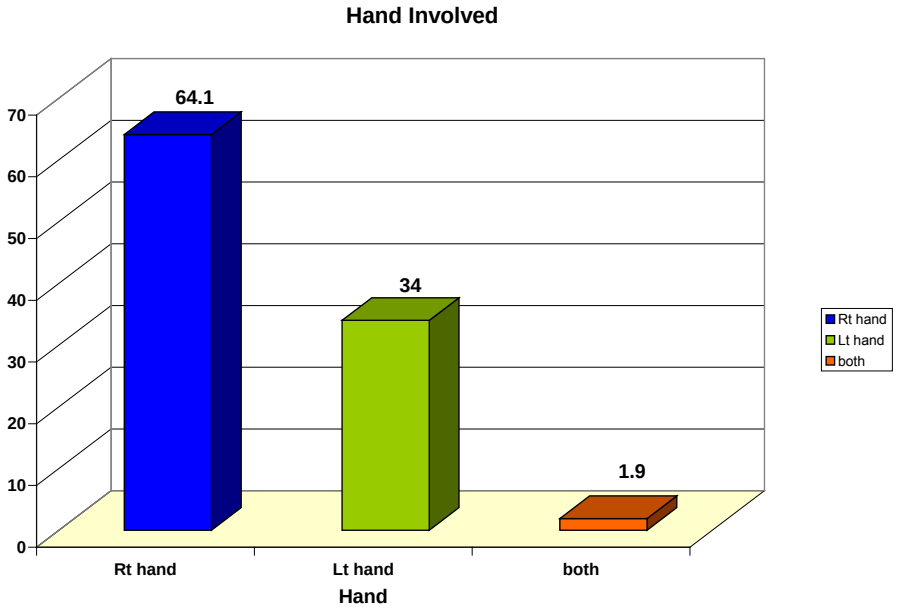


*Figure 3 :* Hand Involved

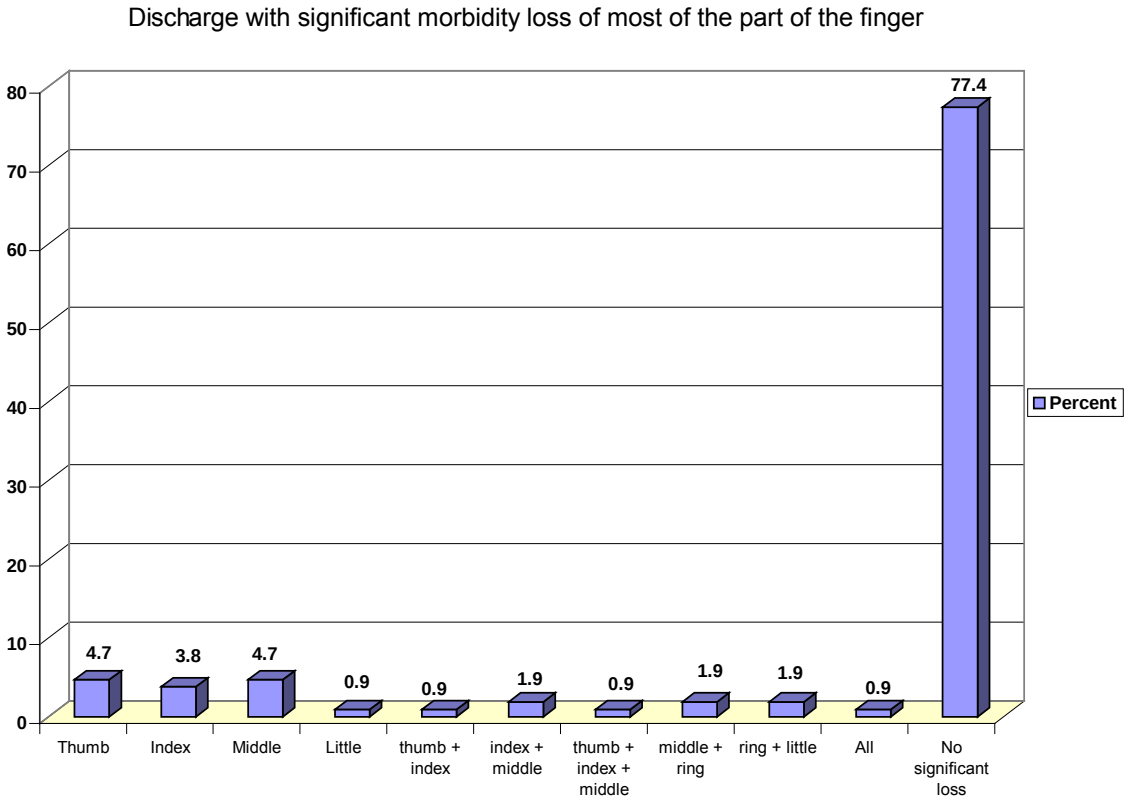


*Figure 4 :* Amputation



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## III. Discussion

The hand is a very intricate and important tool used for daily living activities. In the developing world, it establishes the individual in society, allowing them to meet social and economic responsibilities. It is therefore important to understand the causes of injury to this part of the body to minimize the occurrence of injury and to forestall poor treatment outcomes that may result in dramatic reduction in quality of life. In this study, young adults were most commonly affected. This finding is consistent with other series in which the average age was less than 25 years.[24,26,29,30]However, studies in areas with considerable post productive populations show a slightly higher average age group of 40 years. Most studies show a male predominance, with a male-to-female ratio of 4:1.[24,30,32] In our series, we had a higher incidence of injury among men, so male to female ratio is 4:1.

The report of hand injuries by Beaton and colleagues [27] showed results similar to ours, where right-hand are dominant by 97.2% with sustained injuries more common than left-hand injuries. Similar to other studies, 64.1% of our patients sustained an injury to their dominant hand. These studies reported more than 50% of injuries to the dominant hand.[24,26] However, Mink and colleagues[33] observed dominant-hand injuries in about 37% of their sample. In our study, about 1.9% sustained injury to both hands. A 2% rate of injury to both hands has previously been reported. [24]

In this study, 95.3% who had a hand injury have no co morbid disease and some of them have DM and HTN equally (1.9%) this because most of the patients are of younger age group.[34]

Management in form of nerves, vessels, bones fixation and muscles repair of low percentage and this may be due to severity of injury and tissue destruction due to grinder and named machines.

Mechanism of injury in our study mainly by crush injury(39.7%) followed by laceration(33%) this goes with study conducted in Nigeria by keki and his colleagues [8].In our study the surgical management resemble that which done by Keki in form of minimal stitches ,V.Y flaps and SSG.

Trybus and colleagues [24] performed a study in an industrial city in Poland in which about 50% of workers with a hand injury were manual workers. However, in our study, unskilled workers such as labors (35.8%) and free workers (17%) constituted more than half of all patients with hand injuries. This underscores the important fact that more than 50% of people who sustain hand injuries in our environment are in the work force. It is pertinent to observe that in many studies undertaken in industrialized nations, machine injury is the most common cause of hand injury. [24,30] In our environment, grinder was the most common cause of hand injury among named machines(36.8%) followed by plastic machine injury(8.5%)while others unnamed machines were put under the name of others represent(37.7%)each unnamed machine may represent less than 3%. This may be because of the fact that this study was carried out in an environment with fewer industries and using machines without safety and irresponsible measures like in our environment where they put grinder in front of their shops.

We also observed that the engineers and technicians (1.9%) had low rate of injuries sustained from machine accidents. The labors and free workers had most of their injuries from grinder; this is probably explained by the fact that these professionals are well trained in dealing with safety.

An appreciable number of our patients (45.3%) sustained their injuries from grinder and plastic machine. This was not the finding of other investigators, who rarely reported grinder injuries to the hand.[24,28,30] . All injuries sustained by labors, free worker and children were due to grinder. This is most probably the result of careless placing and operating resulting in sad injuries to one's self. We also observed that all of the grinder injuries occurred outside home and involved most of the part of the hand.

In our series, most injuries occurred outside home (the workplace) (67.1%) while inside home equal to (32.9%); other studies reported more workplace injuries. [28,30,33] Trybus and colleagues[24]reported that 45% of injuries in their study occurred in the home, followed by 20% in the workplace. These results are similar to those from a study conducted in Finland.[34] Some earlier reports showed that home injuries are commonly due to home machines.[24,29,35]This is consistent with our findings. This is probably because most home injuries are minor and are treated at a nearby medical clinic.

Consideration was given to the injury distribution within the zones of the hand. We observed that zone 3 had the highest risk of being injured (38.7%). This is because it is the palmar surface of the hand and is the widest zone, thereby making it the most at risk of injury. Finger injuries accounted for almost 83% of cases and mainly seen in middle index and thumb and these are the common used fingers during grinding .[36] However, 61.6% of cases involved injury to more than one zone. As in other series, the skeleton and integument were the tissue components most commonly injured.[28,30] High-energy injuries from grinder and others named machines have a higher risk of involving all the tissue components and increasing the potential of digit amputation which seen in our study in 42.5%.[28,30,37]

In conclusion, we have shown that hand injuries constitute a major proportion of trauma emergencies in a developing country and that grinder and plastic machine among mentioned machines are the major

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cause of hand trauma in this environment, unlike in other locations where industrial machine injury is the major cause. It is imperative that education for labors and free workers will reduce the incidence of hand injury. Although a large percentage of machine injuries are minor, more than half of the people with this type of injury are from the working class and are the driving force of the country's economy. A substantial number of these workers face the risk of losing their employment and having their social status irreparably altered. This, in turn, leads to major economic loss. We also observed that workers who sustained machine injuries usually had severe to major forms of injury, which included amputation of digits. It is therefore recommended that employers and government focus more effort toward worker education, particularly with regards to occupational health and safety. The provision of a safe and work-friendly environment includes training in equipment operation and maintenance and the provision of appropriate protective clothing and safeguarding of machinery. Furthermore, it is essential that policy measures be put in place for insurance and adequate compensation of the hand injury-related disability.

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