THE PATTERN OF ORAL AND MAXILLOFACIAL INJURIES AMONG PATIENTS ATTENDING MUHIMBILI NATIONAL HOSPITAL, DAR ES SALAAM, TANZANIA

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By

Baraka Fredrick Kileo, DDS

A Dissertation to be submitted in Partial Fulfilment of the Requirements for the Degree of Master of Dentistry (Oral Surgery) of the Muhimbili University of Health and Allied Sciences

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CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance by the Muhimbili University of Health and Allied Sciences in Dar es Salaam, a dissertation entitled**: THE PATTERN OF ORAL AND MAXILLOFACIAL INJURIES AMONG PATIENTS ATTENDING MUHIMBILI NATIONAL HOSPITAL, DAR ES SALAAM, TANZANIA**, In partial fulfilment of the requirements for the Degree of Master of Dentistry (Oral Surgery) of the Muhimbili University of Health and Allied Sciences.

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Dr. Jeremiah Moshy

(Supervisor)

Date……

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Dr. Elison N.M. Simon

(Supervisor)

Date……

DECLARATION AND COPYRIGHT

I, **Dr. Baraka Fredrick Kileo**, declare that this dissertation is my own original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

Signature…….. Date ……..

ACKNOWLEDGEMENTS

I wish to thank God for granting me health during the period of the study. I wish to express my sincere gratitude and appreciation to Dr Jeremiah Moshy and Dr Elison Simon for their supervision, constructive criticisms and encouragement during the preparation of the study proposed and this dissertation.

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Last but not least, I would like to thank all patients who participated in this study for their tolerance despite the pain and the hard times they were going through.

DEDICATION

I would like to dedicate this dissertation to my lovely wife Catherine and my daughters Daniella and Esther.

ABSTRACT

Objective: To determine the pattern of oral and maxillofacial injuries among patients attended at the Muhimbili National Hospital, Dar es Salaam, Tanzania.

Study design: Descriptive cross-sectional hospital based study.

Setting: The study was done at oral and maxillofacial surgery firm and emergency medicine department of Muhimbili National Hospital (MNH).

Study population: All patients who attended the Oral and Maxillofacial Surgery firm and Emergency Medicine departments of MNH for treatment of oral and maxillofacial injuries during the period of the study and consented were included in the study.

Methodology: An interview of the patients with oral and maxillofacial injuries was done through structured questionnaire to obtain relevant information from the patient. Social-demographic information (age, sex, address, education level and marital status), patient's main complaint, type of injury, place where injury took place, cause of injury, general condition of patient immediately after injury and afterwards and the time interval from injury to reporting to hospital were recorded. Clinical findings were recorded as follows: type of injury, site of injury, single or multiple, soft tissue or hard tissue injury. Soft tissue injuries were categorized as bruises, abrasions, cut wound, contusion, lacerations, avulsions, and burn. Hard tissue injury was categorized as fracture of facial bones such as nasal bone, maxilla, mandible, zygoma, frontal palatal and orbital bones. Accompanying injuries to the TMJ were also recorded.

Radiological investigations including plain skull radiography (posterior anterior view, Water's view, submental vertex view), orthopantomograph and where necessary a computed tomography (CT) were ordered. The interpretation of the radiological investigations was done by the principal investigator with the assistance of an experienced clinician and was recorded in a special form as fracture or no fracture, site and type of fracture. Treatment offered and treatment outcomes were also recorded. For admitted patients the number of days spent in hospital was recorded against the type of injury and treatment done. The data was entered into computer and analysis was done using Statistical Package for Social Sciences programme (SPSS) Version 15. Association of maxillofacial injury parameters

(demographic factors, aetiology, treatment and complications) and type of injuries was evaluated using Chi –square test (X^2). Significant level $p<0.05$ was used to draw out conclusion.

Results

A total of 137 patients, 123 (89.8%) males and 14 (10.2%) females with the male-female ratio of 9:1 were included in this study. The age range was from 4 to 70 years with a mean age of 30.13 years. The 21-30 and 31-40 years age groups were the most affected. Road traffic accidents (RTA) were the most (64.2%) common causes of oral and maxillofacial injuries. The most common soft tissue injury was laceration in 63 (26.9%) patients followed by bruises in 57 (24.4%) and cut wounds in 54 (23.1%). Ninety-three patients (67.9%) had sustained fractures of either the mandible, mid face or both and of those 93 patients who sustained fracture, most had mandibular fractures 42 (45.2%).

All patients received basic resuscitation procedures, for stabilization of the patient. Almost all (97.8%) patients with oral and maxillofacial injuries were given analgesics for pain control and prophylaxis antibiotics (96.4%). Surgical wound debridement and wound suturing were the most (62.8% and 53.3% respectively) common treatment for soft tissue injuries, while intermaxillary or mandibulomaxillary fixation was the most (51%) common hard tissue injuries treatment. A total of 27 (19.7%) patients suffered some complications after treatment. Infection was the most (59.3%) common complication followed by malunion (33.3%).

Conclusion

This study showed that road traffic accidents were the most common cause of maxillofacial injuries. Assaults/interpersonal violence were the second most common cause of maxillofacial trauma. These findings should alert the authorities, particularly the government and the road safety commission to the need for improvement of our roads, enforcement of existing traffic laws, and improvement of socio-economic conditions of the general population.

TABLE OF CONTENTS

ABBREVIATIONS

MUHAS	-	Muhimbili University of Health and Allied Sciences
MNH	-	Muhimbili National Hospital
MoHSW	-	Ministry of Health and Social Welfare
WHO	-	World Health Organization
HIV	-	Human Immune Deficiency Virus
FBP	-	Full Blood Picture
ESR	-	Erythrocyte Sedimentation Rate
OPG	-	Orthopantomograph
SPSS	-	Statistical Package for Social Sciences
TMJ	-	Temporomandibular Joint
ORIF	-	Open Reduction and internal Fixation
IMF	-	Intermaxillary Fixation
RTA	-	Road traffic accident
MCA	-	Motorcycle accident

CHAPTER ONE

1.0 INTRODUCTION

Oral and maxillofacial injuries occur in significant number of trauma patients. They represent one of the greatest challenges to the public health services world wide because of their high incidence, health and financial implications. Often they are associated with varying degrees of physical, functional and aesthetic damage[1]. These injuries have been reported to be one of the principal causes of mortality in the western world, especially among young adults[2]. Trauma to the facial area ranges from simple and limited to the soft tissues to complex injuries involving the underlying skeletal structures[3]. Soft-tissue injuries have been reported to be the most common presentation following maxillofacial trauma[4]. The types of these injuries vary considerably. It may be a clean sharp laceration, a laceration with a contusion, an abraded wound, a contused wound, an avulsed wound, a puncture wound, or a burn wound[5]. Fractures of the facial bones may involve among othrs the mandible, maxilla, zygomatic arch, nasal bones, and the orbit. Prompt attention and care to a victim is therefore necessary to prevent serious complications that sometimes may result in death[6]. There are several causes of maxillofacial fractures, however it has been reported that so far road traffic accidents remains the major etiologic factor of maxillofacial injuries[7].

The epidemiology of facial fractures varies in type, severity, and causes depending on the population studied. The results of epidemiological studies vary depending on the demographics of the particular population under study. Factors such as geographic region, socioeconomic status and temporal factors, including period of the year, can influence both the type and the frequency of injuries reported for a given population. The differences in the causes of maxillofacial fractures between populations may be the result of differences in the presence of risk factors and cultural differences between countries[8-9]. Epidemiological assessments are essential to reaffirm patterns, identify new trends and develop clinical and research priorities for effective treatment and prevention of these injuries[11].

1.1 LITERATURE REVIEW

Oral and Maxillofacial injuries remain a serious clinical problem because of the sensitivty of this anatomical region. The occurrence of facial injuries tends to be high compared to injuries in the rest of body because the face is not shielded by other structures. Maxillofacial injuries resulting from trauma are usually challenging to the maxillofacial surgeon. Causes of these injuries include automobile accidents, physical altercations, gunshot, home accidents, sports, occupational hazards and other less common causes[8, 9,10]. In most developing countries road traffic accidents are the leading cause of maxillofacial injuries[12].

Studies worldwide show that in recent years there has been a high incidence of oral and maxillofacial injuries[13]. A significantly higher prevalence has been found in serious accidents or traumatic events in which most of the injured suffered multiple injuries[14]. Knowledge of the etiologic factors and mechanisms of injuries can be helpful for a satisfactory trauma prevention programme[15]. Maxillofacial terror casualties present a unique epidemiology, with more severe injuries and higher prevalence of both soft and hard tissue injuries[16] . Gunshot injuries to the face in civilian life are rarely reported and when occurring they are accompanied by potential complications and can have catastrophic consequences[17]. In serious accidents or traumatic events soft-tissue injuries (cuts, lacerations or bruises) may occur along with other injuries such as fractures[14].

Other studies indicated that the facial region was the most common site of injury following violent episodes mostly in married couples[18]. A study to review the epidemiology of patients aged 1-18 years treated for oral and maxillofacial injuries during a 3-year period at a tertiary care center in Wales UK showed that 65.5% were aged 1-10 years. Seventy-three per cent of injuries occurred to the soft tissues and 15% were fractures. Falls were by far, the commonest cause of injury, but with increasing age, assaults became more common[19]. In Tanzania road traffic accidents and assaults have been found to be the most common causes of maxillofacial trauma[20].

Nevertheless the aetiology and incidences of maxillofacial injuries varies from one country to another and in different places within the same country depending on the prevailing socio-economic, cultural and environmental factors[21]. In Sub-Saharan

Africa, males sustained more facial fractures than females; the ratios were reported to be 5.4:1, 4.5:1 and 5:1 in Nigeria, Senegal and Zimbabwe respectively[22, 23, 24]. The male predominance is not only related to violence and falls but also partly to traditional role of males in society whereby they are more exposed to occupational and environmental hazards than the women. Literature from developed countries show that facial bone fractures are caused by accidents from automobiles and motorcycles, sports, occupational and social altercations[25,26,27,28,29]. Periodic verification of the aetiology of maxillofacial injuries helps to recommend ways in which maxillofacial injuries can be averted[22]. Even though numerous reports on maxillofacial trauma exist, only a few gave detailed information about work-related maxillofacial injuries[30].

In victims of domestic violence who sustained maxillofacial injuries, midface injuries predominated[31]. Although falls and road traffic accidents are the most frequent causes of oro-facial soft tissue injuries, less common causes, like burns and dog bites are more likely to result in death[32].

In sport most reported injuries were soft tissue and only few required professional attention. The reported incidence of orofacial injury related to sport was generally very low suggesting that at the age and skill levels represented by these soccer appears to be relatively safe to the maxillofacial complex[12, 47]. In Tanzania sports/games were found to be the cause of 4.9% of all maxillofacial trauma[20].

Presence of injuries in the maxillofacial complex in children and adolescents, victims of physical violence in school environment has been reported[48]. In most of these cases the perpetrators were friends from school. Injuries around the head and face were all situated in soft tissues, mainly in the lips. Rahman et al. (2007) [49] have reported that children exhibit different pattern of clinical features depending on the etiology and stage of their bone maturation.

Bite wounds have a special position in traumatology because of their high complications compared to wounds from other causes[34, 35]. The mammalian bite injuries accounted for 10% of patient managed because of soft tissue injuries to the orofacial region[36] and dogs were the most common perpetrators[33, 37]. Besides dogs other animals such as snake, cats, horses or donkies may be responsible for these accidents[38, 39]. Human bites are thought to be more serious than animal bites because of a higher incidence of infection[40, 41]. Most human bites occur during fights whereas

a substantial percentage is related to sexual activities[40]. Transmissions of several systemic viral and bacterial infections have been reported to occur with human bites, including hepatitis B and C, tuberculosis, syphilis, and tetanus[42]. Furthermore, transmission of human immunodeficiency virus (HIV) following an accidental bite has been documented[43].

Facial burns vary from relatively minor insults to severe debilitating injuries. Over 50% of burn injuries involve the head and neck region and can be caused by flame, electrical current, steam, hot substances, and chemicals[44]. A burn involves the destruction of skin cells and sometimes the underlying structures of fascia, bone and muscle.

A burn occurs when these structures absorb more heat than their capacity to dissipate. The injury to skin triggers inflammatory responses, and a variety of local cytokines cause a rapid accumulation of extravascular fluid. Inhalation injuries are currently the factor most responsible for mortality in thermally injured patients. Inhalation injuries may occur independently, but generally occur together with skin burn. Smoke inhalation affects all levels of the respiratory system. The extent of the inhalation injury depends on the duration, exposure, amount and toxicity of the fume temperature. Also concentration and solubility of toxic gases, the occurrence of the accident in a closed space and pre-existing diseases are the determinants of the extent of injury. Smoke inhalation also induces changes in the systemic organs resulting in the need for more fluid for resuscitation[45]. Burn mortality statistics are influenced by age and degree of total surface body burn. The addition of an inhalation injury to a cutaneous burn results in a significant increase in mortality rate. Irrespective of presence of inhalation injury, sepsis originating from the wound or respiratory tract is the main cause of death in the late stage of burn[46].

Management of maxillofacial trauma has developed in an evolutionary manner. Evaluation of injuries of soft tissue and bone must be precise through instrumental diagnostic examinations[50]. Careful inspection, palpation, and examination of function assure accurate diagnosis of the injuries[51]. New principles evolved, which are definitive soft and hard tissue management, allowing for better return of patients to their pre-traumatic appearance or at least as close as possible[52]. Treatment priorities have been divided into three different stages according to the need for acute urgent, urgent and necessary intervention. It is recommended that urgent therapy should be

given within 8 hours after the trauma, and also it has been shown that the most serious immediate life-threatening complication following maxillofacial trauma is airway obstruction. The onset can be sudden, as with foreign body aspiration, or following soft-tissue damage that can lead, at a later stage, to airway-compromising edema[2]**.** The management of the pediatric patient with maxillofacial injury should take into consideration the differences in anatomy and physiology between children and adults, the presence of concomitant injury and the particular stage in growth and development[53].

The face and neck take on a particular significance when one considers the complexity of function and significant aesthetic value of the structures of the face and neck[51]. Aggressive surgery for complicated oral and maxillofacial injuries, including reconstruction using fibular flap combined with lateral crural flap to achieve good reconstruction results has been documented and could be selected as the first line treatment[54]. The free flaps transfer is reliable and can reconstruct the oral-maxillofacial traumatic soft and hard tissue defects. Fibula and radial forearm free flap are the most commonly used flaps. Early aggressive surgery with free flaps transfer for traumatic defects can prevent scar contracture and tissue displacement, which can shorten the treatment period and improve the final outcome[55].

Application of local tissue transfer procedures in a series of facial warfare injuries yielded acceptable tissue form, texture, and colour match, especially when these procedures were used in combination, and tailored to surgically fit the individual case. Moreover, application of these procedures is relatively easy and postoperative morbidity is limited, provided the general condition of the patient is stable, and the surgical techniques used have good indications and flap principles [56]. The nasal skeleton and soft tissues are frequently involved and may require surgical repair of the injuries. The primary reconstruction often requires the use of autogenous grafts, and secondary revision surgery. The treatment may require a multidisciplinary surgical team or a single surgeon who knows how to manage the injury. Optimally, the reconstruction of nasal bone avulsions is performed primarily, using autogenous graft materials[57]. Animal bite wounds on the face, even with soft tissue defects, should be treated according to the criteria of aesthetic reconstructive maxillofacial surgery[58]. As with any injury,

priorities are given to life threatening conditions, according to advanced trauma life support resuscitation[59]. Initial wound management consisting of irrigation and debridement is at least equally important with antibiotics for prevention of infection. The need for prophylaxis against complicated systemic infections, particularly tetanus, should be provided. Facial burns are frequently associated with other morbidities. An initial evaluation and treatment should follow the same systematic approach as for all trauma patients: a primary survey, a secondary survey, followed by definitive treatment. For head and neck burns, the airway is a major concern because of potential inhalation injuries e.g. laryngeal oedema and is much more likely to require intubation. Despite the rather high number of oral and maxillofacial injuries seen in our setting, very few studies have been done to evaluate these injuries and none of them is comprehensive enough. Therefore, the aim of this study was to determine the pattern of occurrence and management of oral and maxillofacial injuries among patients attending Muhimbili National Hospital, Dar es salaam, Tanzania.

1.2 STATEMENT OF THE PROBLEM

It has been observed that oral and maxillofacial injuries constitute significant number of both out patient and in patients' attendance. They are often associated with morbidity due to varying degrees of functional and aesthetic disruption. However, only scanty information has been documented at our setting on the pattern, treatment modalities and complications.

Information on the major causes of maxillofacial trauma in Tanzania and in Africa in general is not consistent.While some have reported assault as the most common cause (Shaikh et al. 2002) others show that road traffic accidents were the most common causes (Schaftenaar et al. 2009). Without proper knowledge on the causes and other associated factors, it becomes difficult to plan evidence based programmes for community education on preventive measures.

In the recent past the government of Tanzania has liberalized the transportation sector and in the process has allowed two wheelers (motorcycles) to transport passengers. As a result many motorcycles have been bought and are plying the roads in both urban and rural areas. Often they are exposed to unecessary accidents resulting in injuries to the riders and their passengers. No in depth study has so far been carried out after these changes in our society. The seriousness of the problem of maxillofacial injuries resulting from motorcycle accidents is therefore not clearly known.

An increase in maxillofacial injuries has outweighted available human resource and equipment currently available resulting in an increase of pressure on the government to increase personnel and provide adequate supplies in hospitals to meet this new demand. This means a demand to deploy manpower in the maxillofacial speciality in zonal refferal centres and regional hospitals. This can not be done approprietely without the availability of adequate data showing the epidemiology, aetiology, management and complications of maxillofacial injuries in Tanzania.

1.3 RATIONALE

Carrying out this study shall provide results with useful information and knowledge regarding aetiology, demographic pattern and type of oral and maxillofacial injuries and associated complications. It will further provide information on the treatment modalities in place in the MNH and the outcome of such treatment. Knowledge accrued on the oral and maxillofacial injuries, is necessary for early intervention, in form of proper management and implementation of prevention measures. This will also reduce significantly the morbidity and mortality associated with these injuries through providing valuable source of information for clinicians and researchers regarding oral and maxillofacial injuries in Tanzania.

The findings will provide the hospital and the MoHSW authorities with evidence based information that can form a basis for decision making in planning community based preventive strategies, equiping the oral and maxillofacial firm with both manpower and equipment and education programmes. Such information shall also form basis for planning the provision of manpower, materials and equipment nationwide. Finally, the study is a part of fulfilment of the requirement of Masters of Dentistry in Oral surgery degree programme.

1.4 OBJECTIVES

1.4.1 Broad Objective

To determine the pattern of oral and maxillofacial injuries among patients attending Muhimbili National Hospital, Dar es Salaam, Tanzania.

1.4.2 Specific Objectives

1. To determine the demographic patterns of patients presenting with oral and maxillofacial injuries attending Muhimbili National Hospital.
2. To determine the aetiology of oral and maxillofacial injuries among patients attending Muhimbili National Hospital.
3. To determine the types of oral and maxillofacial injuries among patients attending Muhimbili National Hospital
4. To determine the treatment modalities of different types of oral and maxillofacial injuries among patient attending Muhimbili National Hospital
5. To determine the complications associated with injuries to the oral and maxillofacial region.

CHAPTER TWO

2.0 MATERIAL AND METHODS

2.1 Study settings.

This study was conducted at the Oral and Maxillofacial section of the Muhimbili National Hospital (MNH). This is the largest referral hospital in Tanzania. It is also the only referral centre for all complicated cases of oral and maxillofacial injuries in Tanzania. The centre is a teaching hospital for Muhimbili University of Health and Allied Sciences. This study was carried out in two departments: Oral and maxillofacial surgery firm and Emergence Medicine Department.

2.2. Study design

Descriptive cross-sectional hospital based study.

2.3 Study duration

The study was carried out for 8 months, from June 2011 to the end of February 2012 inclusive.

2.4 Study population

Participants to this study comprised of all patients who attended the oral and maxillofacial surgery firm and Emergence Medicine Department for treatment of oral and maxillofacial injuries during the period of the study.

2.5 Inclusion and exclusion criteria

*Inclusion criteria***:** - All patients presenting at the oral and maxillofacial surgery firm and Emergency Medicine department with oral and maxillofacial injuries and who consented for the study.

Exclusion criteria:- Patients presenting at oral and maxillofacial surgery firm and Emergency Medicine Departments with different oral and maxillofacial injuries who could not consent for the study due to various reasons.

2.6 Sample size estimation

Sample size to this study was estimated based on previous study (Mackenzie, 2000) a total of 135 patients were expected to participate.

2.7 Sampling procedure

All patients presenting at the oral and maxillofacial surgery firm and Emergency Medicine department with oral and maxillofacial injuries and who consented were enrolled for the study.

2.8 Sample size calculation

Total of 135 people will be studied between June 2011 and February 2012.

The sample size is calculated from the formula

$n = \frac{Z^2 P(1-P)}{E^2}$ where:

n= Sample size

Z= 95% Confidence Interval (1.96)

P= Previous prevalence (Mackenzie, 2000).

E= Error margin (5%)

Therefore $n = \frac{(1.96)^2 x 0.087(1-0.087)}{(0.05)^2} = 122$

Adding 10% non respondent n=135

2.9 METHODS

A structured questionnaire was used to obtain relevant information on patient's social-demographic information. (age, sex, address, education level and marital status), patient's main complaint, place where injury took place, cause of injury and general condition of patient immediately after injury and afterwards, time interval from injury to reporting to hospital.

A thorough clinical examination was carried out at the Emergency Department in special room, Emergency section of Oral and Maxillofacial surgery unit and in the ward at the side room with the patient on an examination bed or on a dental chair using artificial light.

Special clinical forms were prepared for recording clinical findings as follows: type of injury, site of injury, single or multiple, soft tissue or hard tissue injury. Soft tissue injuries were categorized as bruises, abrasions, cut wound, contusion, lacerations, avulsions, and burns. Hard tissue injury was categorized as fracture of facial bones such as nasal bone, maxilla, mandible, zygoma, frontal palatal and orbital bones. Accompanying injuries to the TMJ were also recorded. Interview and clinical examination conducted by the principal investigator.

All patients underwent a series of routine as well as specific investigations. These included haematological and radiological investigations.

Haematological investigations included full blood picture (FBP) and erythrocyte sedimentation rate (ESR). Radiological investigations included plain radiography (Skull lateral and posterior anterior view, Water's view, submental vertex view,Townes view) orthopantomography and computed tomography (CT) where necessary. The interpretation of the radiological investigations was done by the principal investigator with the assistance of an experienced clinician. The laboratory investigations results and radiological findings were recorded in the clinical form. Also the type and site of injury was recorded.

All patients received basic resuscitation procedures, for stabilization of the patient. Securing the airway by whatever means was necessary, including endo tracheal intubation or surgical airway, was to be performed immediately whenever there was any doubt about future stability of the patient. The breathing was also monitored before identifying the injury. Bleeding was controlled and volume expansion,

accomplished to maintain perfusion of the vital organs by blood transfusion, blood substitutes or i/v fluids as it was indicated. Medication such as tetanus toxoid (TT), analgesics and antibiotics were also given when necessary. Surgical procedures such as bleeding control, tracheostomy, surgical wound toilet, wound suturing and teeth extraction were also recorded. Orthopaedic procedures such as alveolar bone splinting, intermaxillary fixation (IMF), open reduction and internal fixation (ORIF) and open reduction with cranial facial suspension were done where appropriate. Complications e.g. wound infection, osteomyelitis, malunion or non union were also recorded in the special form and monitored monthly for the first three months.

For admitted patients the number of days spent in hospital was recorded against the type of injury and treatment done. They were checked for completeness and clarity and then entered into the computer for analysis.

2.9.1 Analysis

The analysis was done using Statistical Package for Social Sciences programme (SPSS) Version 15. Association of maxillofacial injury parameters (demographic factors, etiology, treatment and complications) and type of injuries were evaluated using Chi –square test (X^2). Significant level $p<0.05$ was used to draw out conclusion.

2.9.2 ETHICAL CONSIDERATION

All patients were informed about the study before they are asked to participate. Information obtained was used only for this study and were kept confidentially. Refusal to participate or withdrawal from the study did not result into penalty or affect the right of a patient for treatment.

2.9.3 Ethical clearance

This study was channelled through the Research and Publication Ethical committees of the Muhimbili University of Health and Allies Sciences (MUHAS) and the Muhimbili National Hospital (MNH) for clearance. It was accepted and the study was done.

CHAPTER THREE

3.0 RESULTS

3.1 Socio-demographic factors

The study comprised a total of 137 patients with oral and maxillofacial injuries. One hundred and twenty three (89.8%) were males while 14 (10.2%) were females (Fig 1). The age range was 4 to 70 yrs with a mean age of 30.13 years and median age was 29 years. The age group 21-30 and 31- 40 were the most affected age groups. The age group 0-10 was the least affected (Table 1). Majority (50.4%) of patients with oral and maxillofacial injuries had a maximum of primary school education only followed by secondary education 26 (19%) and tertiary education 20 (14%) (Table 2). Oral and maxillofacial injuries were found to occur more in urban areas 113 (82.5%) compared to rural areas 24 (17.5%) in this population (Fig 2). When considering the occupation of the victims, petty traders 38 (27.7%), unemployed 33 (241%) and employed 32 (23.4) were the most affected groups (Table 3).

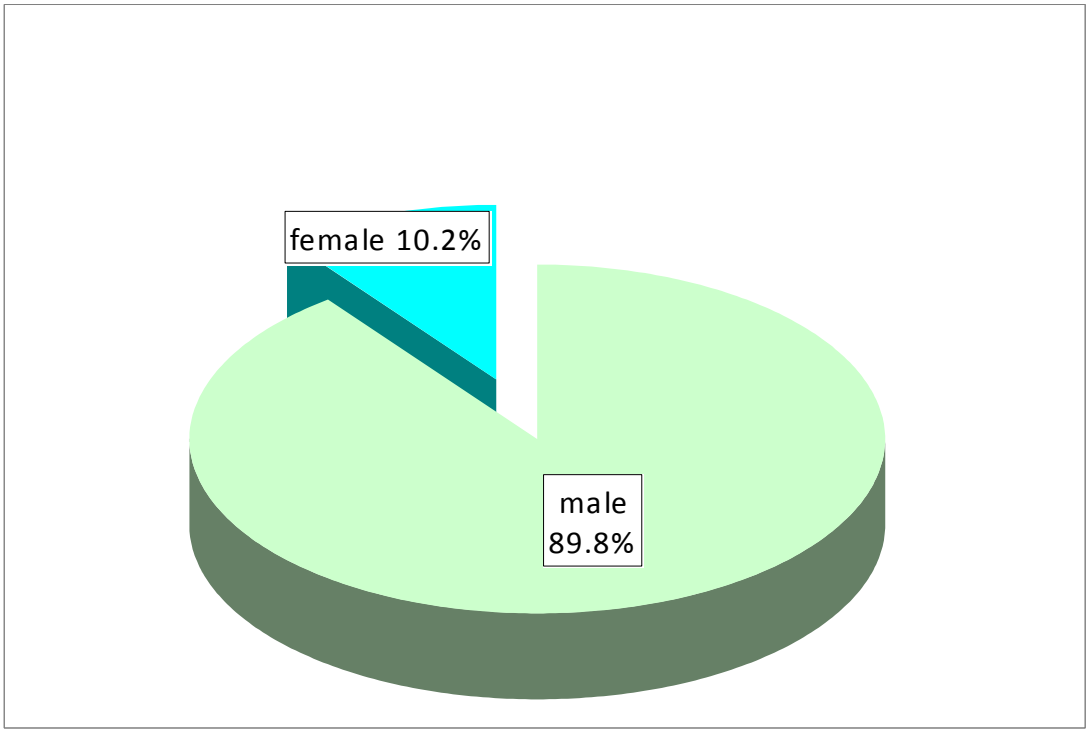

Fig 1: Proportion of patient in gender

Table 1: **Age group and sex distribution of patients with oral and maxillofacial injuries**

Age Range (years)	Gender of the Patients		No of Patients (percentage)
	Male	**Female**	
0-10	2	2	4 (2.9)
11-20	14	3	17 (12.4)
21-30	54	5	59 (43.1)
31-40	35	1	36 (26.3)
41-50	11	2	13 (9.5)
>50	7	1	8 (5.8)
Total	**123**	**14**	**137 (100)**

Table 2: Patient education level

Education	No. of patients (percentage)
No formal education	10 (7.3)
Did not complete primary education	7 (5.1)
Primary education	69 (50.4)
Did not complete secondary education	5 (3.6)
Secondary education	26 (19.0)
Tertiary education	20 (14.6)
Total	**137 (100)**

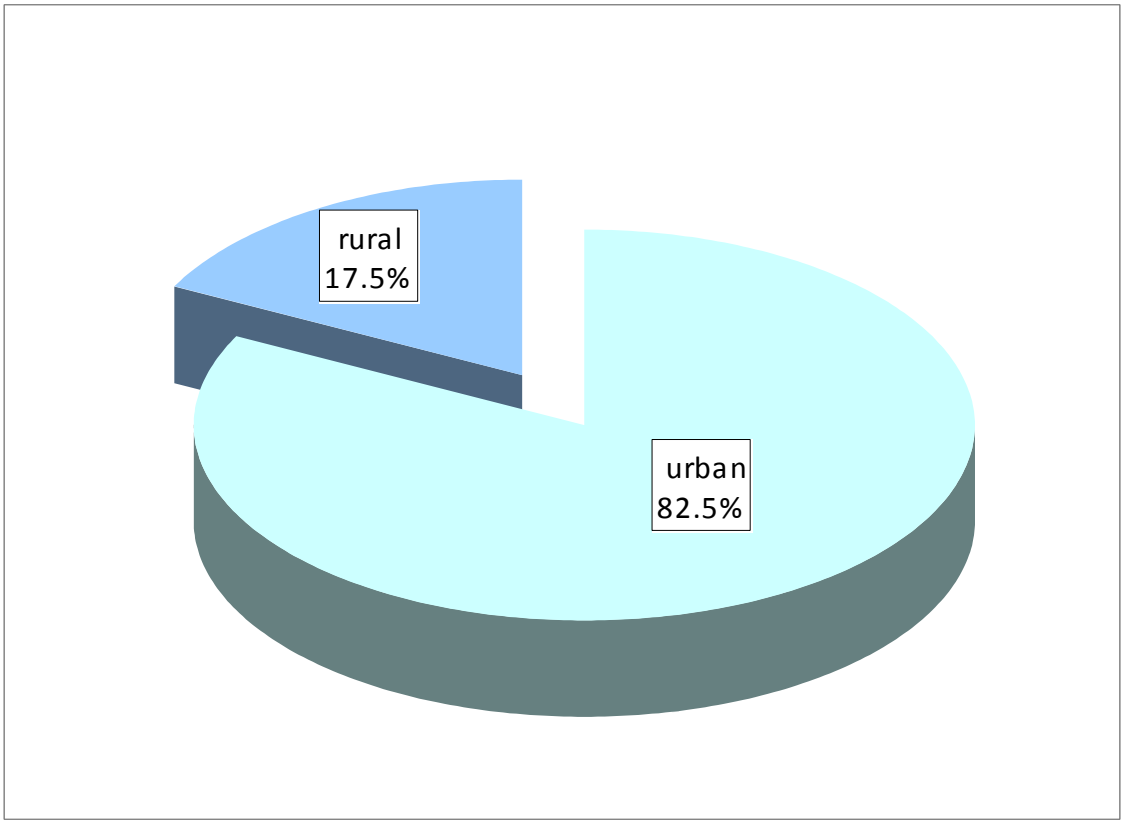

Fig 2: Distribution of patient by place of residence

Table 3: Proportion distribution of patient by occupation

Occupation	**No. of patients (percentage)**
Peasant	14 (10.2)
Petty trader	38 (27.7)
Businessman	20 (14.6)
Employed	32 (23.4)
Unemployed	33 (24.1)
Total	**137 (100.0)**

3.2 Causes of injury

Road traffic accidents (RTA) were the most common cause of oral and maxillofacial injuries 88 (64.2%). The other significant cause was assault 26 (19%) and falls 10 (7.3%). Human bite and burn appears the least cause of oral and maxillofacial injuries (Fig 3). Among the injuries caused by road traffic accidents (RTA) motorcycle accidents were the leading cause of injury 47 (53.4%) followed by motor vehicle accidents 17 (19.3%) and pedestrians 16 (18.2%) (Fig 3& 4)

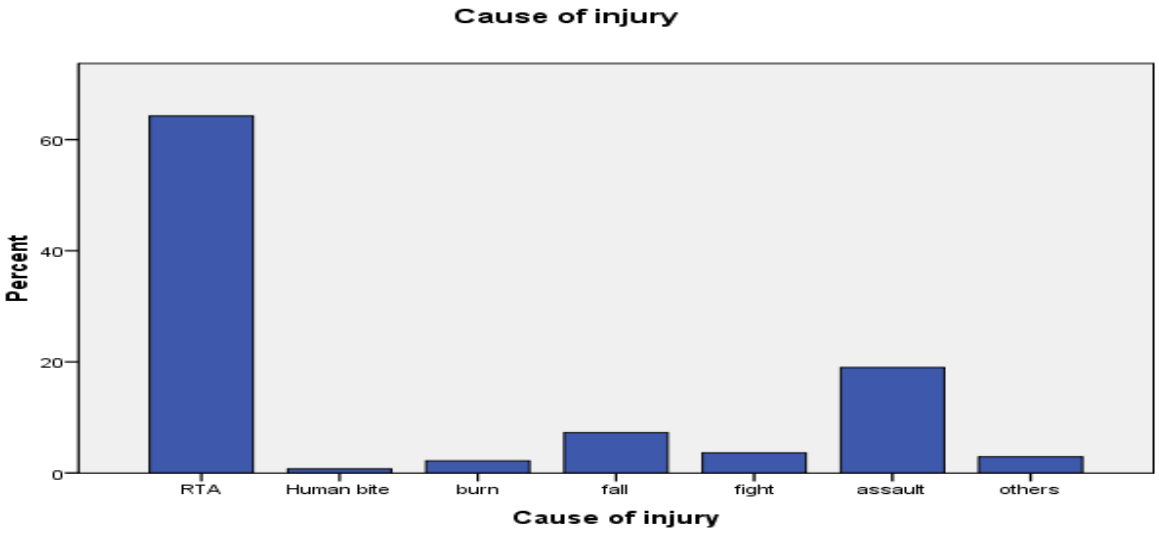

Fig 3: Proportion distribution of patient by cause of injury

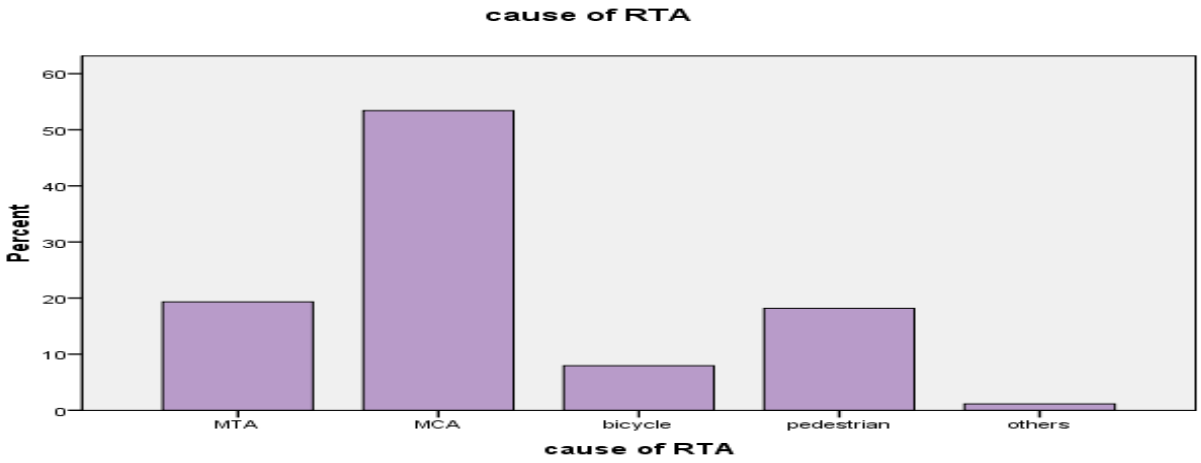

Fig 4 Distribution of patients by cause of road traffic accident

3.3 Soft tissue injuries

There were 234 oral and maxillofacial soft tissue injuries diagnosed from 137 patients (Table 4). The most common soft tissue injury was laceration 63 (26.9%) followed by bruises 57 (24.4%) and cut wounds 54 (23.1%)

Table 4: Types of soft tissue injuries

Type of soft tissue injury	No of cases	Percentage
Laceration	63	26.9
Bruises	57	24.4
Cut wound	54	23.1
Contusion	24	10.3
Abrasion	22	9.4
Avulsion	9	3.8
Burn	5	2.1
Total	**234**	**100**

3.4 Hard tissue injuries

Of 137 patients with oral and maxillofacial injuries, 93 (67.9%) patients had sustained fracture of either the mandible, mid face or both. Of those 93 patients who sustained fracture, most had mandibular fracture 42 (45.2%), followed by mid facial injury 26 (28%) and the rest 25 (26.8) had both mandibular and mid facial fractures. The total fractures sustained by 93 patients were 210, among them 98 were of the mandible, and 112 were of the midfacial skeleton. Of the Mandibular fractures symphyseal fractures were the commonest 26 (26.5%), followed by fractures of the body 21 (21.4%) and those of angle of the mandible 20 (20.4%). In the midface, zygomatic complex fractures were the commonest 25 (18.2%). Others were isolated zygomatic arch fractures 24 (17.5%) and Le Forte II fractures 22 (16.1%). The rest occurred in very low frequencies (Table 6 and 7).

Table 5: Distribution of patients with fractures of facial skeleton

Types of Hard Tissue Injuries	**No. of patients (percentage)**
Mandibular	42 (45.2)
Mid facial	26 (28)
Mandibular and mid facial	25 (26.8)
Total	**93 (100.0)**

Table 6: **Types of mandibular fractures distribution**

Type of mandibular fracture	**Number of fractures**	**Percentage**
Symphysis	26	26.5
Body	21	21.4
Angle	20	20.4
Para symphysis	18	18.5
Ramus	7	7.1
Condyle	6	6.1
Total	**98**	**100.0**

Table 7: **Type of mid-facial fractures**

Type of mid-facial fractures	Number of fractures	Percentage (%)
Zygomatic complex	25	22.3
Zygomatic arch	24	21.4
Le Fort II	22	19.6
Orbital	13	11.6
Nasal bone	8	7.1
Le Fort I	6	5.4
Nasal orbital ethmoid	5	4.5
Frontal orbital suture	5	4.5
Nasal suture	3	2.7
Infra Orbital	1	0.9
Total	**112**	**100**

3.5 Treatment modalities

Pain management

Many patients who had severe injuries were given analgesics for pain control. Almost all (97.8%) the patients with oral and maxillofacial injuries needed analgesics.

Infection control

Patients with open wounds were started on prophylactic antibiotics for 24 hours, whereby antibiotics were given to 132 (96.4%) patients.

Identification of injuries

After initial stabilization of a patient, thorough examination was performed to document all injuries. Adequate radiographs that were essential for diagnosis and treatment planning were ordered.

Surgical wound debridement and wound suturing were the most common (62.8% and 53.3% respectively) treatment for soft tissue injuries. About 51% of all the patients seen had to undergo inter maxillary fixation (IMF). Few (13.1%) patients had to undergo open reduction and internal fixation (ORIF) and 12.4% underwent zygomaticomaxillary/craniofacial suspension. Intermaxillary or

manndibulomaxillary fixation was the most common (51%) hard tissue injuries treatment.

3.6 Complications

Out of 137 patients who had sustained oral and maxillofacial injuries only 27 (19.7%) patients had developed complications (Table 8).

Infection was the most common (59.3%) complication followed by malunion 9 (33.3%)

Table 8: Proportion of patients who developed complication after treatment.

Complications	Number of patients	Percentage (%)
Infection	16	59.3
Osteomyelitis	1	3.7
Non Union	1	3.7
Mal-Union	9	33.3
Total	**27**	**100**

CHAPTER FOUR

4.0 DISCUSSION

The majority of patients who suffer maxillofacial injuries in the city of Dar es salaam and sarrounding regions report directly or are reffered by the primary health facilities to the MNH. MNH has the only oral and maxillofacial treatment centre in the country, therefore, any of the cases that were considered complicated in the district and regional hospitals so as to need the attention of the maxillofacial surgeon were referred here. Since some soft tissue injuries could be handled at the primary centres, they must have been missed in this study. Despite this drawback, this study gives a good picture on the true pattern of occurrence of maxillofacial injuries in Dar es Salaam and its neighbourhood.

In the current study men had a higher frequency of oral and maxillofacial injuries compared to women with a male to female ratio of 9:1. This is similar to studies done in other Sub-sahara African countries like Zimbabwe, Senegal and Nigeria which reported ratios of 5:1, 4.5:1 and 5.4:1 respectively [22,23,24]. This high frequency of maxillofacial injuries in men has been attributed to the fact that men are involved in more high risk activities e.g occupation in construction, driving or factory work and sports activities that expose them to a higher risk for injuries[68]. Furthermore, men are involved in physical social altercations more often than women hence are more prone to get injured than women. On the contrary, in Tanzania, like in most African societies, women spend most of their time carrying out the less risky social chores hence the low incidences of injuries. The most commonly affected age group in this study was 21-30 years which was similar to the findings of other studies from developing countries[70,74, 75]. These findings most possibly reflect the greater physical activity and self-mobility seen in this young section of population.

In this study oral and maxillofacial injuries were seen with a higher (62.8%) frequency in patients with low education level (Table 2). Patients with low education are underprivileged in terms of social and economic status. They are the ones involved in manual and high risk jobs which have higher likelihood of getting maxillofacial injuries. Their activities for earning life include running around using cheap transport (motorcycles, bicycles ect.) which put them at

a high risk of getting accidents. They are often employed as cheap laborers in the construction and production industries or other factory works which involve physical strain and expose them to bodily injuries including oral and maxillofacial injuries. In this study the majority (82.5%) of the patients were from urban areas among whom the majority were lowly educated and of a low social-economic class (Fig 2).

The present study showed that RTA constituted the most (64.2%) common cause of injury. These results are similar to findings of other studies done in most developing countries[11, 20]. According to the results of previous studies RTA were the reasons for 34.42% to 90.15% of all the skeletal and soft tissues injuries of the face[77, 78, 81]. The other significant etiologic factors of injuries to the maxillofacial region are assaults[78] and sport injuries[14], which were also found in the current study. Among the RTA's motorcycle accidents accounted for the highest (53.4%) proportion (Fig4). In Tanzania RTA are on the rise because of a gradual increase in the number of motor vehicles and motor cycles plying the roads in the city centres. Improvements in infrastructure have not kept abreast with the surge in motor vehicles and motorcycles on the roads. Frequent traffic jams as a result of poor road network in the country have made the use of motorcycles a quick, attractive and prominent mode of transportation in both urban and suburban areas because they can pass through narrow pathways. This coupled with the fact that this is a much cheaper means of transport compared to commercial taxis has attracted many people to use them. However, the majority are owned by the youth who in most cases easily take risks that result in accidents. Furthermore, most of the motorcyclists are unlicensed and often either because of ignorance or negligence do not abide by traffic rules and regulations. Poor vehicle maintenance, lack of enforcement of traffic rules, poor educational status of the drivers, inadequate trauma care, legislation and political will compound the problems.

In contrast to these findings, a study conducted in Glasgow[72] reported assaults and falls respectively, to be the most common causes of oral and maxillofacial injuries. Reasons for the differences in aetiologic pattern could be due to socioeconomic differences which exist between developed and developing countries. Such a change in etiological factors where previously RTA were the most common causes to the current situation is in agreement with data fom other developed countries[79, 80].

Skeletal and soft tissue injuries of the face constitute quite a significant portion of the workload of the oral and maxillofacial surgeons[86]. Being the most exposed part of the body, the face is particularly vulnerable to such injuries. Between twenty and sixty percent of all those involved in automobile accidents usually suffered some levels of facial fractures[87, 88]. Soft tissue injuries have been mentioned to be the commonest injuries in oral and maxillofacial trauma[5]. Our results exhibit that the most (26.9%) common soft tissue injuries were lacerations (Table 4). This is in agreement with other studies in the literature where lacerations were reported to be the commonest type of soft tissue injury[85, 95].

In this study, although there were more patients with mandibular fractures compared to those with mid facial fractures, there were more midfacial fractures because some patients in this group had several fractures e.g. Le Fort and zygoma. The results of this study indicate that mandibular fractures were common in patients who sustained facial trauma and this was comparable to other reports from elsewhre[89, 90, 93]. The position and anatomy of the mandible is such that it is the most prominent and therefore often the most likely fractured bone of the facial region. The mandible is a strong bone but has certain areas of weakness. It is thin at the angles where the body joins with the ramus and the neck of condyle. The mental foramen through which mental nerve and vessels extend to the tissues of lateral aspect of the face and lower lip is large in some individuals and is an area of weakness through which fractures frequently occur. These factors contribute to the occurrence of high numbers of fractures of the mandibular symphysis, angle, and body as shown by this study.

In other studies midfacial bone fractures especially Le Fort types and orbital floor fractures were reported to be commoner than mandibular fractures[91,92]. Motor vehicle accidents tend to be the primary cause of most mid-face fractures and lacerations due to the face hitting the dashboard, windshield and steering wheel or the back of the front seat for passengers in the rear. Fractures of the maxilla are usually caused by a direct impact to the bone and vary from simple alveolar fracture and fracture involving only the maxillary bone to extensive fracture of the entire mid-facial skeleton. The mechanism involved in fracture of maxilla is the force sustained from the so called ''quest passenger'' type of injury. This occurs in automobile, airplane, and other high-speed accidents when the patient is thrown forward and strikes the middle third of his face against the instrument panel, the back of a seat or the head of

another individual[96]. In the current study motor vehicle accident was the commonest cause of oral and maxillofacial injuries and the mid facial skeleton fracture were more common than the mandibular fractures.

Of the mid-facial skeleton fractures, zygomatic complex fracture was the commonest (22.3%). These fractures resulted from direct trauma. The zygoma is a buttress of the facial skeleton and the bone of the face that gives the cheek area prominence. This bone has its broadest and strongest attachment with the maxilla, a thin weak attachment with the sphenoid bone, and a moderately strong attachment with the frontal bone. In most skulls, it forms the lateral superior wall of the maxillary sinus and may be pneumotized with air cells connecting with the maxillary sinus. Because of these factors zygoma is easily fractures by direct impact.

It has been shown that the most serious immediate life-threatening complication following maxillofacial trauma is airway obstruction. So securing the airway by the most immediate available means, including endotracheal intubation or surgical airway where necessary is to be performed immediately if there existed any doubt about future stability of the patient. Treatment priorities in patient presenting with oral and maxillofacial injuries have been divided into three different stages according to the need for acute urgent, urgent and necessary intervention[2]. It is recommended that urgent therapy should be given within 8 hours after the trauma and this was done to most of our patients.

In the present study almost all (97.8%) the patients with oral and maxillofacial injuries were given analgesic for pain control and prophylactic antibiotics. In accordance with information from the literatures both patients with minor and major injuries are supposed to be given tetanus prophylaxis[97], so tetanus wound prophylaxis was given to all patients with open wounds. Surgical wound debridement and wound suturing were the most common (62.8% and 53.3% respectively) treatment for soft tissue injuries. This was done immediately after complete assessment and stabilization of the patient according to usual protocol of this institution. About 51% of all the patients seen had to undergo intermaxillary fixation (IMF). Few (13.1%) patients had to undergo open reduction and internal fixation (ORIF) and 12.4% underwent zygomaticomaxillary or craniofacial suspension. For patients who presented in serious conditions these procedures were delayed until adequate stabilization of the patient. Nevertheless, during the interim

the patients were put on strong broadspectrum antibiotics. Intermaxillary or mandibulomaxillary fixation was the most (51%) common hard tissue injuries treatment.

Out of all the patients in this study 27 (19.7%) suffered one or more complications. Among these 16 patients suffered from infection, which was the commonest (59.3%) complication. Infection after treatment as was seen in this group of patients could be ascribed to the use of closed reduction with intermaxillary-fixation (IMF) and its accompanying oral hygiene and nutritional challenges. Many patients presented with poor oral hygiene and suffered differing levels of poor nutrition during the course treatment. These factors to a certain extent weakened patients leading to infections. Other complications observed were osteomyelitis, non-union and mal union. Delays in presenting for treatment due to different reasons was one of the commonest cause of these complications. Malunion in maxillofacial fractures often result in malocclusion. This makes restoration of function impossible without further surgical manipulations otherwise patients suffer from difficulties in mastication and lead a poor quality of life for the rest of their lives. Such manipulations are expensive and subject the patient to additional operations that could be avoided if the patient had presented early for treatment.

4.1 Conclusion:

This study shows that road traffic accidents were the most common cause of maxillofacial injuries. This is in concurrence with the results from most recent studies. Assaults/interpersonal violence were the second most common cause of maxillofacial trauma. These findings should alert the authorities, particularly the government and the road safety commission on the need for provision of good roads, enforcement of existing traffic laws, and general improvement of socio-economic condition of the population.

4.2 Recommendation

In the light of this study the following recommendations are given:

• The laws regarding seat belts tightening, speed limits and traffic rules must be observed strictly

• An awareness campaign to educate the public especially the drivers about the importance of restraints and protective measures in motor vehicles should be introduced.

• Oral and Maxillofacial injuries management should be done as early as possible in order to reduce the morbidity resulting from these injuries.

• To get a good pattern of oral and maxillofacial injuries in Tanzania a larger study with large sample representing the whole country is recommended.

• The establishment of regionalized, efficient, and focused Oral and Maxillofacial centres in various parts of the country in order to avoid mortality and morbidity resulting from oral and maxillofacial injuries should be considered.

4.3 Study limitation

1. This was a hospital based study therefore some patients with oral and maxillofacial injuries might not have reported to MNH due to socio-economic or other reasons such as distance and ignorance.
2. It was necessary for some patients to have advanced radiographic investigations in order to reach a definitive diagnosis, but due to unafordability only conventional radiographs were used therefore in such patients some of the fractures might have been missed.

Disposal of patients

The definitive treatment of patients depended on the final diagnoses, which confirmed by clinical examination and radiography. The general condition of patients was also important factor in determining the management. All patients who presented with oral and maxillofacial injuries received basic resuscitation procedures for stabilization. All the patients who sustained cut wounds and lacerations were treated by surgical wound debridement and wound suturing. Seventy patients with oral and maxillofacial fractures were treated by Intermaxillary Fixation under local anaesthesia. Open reduction and Internal Fixation (ORIF) was done on 18 patients while 17 patients were treated by Zygomaxillary/craniofacial suspension. Those who had complications were managed and followed up, few of the who still need follow up have been handled over to the clinic

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APPENDIX I – DATA DOCUMENTATION TABLE

S/N	F/No	SEX	AGE	ADDRESS	PATIENT CATEGORY	TYPE		CAUSE	SITE	TREATMENT OFFERED	PROGNOSIS	COMPLI-CATIONS
						SOFT TISSUE	HARD TISSUE					

APPENDIX II: CONSENT FORM – ENGLISH VERSION

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

DIRECTORATE OF RESEARCH AND PUBLICATIONS,

MUHAS INFORMED CONSENT

ID NO……..

Consent to participate in a study

Greetings! My name is Dr. Baraka I am working on this research with the objective of studying pattern of Oral and Maxillofacial injuries among patients attending Muhimbili National hospital, Dar es Salaam, Tanzania.

Purpose of Study

The study is conducted in partial fulfilment of requirement for the degree of Masters of Dentistry in Oral Surgery of MUHAS. This study is aiming to determine pattern of Oral and Maxillofacial injuries among patients attending Muhimbili National hospital, Dar es Salaam, Tanzania. You are being asked to participate in this study because you have particular knowledge and experiences that may be important to the study. Kindly please be honest and true for betterment of the results that could lead to better intervention and recommendations for future.

What participation Involves

If you agree to join the study, you will be interviewed in order to answer a series of questions in the questionnaire prepared for the study. You will also undergo a clinical examination in order to know clinical presentation of your problem. There after, you will undergo a series of investigations including blood count and X-rays.

Confidentiality

I assure you that all the information collected from you will be kept confidential.

Your name will not be written on any questionnaire or any report /documents that might let some one identify you. Your name will not be linked with research information in any way. All information collected on forms will be entered into computers with only the study identification number.

Confidentiality will be observed and unauthorized persons will have no access to the data collected.

Risks

We do not expect that any harm will happen to you because of participating in this study. Some questions could potentially make you feel uncomfortable. You may refuse to answer any particular question and stop the interview any time.

Right to withdraw and alternatives

Taking part in this study is completely voluntary. You can stop participating in this study at any time, even if you have already given your consent. Refusal to participate or withdraw from the study will not involve penalty.

Benefits

The information gathered from you will ascertain the pattern of oral and maxillofacial injuries and will therefore aid in the management of patients with this condition and plan for future preventive programmes

Who to Contact

If you ever have questions about this study, you should contact the Principal Investigator, Dr. Baraka Fredrick Kileo of Muhimbili University of Health and Allied Sciences, P.O. Box 65001, Dar es Salaam

If you ever have questions about your rights as a participant, you may call Prof. E. F. Lyamuya, Chairperson of Senate Research and Publications Committee, P.O. Box 65001, Telephone +255 22 2152489 Dar es Salaam and Dr Jeremiah Moshy who is the supervisor of this study.

Do you agree?

Participant agrees…….. Participant does not agree……

I…….have read and understand the contents in this form. My questions have been answered. I agree to participate in this study.

Signature of participant……..

Signature of Principal Investigator……

Date of Signed consent……..

APPENDIX III: CONSENT FORM – SWAHILI VERSION

CHUO KIKUU CHA SAYANSI ZA AFYA MUHIMBILI

KURUGENZI YA TAFITI NA ACHAPISHAJI FOMU YA RIDHAA

Namba ya utambulisho…….

Ridhaa ya kushiriki kwenye utafiti

Salamu! Naitwa Dr Baraka Fredrick Kileo, nashughulika kwenye utafiti huu wenye lengo la kutathimini majeraha katika kinywa na uso kwa wagonjwa wanaohudhuria katika hospitali ya Taifa Muhimbili, Tanzania.

Umuhimu wa Utafiti

Utafiti huu unafanyika katika kutimiza sehemu ya matakwa ya shahada ya uzamili ya upasuaji kinywa wa Meno ya Chuo kikuu cha afya na Sayansi ya Tiba Muhimbili. Utafiti unalenga kuchunguza sababu , aina na tiba ya majeraha katika sehemu za kinywa na uso. Unaombwa kushriki katka utafiti kutokana na upeo na ufahamu ulio nao ambavyo ni muhimu kwa utafiti huu. Tafadhali kuwa mkweli na muwazi kwa vile matokeo ya utafiti huu yanaweza yakatoa maamuzi na mapendekezo ya baadaye

Jinsi ya kushiriki

Ukikubali kushiriki katika utafiti huu, utasailiwa ili kuweza kujibu maswali toka kwenye dodoso lililo andaliwa kwa ajili ya utafiti huu na kasha utafanyiwa uchunguzi ambao utahusisha kuangalia maeneo ulioumia, pia utafanyiwa vipimo mbalimbali kama vile vipimo vya damu kuangalia wingi wa seli mbalimbali za damu na picha za x-ray.

Usiri

Taarifa zote zitakazo kusanywa zitaingizwa kwenye ngamizi kwa kutumia namba za utambulisho. Kutakuwa na usiri na hakuna mtu yeyote asiyehusika atakayepata taarifa zilizokusanywa.

Hatari

Hatutegemei madhara yoyote kukutokea kwa kushiriki kwako katika utafiti huu.

Faida

Kama utakubali kushiriki katika utafiti huu taarifa utakazotoa zitatuwezesha kujua ukubwa wa tatizo ambao ni muhimu katika uamuzi wa kuzuia au kupunguza tatizo.

Athari na kukitokea madhara

Haitegemewi kupata madhara yoyote kutokea kutokana na ushiriki wako katika utafiti huu. Baadhi ya maswali yanaweza yasikupendeze, unaweza kukataa kujibu swali lolote la aina hiyo na unaweza kuamua kusimamisha udahili wakati wowote.

Uhuru wa kushiriki na haki ya kujitoa

Kushiriki kwenye utafiti huu ni hiari. Unaweza kujitoa kwenye utafiti huu wakati wowote hata kama umeshajaza fomu ya ridhaa ya kushiriki utafiti huu. Kukataa kushiriki au kujitoa kwenye utafiti huu hakutaambatana na masharti yoyote.

Nani wa kuwasiliana naye

Kama una maswali kuhusiana na utafiti huu, wasiliana na mtafiti mkuu wa utafiti huu, Dr. Baraka Fredrick Kileo wa Chuo Kikuu cha Afya na Sayansi ya Tiba Muhimbili, S.L.P 65001, Dar es Salaam. Kama una swali kuhusu stahili zako kama mshiriki unaweza kumpigia Prof. E. F. Lyamuya , Mwenyekiti wa kamati ya Utafiti na Uchapishaji , Chuo Kikuu cha Afya na Sayansi ya Tiba Muhimbili, S.L.P 65001 Dar

es Salaam, Simu: +255 22 2152489 Dar es Salaam au msimamizi wa utafiti huu Dr Jeremiah Moshy.

Je umekubali?

Mshiriki amekubali…… Mshiriki hajakubali……..

Mimi …….nimesoma na kuelewa maelezo ya fomu hii. Maswali yangu yamejibiwa. Nakubali kushiriki katika utafiti huu.

Sahihi ya mshiriki……..

Sahihi ya mtafiti mkuu……..

Tarehe ya kutia sahihi ya idhini ya kushiriki……..

APPENDIX IV QUESTIONNAIRE-ENGLISH VERSION

Demographic data

1. Serial No_____ 2.Date_____ 3 Hosp. Reg. No_____

4. Address: District_____

Tel.No. _____

5. Patient type 1.Out patient
2. In-patient

6. Age (In years) ☐☐

7. Sex 1. Male
2. Female ☐

8. Residence 1.Urban
2. Rural ☐

9. Education level 1. No formal education
2. Did not complete primary education
3. Primary education ☐
4. Did not complete secondary education
5. Secondary education
6. Tertiary education

10. Marital status 1. Single
2. Married
3. Widow
4. Widower ☐

5. Divorced
6. Cohabiting

11. Occupation 1. Peasant
2. Petty trader
3.Bussinessman
4. Employed
5. Un employed

12. The injury occurred on: Date …../…../……..

13. At what time did the injury occur?

1. Morning
2. Midday
3. Evening
4. Night

Etiology

14. What was the cause of injury?

1. Road traffic accident
2. Human bites
3. Animal bites
4. Burns
5. Fall
6. Fight
7. Assault
8.Others (Specify)……

If road traffic accident

15.What was the cause?

1. Motor vehicle accident
2. Motor Cycle accident
3. Bicycle accident

4. Pedestrian

5. Others (Specify)……..

If human bites

16. What was the reason?

1.Interpersonal fight

2.Domestic violence

3.Assault

5. Others (Specify)……

If animal bites

17.What type of animal bite you?

1. Dog

2. Cat

3. Others (Specify)……..

If burn

18. What was the cause?

1. Chemical

2. Electrical

3. Road traffic accident (RTA)

4. Domestic Fire

5. Others (Specify)…….

If chemical is the cause of burn,

19. What was the type of chemical?

1. Acid

2. Alkaline

3. Others (Specify)……

If electrical is the cause of burn,

20.What was the cause?

1. Domestic appliance

2. House short circuits

3. Others (Specify)……

If RTA is the cause of burn,

21. What was the cause?

1. Car explored

2. Petrol/Diesel Truck explored

3. Others (Specify)……

If domestic fire was the cause of burn,

22. What was the cause?

1. Domestic kerosene stove explored
2. Domestic gas stove explored ☐
3. Others (Specify)…….

If fall

23. What was the cause of fall?

1.Biological (Disease)
2. Sports ☐
3. Constructions
4. Accidental
5. Others (Specify)……..

If fight

24. What was the cause?

1. Inter personal
2. Domestic violence ☐
3. Others (Specify)……..

25. Where did the accident take place?

1. Up country (Urban)
2. Up country (Rural) ☐
3. Dar es Salaam Urban
4. Dar es Salaam Peri Urban

26 Did you loose consciousness following the injury?

1. Yes ☐
2. No

If yes

27. For how long did you lose consciousness?

1. Less than 5 minutes
2. 5-10 minutes
3. 1-6 hours
4. 6-12 hours
5. Others (Specify)

28. When did you first report for treatment after the injury? :date …/…/……

29. Time lag between injury and reporting for treatment was:

1 ……Minutes
2 ……Hours
3 ……Days
4. ……Months
5…….Years

30. If delayed, what was the reason?

1. No money for treatment cost
2. No nearby hospital
3. There was no pain
4. Am scared of treatment
5. Others (Specify)

APPENDIX V QUESTIONNAIRE-SWAHILI VERSION

Taarifa binafsi

1. Namba…… 2. Date……3. Na. Ya Hosp…….

4. Anwani:

Wilaya ……..

Namba ya simu……,

5.Aina ya mgonjwa 1.Wa kliniki ya nje

2.Wa wodini

6.Umri (Miaka

7.Jinsia

1. Mme
2. Mke

8.Makazi 1.Mjini

2.Vijijini

9.Kiwango cha Elimu

1.Hukupata elimu kabisa

2.Hakumaliza elimu ya msingi

3. Elimu ya Msingi

4. Hakumaliza elimu ya sekondari

5. Elimu ya sekondari

4. Zaidi ya sekondari

10.Hali ya ndoa

1. Hujaoa/Hujaolewa
2. Umeoa / Umeolewa
3. Mjane
4. Mkane
5. Mtaliki/Mtalika
6. Huna ndoa ila unaishi na Mwenza

11. Kazi 1. Mkulima

2. Mfanya biashara ndogondogo

3. Mfanya biashara

4.Muajiriwa

5. Huna kazi

12. Je ni lini ulipata jeraha?: tarehe …/…./….

13. Je ni wakati gani wa siku jeraha lilitokea

1. Asubuhi
2. Mchana
3. Jioni
4. Usiku

Sababu zilizosababisha jeraha

14.Je, nini kilichosababisha ukamia

1. Ajali ya barabarani
2. Umeng'atwa na mtu
3. Umeng'atwa na Mnyama
4. Umeungua moto
5. Umeanguka
6. Umepigana
7. Umeshambuliwa
8. Nyingineyo (Taja)……. ……

Kama jibu ni ajali ya barabarani,

15. Je, ni ajali ya nini?

1. Gari
2. Pikipiki
3. Baiskeli
4. Kugongwa barabarani
5. Nyingineyo (Taja)……..

Kama jibu ni Umeng'atwa na mtu

16. Je, Kwa nini alikung'ta?

1. Mligombana
2. Mapigano ya nyumbani
5. Ulishambuliwa
4. Nyingineyo(Taja)……

Kama jibu ni Umeng'atwa na mnyama

17. Je, ni mnyama gani alikung'ata?

1. Mbwa
2. Paka
3. Nyingineyo (Taja)…….

Kama jibu ni Umeungua moto

18. Je ni kitu gani kilikuunguza?

1. Kemikali
2. Umeme
3. Ajali ya barabarani
4. Moto
5. Nyingineyo(Taja)……

Kama jibu ni kemikali

19. Je, ni kemikali gani?

1. Asidi
2. Alkali
3. Nyinginezo (Taja)……..

Kama jibu ni Umeme

20. Je, nini kilisababisha?

1. Kifaa cha matumizi ya nyumbani
2. Shoti ya nyumba
3. Nyinginezo (Taja)…….

Kama jibu ni ajali ya barabarani

21. Je, moto ulisababishwa na nini?

1 Gari ililipuka

2 Lori la Mafuta lililipuka

3 Nyinginezo (Taja)……

Kama jibu ni moto

22. Je nini kisilisababisha moto

1. Jiko la mafuta ya taa
2. Jiko la gesi
3. Nyingineyo(Taja)……

Kama Ulianguka

23. Je, nini kilisababisha?

1. Ugonjwa
2. Ujenzi
3. Ajali
4. Nyinginezo (Taja)……

Kama ulipigana

24. Je, nini kilisababisha?

1. Kutokuelewana
2. Mapigano ya nyumbani
3. Nyinginezo(Taja)……...

25. Je, ulipatia ajali maeneo gani?

1. Mkoani mjini
2. Mkoani vijijini
3.Dar es Salaam mjini
4. Dar es Salaam nje ya mji

26. Je ulipopata jeraha hili ulipoteza fahamu?

1. Ndiyo
2. Hapana

27. Kama ulipoteza fahamu je ni kwa muda gani

1. Chini ya dakika 5
2. Dakika 5-10
3. Masaa 1-6
4. Masaa 6-12
5. Nyinginezo (Taja)

28. Je lini ulifika hospitali kwa mara ya kwanza baada ya jeraha?: tarehe …./…./…….

29. Je ni muda gani ulipita kabla ya kufika hospitali baada ya kupata jeraha?

1. Dakika……
2. Masaa…….
3. Siku……
4. Miezi……..
5. Miaka…….

30. Kama ulichelewa, sababu gani ilikucheleweshа?

1. Hana pesa za nauli na kulipia matibabu
2. Hakuna hospitali ya karibu
3. Hakua na maumivu
4. Anaogopa matibabu
5. Nyinginezo (Taja)

APPENDIX VI: CLINICAL EXAMINATION FORM

SOFT TISSUE INJURY

Extra oral examination

Scalp	1 Yes	2No
Forehead	1 Yes	2No
Nose	1Yes	2No
Eyes	1Yes	2No
Cheeks	1Yes	2No
Upper lip	1Yes	2No
Lower lip	1 Yes	2No
Mental region	1 Yes	2No
Submandibular region	1 Yes	2No
Ears	1 Yes	2No
Neck (Cervical) region	1Yes	2No

Intraoral Examination

Tongue	1Yes	2No
Labial mucosa	1Yes	2No
Buccal mucosa	1Yes	2No
Gingiva	1Yes	2No
Molar region	1Yes	2No
Floor of mouth	1Yes	2No
Soft palate	1Yes	2No
Oropharynx	1Yes	2No

Type of soft tissue injury inflicted

Bruises	1 Yes	2No
Abrasion	1 Yes	2No
Cut wound	1 Yes	2 No
Contusion	1 Yes	2No

Laceration	1Yes 2No
Avulsion	1 Yes 2 No
Burn	1 Yes 2 No

HARD TISSUE INJURY

Mandibular fractures

Alveolar bone	1 Yes 2 No
Symphysis	1Yes 2No
Para symphysis	1Yes 2No
Body	1Yes 2No
Angle	1Yes 2No
Ramus	1 Yes 2No
Condyle	1 Yes 2No

Maxillary fractures

Zygomatic arch	1 Yes 2No
Zygomatic complex	1 Yes 2No
Le Fort I	1 Yes 2No
Le Fort II	1 Yes 2No
Le Fort III	1 Yes 2No
Orbital	1 Yes 2No
Nasal	1 Yes 2No
Naso-orbital-ethmoidal	1 Yes 2No
Frontal-orbital-suture	1 Yes 2No
Infraorbital suture	1 Yes 2No
Nasal –suture	1 Yes 2No

INJURY TO TEMPOROMANDIBULAR JOINT

Trismus	1 Yes 2 No
Deviation on opening mouth	1 Yes 2 No
Clicking/crepitus sounds	1 Yes 2No
Joint tenderness	1 Yes 2 No

TREATMENT NEEDS

Tetanus Toxoid (TT)	1Yes	2No
Bleeding Control	1 Yes	2No
Intravenous fluids	1 Yes	2No
Blood transfusion	1 Yes	2 No
Tracheostomy	1 Yes	2 No
Surgical wound toilet	1 Yes	2 No
Wound suturing	1 Yes	2 No
Teeth extraction	1 Yes	2 No
Analgesics	1Yes	2 No
Antibiotics	1 Yes	2 No
Alveolar bone splinting	1 Yes	2 No
Intermaxillary fixation (IMF)	1 Yes	2 No
Open reduction Immobilization and fixation	1 Yes	2 No
Ope reduction + cranial facial suspension	1 Yes	2 No
Manual reduction	1 Yes	2 No

COMPLICATIONS

Infection	1Yes	2 No
Osteomyelitis	1Yes	2 No
Non union	1Yes	2 No
Malunion	1Yes	2 No

RADIOLOGY FORM

Postero-anterior view skull	1 Fracture	2 No fracture
Waters View skull	1 Fracture	2 No fracture
Orthopantomography (OPG)	1 Fracture	2 No fracture
Lateral view skull	1 Fracture	2 No fracture
Occipitomental view skull	1 Fracture	2 No fracture
Submentovetex view skull	1 Fracture	2 No fracture
Townes view skull	1 Fracture	2 No Fracture
Other radiological findings (State)	1 Fracture	2 No Fracture

PROGNOSIS

Complete recovery	1 Yes 2 No
Function impaired	1 Yes 2 No
Aesthetic impaired	1 Yes 2 No

APPENDIX VII: ILLUSTRATIONS

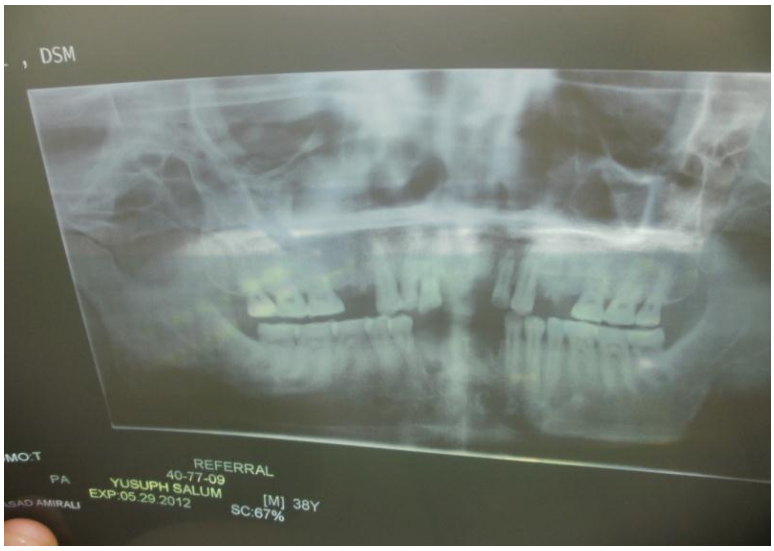

Fig 5
OPG X-ray of patient who sustained mandibular fracture

Fig 6
A 21 year old lady who sustained soft tissue maxillofacial injury and mandibular condyle fracture following hit by falling tree.

Fig 7
A 33years old man who sustained midfacial and mandibular fractures following motorcycle accident

Fig 8
Soft tissue injury (deep cut wound) due to motor vehicle accident