



MAKERERE UNIVERSITY

**PREVALENCE OF POST TRAUMATIC STRESS DISORDER AND
ASSOCIATED FACTORS IN ADULT ORTHOPAEDIC TRAUMA
PATIENTS SEEN AT MULAGO HOSPITAL,
KAMPALA UGANDA.**

BY

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DECLARATION

I declare that this dissertation has not been submitted for another degree in this or any other University or institution of higher learning and that views expressed herein are mine unless otherwise stated, and where such has been the case acknowledgement or reference has been quoted appropriately.

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DEDICATION

I wish to dedicate this book to the Almighty God for guidance and protection, my dear wife Rhoda, my children, Audrey and Abraham, for allowing me to be absent in their lives for a while to pursue this postgraduate degree.

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OPERATIONAL DEFINITIONS

Orthopaedic trauma	Any musculoskeletal injury resulting from a life threatening event to soft tissues, bones or joints.
Life-threatening event	An event that has the ability to cause injury to a person that can result in disability or death.
Multiple traumas	Injury involving more than one anatomical site.
Mechanism of injury	The process through which a force caused an injury.
Severity of physical injury will be classified into;	
Severe	Multiple trauma, pelvic fractures, orthopaedic trauma injury requiring more than 24hrs stay in intensive care.
Moderate	Open or close fracture or soft tissue injury causing a patient to stay more than 72hrs before discharge from hospital.
Minor	Open or closed fracture or soft tissue injury that was treated and discharged within 24-72hrs

LIST OF ABBREVIATIONS

PTSD	Post Traumatic Stress Disorder
DSM III/IV	Diagnostic and Statistical Manual of Mental Disorders Third or Fourth Edition
MVA	Motor Vehicle Accidents
RTA	Road Traffic Accidents

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ABSTRACT

Background

Attempts to ensure total care of the trauma patient in order to reduce morbidity and mortality, has led to a drift of global concern towards the psychiatric sequelae of trauma patients. Psychiatric disorders following trauma are common with one of the commonest being post- traumatic stress disorder (PTSD) and are associated with poor functional and occupational outcomes. The prevalence of PTSD in orthopaedic trauma patients vary from place to place. Studies in United States, Kenya and Nigeria had 51, 13.3 and 26.7% of patients fulfilling the criteria for PTSD . No similar studies have been carried out in Uganda. PTSD in orthopaedic trauma patients causes unique problems for patients ranging from depression, anxiety, pain or sleep problems that may be more challenging than their orthopaedic trauma.

Objective

To determine the prevalence and associated factors of post- traumatic stress disorder in adult orthopaedic trauma patients seen at Mulago hospital.

Methodology

This was a hospital based cross-sectional descriptive study of adult orthopaedic trauma patients at Mulago hospital. A structured questionnaire containing injury characteristics and module for PTSD diagnosis in Diagnostic and Statistical Manual Fourth Edition Text Revised (DSM-IV-TR) was administered to consenting patients who met the inclusion criteria by systematic random sampling. Data was entered in Epi Data software and exported to STATA 10.0 for Univariate, bivariate and multivariate analysis using Mantel Haenszel method and logistic regression model.

Results

Two hundred and ninety seven (297) patients were recruited into the study of which the prevalence of PTSD in adult orthopaedic trauma patients seen at Mulago hospital was 17.85%(53/297). Spine injuries, duration of injury>12 months, presence of death in an accident and absence of alcohol consumption were associated with post traumatic stress disorder after bivariate analysis (p <0.05). Multivariate logistic regression showed -

presence of death in an accident and absence of alcohol consumption to be significantly associated with post traumatic stress disorder after adjusted for spine injury and duration of injury > 12 months.

Conclusion

The prevalence of PTSD in adult orthopaedic trauma patients in Mulago Hospital is 17.85%. Therefore there is the need for collaboration between Psychiatrists and Orthopaedic Surgeons in the management of these patients to ensure a better functional, occupational and psychological outcome.

CHAPTER ONE

1.1 Background

In recent times, a bid to ensure total care of the trauma patient in order to reduce morbidity and mortality, has led to a drift of global concern towards the psychiatric aspects and sequelae of trauma patients(1, 2). Psychiatric disorders following trauma are common with one of the commonest being post- traumatic stress disorder (PTSD)(3, 4) and are associated with poor functional and occupational outcomes(5-7).

A review of psychiatric morbidity after motor vehicle collisions found the most commonly reported disorders were depression (21% to 67%), anxiety (4% to 87%), driving phobia (2% to 47%) and PTSD (0% to 100% across studies)(8). Another systematic review reported rates of PTSD ranging across studies from 2-30%, depression from 6- 42%, with up to half of those with PTSD also having co- morbid depression; anxiety disorders were reported to range from 4-24%, with up to 60% of those with PTSD also having co-morbid anxiety disorders(9). This clearly indicates the central placement of PTSD as common psychiatric sequelae following most trauma patients visa avis other conditions.

In the United States of America a study found that motor vehicle accidents (MVA) were the single leading cause of PTSD in the general population.(1)

According to DSM-IV-TR PTSD can occur when an individual has been exposed to a traumatic event in which the person experienced, witnessed or was confronted with a potentially life-threatening event to self or others, and the person responded with intense fear, helplessness or horror(10).Symptoms include, re-experiencing the event (intrusive memories or nightmares), avoiding stimuli associated with the trauma, numbing of general responsiveness and hyper arousal. Majority of patients who experience traumatic events like military combat, violent personal assault (sexual and physical attack), motor vehicle accidents, falls , will have some of these symptoms within days or weeks after the traumatic event, but PTSD is not diagnosed until symptoms last at least one month. Three types are recognized, acute within 1- 3 months, chronic 3 to more months and delayed onset if symptoms occur 6 months after the traumatic event(10).

PTSD in orthopaedic trauma patients causes psychiatric/psychological problems for patients ranging from depression, anxiety, pain or sleep problems that may be more challenging than their orthopaedic trauma. This can affect their treatment to an extent that the patient may not have the inherent incentive to maintain healing or participate in rehabilitative therapy(11).

The life time prevalence of PTSD is estimated to be 8% in the general population of the United State(10) . The prevalence of PTSD in orthopaedic trauma patients has been found to be high but vary from country to country(11-13). In developed countries the prevalence of PTSD among orthopaedic trauma patients have been reported with varying figures. A study in 580 patients in the United States had 51% of patients fulfilling the criteria for PTSD(11) . Also a four month follow up of orthopaedic trauma patients reported a 23% prevalence of PTSD(13) while an Oxford study reported a 10% prevalence of PTSD in road traffic accident victims(14). Other researchers in Australia reported an unrecognised PTSD in 33% of road traffic victims in a trauma unit following psychiatric evaluation.

Despite the varied prevalence of PTSD in orthopaedic trauma patients in developed countries, little is known of the prevalence in developing countries like in Africa. A study in Kenya among motor vehicle survivors attending orthopaedic clinic reported a prevalence of 13.3% in patients that were not initially diagnosed(15).

1.2 Problem Statement

In Uganda most of the musculoskeletal injuries result from motor vehicle accidents which constitute the bulk of orthopaedic trauma patients seen at Mulago National Referral hospital (16). The increase in road traffic accidents has led to an enormous number of orthopaedic trauma patients seen in the out-patients department of about 7361 in 2012(17).

Despite the burden of trauma in Uganda, little is however known about the psychiatric sequelae specifically PTSD in orthopaedic trauma patients unlike in Kenya where a prevalence of PTSD of 13.3% has been reported among motor vehicle accident survivors.

A pilot study conducted in December 2012 among 25 adult orthopaedic trauma patients attending the out patients clinic recorded PTSD prevalence of 28% with varied characteristics.

There is however no documented data about the prevalence and associated factors of PTSD in orthopaedic trauma patients in Uganda even though most of these patients are exposed to seemingly life threatening situations that can trigger PTSD that negatively affect the physical, functional and occupational outcome of these patients since PTSD become chronic in up to 40% of cases(18, 19).

1.3 Justification of study

The knowledge and management of psychiatric sequelae of trauma for example, PTSD especially in orthopaedic trauma plays a vital role in the physical, functional and occupational outcome of patients. In addition, undiagnosed or the late diagnosis of PTSD in such patients becomes chronic and more difficult to treat(18).

A study to determine the prevalence and associated factors of PTSD a known common psychiatric sequelae in orthopaedic trauma patients was justified in Mulago hospital in the following regards;

1. This study described the magnitude and scope of this problem in Ugandan orthopaedic trauma patients.

It was hoped that the findings of the study may;

2. Help orthopaedic surgeons who are primary care providers for orthopaedic trauma patients have a high index of suspicion for diagnosing this disorder.
3. Create a platform for collaboration between Orthopaedics &Psychiatry for the holistic management of the orthopaedic trauma patient in Uganda.

1.4 Benefit of study to patients

This study benefited the participants in that all diagnosed cases of post- traumatic stress disorder were referred to the mental health department for further evaluation and management.

1.5 Research questions

1. What is the prevalence of post- traumatic stress disorder in adult orthopaedic trauma patients at Mulago hospital?
2. What are the common presenting symptoms of post- traumatic stress disorder in adult orthopaedic trauma patients at Mulago hospital?
3. What are the factors associated with the diagnosis of PTSD in adult orthopaedic trauma patients at Mulago hospital?

1.6 Objectives of study

1.1.1 General objective

1. To determine the prevalence and associated factors of post- traumatic stress disorder in adult orthopaedic trauma patients at Mulago hospital.

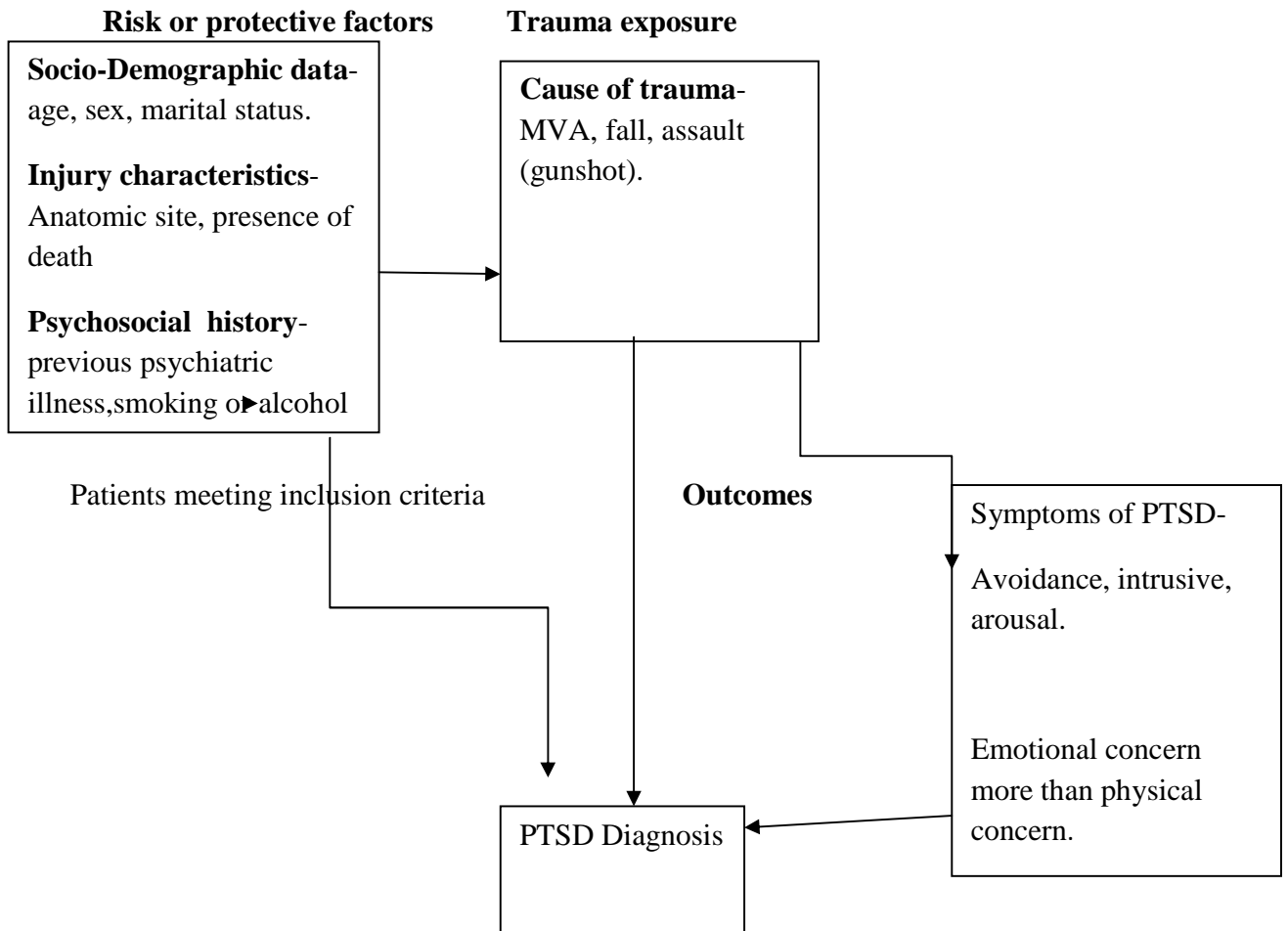
1.6.2 Specific objectives

1. To determine the prevalence of post -traumatic stress disorder in adult orthopaedic trauma patients at Mulago hospital.
2. To describe the common symptoms of post- traumatic stress disorder in adult orthopaedic trauma patients at Mulago hospital
3. To determine the factors associated with post traumatic stress disorder in adult orthopaedic trauma patients at Mulago hospital.

1.7 Conceptual framework

The study seeks to determine the prevalence of PTSD and associated factors in adult orthopaedic trauma patients attending the out-patient clinic.

Figure 1. Conceptual framework.



CHAPTER TWO

LITERATURE REVIEW

2.1 Historical Overview of Post-traumatic stress disorder.

Exposure to traumatic situations in human history is not new and will continue to be part of our daily life. PTSD following traumatic exposure in life was not given a formal name until 1980 when it was added to the diagnostic and statistical manual of mental disorders (DSM-III) nosologic classification system(20) .Before then it had been known as shell shock, battle fatigue, accident neurosis and post-rape syndrome(21). Many heroes and heroines including shakespeare's Henry IV historical world literature seems to meet the diagnostic criteria of PTSD as described by Trimble in 1985(22).

Some revisions were made in the diagnostic criteria of DSM-III –R(1987) and DSM-IV(1994) notably was what constitutes a traumatic event which initially referred to events outside the usual human experience such as ,war, torture, rape, holocaust , atomic bombings, natural disasters(earthquakes, hurricanes, volcanic eruptions) etc was altered to include events not outside the usual human experience such as automobile accidents including orthopaedic trauma, divorce, financial reverses etc(20). Even though it was initially a controversial diagnosis in the beginning, it later became an important concept in psychiatry theory more so because the diagnosis of PTSD stipulates that the etiological agent is outside the individual rather than a personal weakness or flaw(23). The importance of an etiological agent makes PTSD unique among other psychiatric conditions.

PTSD diagnostic criteria in DSM-5 have undergone some major changes. The first criteria is far more explicit in what constitutes a traumatic event, for example, sexual assault is specially included as a recurring exposure to for example police officers investigating cases of sexual abuse or first responders(24). Secondly language stipulating an individual's reaction to the event e.g. intense fear, helplessness of horror according to DSM-IV has been deleted. Thirdly, instead of three major symptom clusters, DSM-5 now has 4 clusters: re-experiencing, heightened arousal, avoidance and negative thoughts or moods or feelings(24). And lastly the 2 subtypes are PTSD preschool and dissociative subtypes(24).

This study was based on DSM-IV-TR as DSM-5 was not published as yet by the time of the study.

2.2 Diagnosis of post traumatic stress disorder

Till May 2013, the diagnosis of PTSD was based on the criteria profile of the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition in 1994 by the American Psychiatric Association which was the gold standard. It basically has six categories specifying the symptoms that need to be present before a diagnosis can be made(21).

Criterion A: stressor

The person has been exposed to a traumatic event in which both of the following have been present:

1. The person has experienced, witnessed, or been confronted with an event or events that involve actual or threatened death or serious injury, or a threat to the physical integrity of oneself or others.
2. The person's response involved intense fear, helplessness, or horror. Note: in children, it may be expressed instead by disorganized or agitated behavior.

Criterion B: intrusive recollection

The traumatic event is persistently re-experienced in at least **one** of the following ways:

1. Recurrent and intrusive distressing recollections of the event, including images, thoughts, or perceptions. Note: in young children, repetitive play may occur in which themes or aspects of the trauma are expressed.
2. Recurrent distressing dreams of the event. Note: in children, there may be frightening dreams without recognizable content
3. Acting or feeling as if the traumatic event were recurring (includes a sense of reliving the experience, illusions, hallucinations, and dissociative flashback episodes, including those that occur upon awakening or when intoxicated). Note: in children, trauma-specific reenactment may occur.
4. Intense psychological distress at exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event.
5. Physiologic reactivity upon exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event

Criterion C: avoidant/numbing

Persistent avoidance of stimuli associated with the trauma and numbing of general responsiveness (not present before the trauma), as indicated by at least **three** of the following:

1. Efforts to avoid thoughts, feelings, or conversations associated with the trauma
2. Efforts to avoid activities, places, or people that arouse recollections of the trauma
3. Inability to recall an important aspect of the trauma
4. Markedly diminished interest or participation in significant activities
5. Feeling of detachment or estrangement from others
6. Restricted range of affect (e.g., unable to have loving feelings)
7. Sense of foreshortened future (e.g., does not expect to have a career, marriage, children, or a normal life span)

Criterion D: hyper-arousal

Persistent symptoms of increasing arousal (not present before the trauma), indicated by at least **two** of the following:

1. Difficulty falling or staying asleep
2. Irritability or outbursts of anger
3. Difficulty concentrating
4. Hyper-vigilance
5. Exaggerated startle response

Criterion E: duration

Duration of the disturbance (symptoms in B, C, and D) is more than one month.

Criterion F: functional significance

The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.

Patients were diagnosed of PTSD using the DSM-IV by having at least one or more intrusion symptoms, three or more avoidance symptoms and two or more arousal symptoms being present not less than a month. Three types were recognized, acute within 1- 3 months, chronic 3 to more months and delayed onset if symptoms occur 6 months after the traumatic event(10).

2.3 Prevalence of post traumatic stress disorder

PTSD is a recognized mental illness that occurs after injury(25). However over the years it has been described in combat veterans until recently is been recognized in civilians involved in trauma (26-28). It is in this regard that Sutherland called for increased recognition of psychological disturbance in musculoskeletal trauma patients(29). However orthopaedic literature has paid little attention to this topic(4).

In the United States, the lifetime prevalence of PTSD is estimated to be 8% in the general population without regards to specific causes(10). A review study reported rates of PTSD in a range of 2 to 50% across studies(30).

In the United States, a cross-sectional descriptive study of 580 consecutive orthopaedic trauma patients attending level -1 trauma centre clinics in two centres during a three month period reported a PTSD prevalence of 51% among the patients using the Revised Civilian Mississippi Scale for posttraumatic Stress Disorder(11). The study also recognized that the risk of development of PTSD increased with an increase in the interval between the time of injury and filling of the questionnaire which was in agreement with some studies(31)but disagrees with others(7, 13, 32).

The mechanism of injury with regards to PTSD was reported as 65% in motor vehicle-pedestrian collision, 57% in motor- vehicle collisions and 43% of those in a fall(11).

The weakness of the above study was the fact that it was not of a probability sample and could not be a true representation of orthopaedic trauma patients in the United States and it was also a cross-sectional study which only measured the prevalence of PTSD at a point in time even though it identified the time intervals at development of PTSD.

Other studies in the United States looking at MVA survivors only reported prevalence of PTSD of 23% at 3months and 16.5% at 1 year(33), and 39% among survivors(34).These studies were of consecutive sample and did not look at the broad category of orthopaedic trauma patients but rather only motor vehicle accident victims which is rather a part of a bigger picture.

A study conducted in Iran a middle income country, reported the presence of PTSD using DSM-IV among sixty orthopaedic trauma patients attending a clinic. It was a prospective descriptive study of consecutive patients. It reported PTSD of 8.3% at one month and 25.5% at three months showing an increase in the number diagnosed after three months which is in agreement with the study in the United States by Star(35). This study however was of a

small sample size, followed up patients for only three months, not of a probability sample and only included patients perceived to have severe orthopaedic trauma therefore cannot be representative of the entire orthopaedic trauma population of Iran. The study did not also categorize the mechanism of injury and the diagnosis of PTSD which can give a clue to the orthopaedic surgeon if is of significance in suspecting the development of PTSD in future. A similar study in Turkey reported a PTSD prevalence of 30% initially but later reported 17% after 6 months(36). This finding disagrees with the study by Star in the United States that PTSD incidence increases with an increase in the interval between the time of injury and time of diagnosis.

In Africa, not much is known about PTSD in orthopaedic trauma patients and there is a paucity of data in this regard. Kenya a close neighbour of Uganda in East Africa reported the prevalence of PTSD among survivors of MVA. The study was a cross-sectional descriptive study conducted in an orthopaedic out-patient clinic of a referral hospital using DSM-IV and demographic questionnaire. A total of 264 patients participated through a systematic random sampling. A prevalence rate of 13.3% was recorded(15). This is comparable to the prevalence found in both developed and middle income countries (33-36). This study in Kenya was of a probability sample but was skewed towards only survivors of MVA ignoring other orthopaedic trauma victims that also need to be investigated and also failing to relate the anatomic site to the development of PTSD as we seek to do in this study in Uganda.

2.4 Symptoms of post- traumatic stress disorder in orthopaedic trauma patients

PTSD can occur when an individual has been exposed to a traumatic event in which the person experienced, witnessed or was confronted with a potentially life-threatening event to self or others, and the person responded with intense fear, helplessness or horror(10). Symptoms include, re-experiencing the event (intrusive memories or nightmares of event, illusions, hallucinations about event), avoiding stimuli associated with the trauma-feelings, thoughts or conversations concerning the trauma ,diminished interest in activities, numbing of general responsiveness and hyperarousal like outburst of anger, difficulty in falling asleep, difficulty in concentrating and hypervigilance(10) .Majority of patients who experience traumatic events like military combat, violent personal assault(sexual and

physical attack), motor vehicle accidents, falls etc, will have some of these symptoms within days or weeks after the traumatic event, but PTSD is not diagnosed until symptoms last at least one month. Three types are recognized, acute within 1- 3 months, chronic 3 to more months and delayed onset if symptoms occurs 6 months after the traumatic event(10).

There is a variation in the course of this disorder in patients. The symptoms can abate with time or become chronic. Half of the patients diagnosed with PTSD recover within 3 months but over one-third will still have symptoms one year after the injury and over years in about 40% of patients in the general population not necessarily orthopaedic trauma patients only(10, 19).

Pain is one of the common complaints of individuals with PTSD especially among the military population(37, 38). A study in Army soldiers found that those with PTSD were twice likely to report back and limb pain than those without PTSD(39).

Most studies of PTSD in orthopaedic trauma patients have failed to clearly relate the relationship between the presence of certain specific symptoms of avoidance, intrusive memories, numbness and hyperarousal to the diagnosis of PTSD in patients(15, 33, 35).

However in a study conducted by Green in 2003 using DSM-IV checklist revealed that, symptoms like anxiety, insomnia, distressing and recurrent dreams, flashback imagery and intrusive thoughts, irritability, poor concentration, avoidance behaviour and detachment all reached frequencies beyond 70% and men are more likely to suffer from irritability than women(40). This study looked at all patients attending PTSD clinics in the psychiatry department and not only looking at symptoms of patients with orthopaedic trauma with PTSD.

The study by Starr in 2004 found that the response of patients to the question that the 'emotional problems caused by the injury was more difficult than the physical problems' was significantly associated with the diagnosis of PTSD($p=0.0001$) than many other factors or symptoms and could serve as a predictor of diagnosis if further evaluated in other studies for most orthopaedic surgeons(11).

2.5 Factors associated with post-traumatic stress disorder in orthopaedic trauma patients

2.5.1 Age and Sex

A study in Kenya found an association of PTSD and the younger age groups. About 42.9% of those who developed PTSD were in the age group of 20-29 years and 25.7% in the age group of 30-39 years(15). Also a national survey of PTSD conducted in a general population reported a higher prevalence of PTSD among the younger age group than the elderly in the general population attributing it to a higher lifetime exposure to trauma in the younger age group but found a negative significance after controlling for sex in the sample(19). However another study in Iran did not find an association of age with PTSD(35). It is therefore not clear if this association could be as a result of the likelihood of younger patients being involved in orthopaedic trauma or because older patients probably have better coping mechanisms.

A number of studies have shown that females are more prone to developing PTSD than males following orthopaedic trauma(15, 41). The risk of developing PTSD following motor vehicle accidents has been found to be 4.64 times greater in women than in men(42). Also in the general population, women are 2.38 -2.49 times more likely to develop lifetime PTSD than men if exposed to similar trauma(19, 43). It is however not very clear in literature as to what accounts for this difference even though it has been attributed to neurobiological mechanisms(41).

2.5.2 Marital status

Marital status in a Kenyan study of survivors of MVA was found to be a risk factor for the possible development of PTSD. About 81.85% of men who developed PTSD were married and 21.4% of females with PTSD were previously married. There was however no statistical significance between marital status and development of PTSD after MVA. The study did not look at the marital status before and after the traumatic event and its association with PTSD(15). Another study done in Spain looking at marital status before and after traumatic event of MVA survivors and its association with the diagnosis of PTSD reported a similar result as the Kenyan study the only difference was that PTSD was high among the singles than those who were married before and after the event but was not

statistically significant(44). However a population survey of PTSD found that the lifetime prevalence of PTSD was significantly prevalent among the previously married(separated,divorced,widowed) than the just married for both men and women, controlling for age(19) . This study looked at the general population and not orthopaedic trauma patients.

2.5.3 Previous psychiatric comorbidity.

Some works on PTSD have reported that comorbid major depressive disorder and anxiety disorders were risk factors for the development of PTSD(19, 45, 46). In the Kenyan study 33.3% of those with PTSD have had past psychiatric illness. Also patients with other physical illness were at a greater risk of developing PTSD. Also in the same study majority of those with PTSD(71.4%) had no family history of psychiatric illness(15). It was reported in a study in Spain that there was no statistically significant association between previous personal or family history of psychiatric illness or previous traumatic experiences with PTSD which seems to contradict the findings of other authors in this regard which could probably be due to the small sample size of the Spain study(47-49). There was however a statistically significant relationship between the degree of physical injury to the development of PTSD($p=0.001$) in the Spain study . In the said study PTSD patients were the ones with only severe and moderate injuries than non PTSD patients , more in females than males(44).

2.5.4 Educational Level

A little has been reported in literature about the relationship between educational level and the development of PTSD after orthopaedic trauma which could help orthopaedic surgeons select potential PTSD patients early. A study in Kenya of MVA survivors found that post primary education was associated with a higher risk of PTSD than those with primary education ($p<0.05$). This was not consistent with the results of the study in Spain in which the relationship between post-primary education patients and PTSD was not statistically significant(15, 44).

CHAPTER THREE

METHODOLOGY

3.1 Study design

This was a cross sectional descriptive study.

3.2 Study setting

It was a hospital based study at the orthopaedic out patient's clinic of Mulago National Referral and Teaching hospital of Makerere University. The hospital is located in Kampala, the capital city of Uganda about 4.9km from the city centre and has a bed capacity of more than 1500.

The orthopaedic out patient's clinic located on the fourth floor of the new Mulago building is held every Friday. The clinic receives both old and new patients of the department of orthopaedic surgery including a range of musculoskeletal injuries and other orthopaedic conditions. On average about 160 patients are seen on each clinic day with about 80 being patients with traumatic injuries like fractures, dislocations, and ligamentous injuries.

3.3 Study population

The study population included all adult (18years and above) orthopaedic patients attending the out-patient clinic who met the inclusion criteria of the study.

3.4 Study period

The study was conducted within a period of 6 months-24 weeks (Friday clinic days) from 19/04/2013 to 27/09/2013-(April to September 2013).

3.5 Selection criteria

3.5.1 Inclusion criteria

The study included all adult orthopaedic trauma patients who attended the out-patients clinic and met the following criteria:

1. The patient was 18 years and above
2. The patient willingly consented to be part of the study.
3. The patient was involved in a life threatening orthopaedic trauma situation resulting in an injury E.g RTA, fall from a height, assault situations etc.
4. The patient experienced the injury over one month prior to the interview.

3.5.2 Exclusion criteria

The following patients were excluded from the study.

1. A patient whose Glasgow coma score was less than 15 or has amnesia.
2. A patient who was interviewed in a previous visit.

3.6 Sample size

The formula for determining sample of a single proportion was used. The formula derived by Wayne W. Daniel

$$n = \frac{NZ^2P(1-P)}{d^2(N-1) + Z^2P(1-P)}$$

n=sample size

N= Number of patients with orthopaedic trauma attending out-patient clinic

Z= z value corresponding to the confidence level

d=absolute precision

P=expected proportion of the characteristics to be measured

N= Number of patients with orthopaedic trauma attending clinic weekly is 80, for a period of 3 months 960

The confidence level is 95% giving a z value of 1.96

The absolute precision (d) or expected error has been put at 5%

The expected proportion (P) in the characteristics of interest was the average of the prevalence in the pilot study in Mulago and the prevalence in the Kenya study i.e 28% +13.3%/2=0.413

$n = \frac{960 \times 1.96 \times 1.96 \times 0.413(1-0.413)}{0.05 \times 0.05(960-1) + 1.96 \times 1.96 \times 0.413(1-0.413)}$
=269.53=270. 10% of this number. (ie 27) was added to cater for inappropriate response ,invalid questionnaire or missing questionnaire.

Total sample size =270 + 27= **297**.

3.7 Sampling method

Systematic random sampling method was used in this study. Given that averagely 160 patients attended the clinic weekly, 640 and 1920 patients were expected in a month and 3 months respectively. The estimated sample size was 270 therefore the nth number is 1920/270=7.11 approximated to 7.

Therefore every 7th patient at the clinic who met the inclusion criteria was interviewed.

3.8 Study procedure.

The study was carried out by administering a structured questionnaire in the form of an interview.

The questions included demographic data of patient, type and cause of traumatic event, severity of injury, time interval of injury and symptoms of PTSD as per the diagnostic statistical manual IV(DSM-IV-TR) of PTSD, history of psychiatric illness in participant or family.

Severity of physical injury was classified into;

Severe- Multiple trauma, pelvic fractures, or orthopaedic trauma injury requiring more than 24hrs stay in intensive care.

Moderate- Open or closed fracture/soft tissue injury that stayed more than 72hrs before discharge from hospital.

Minor – Open or closed fracture/soft tissue injury that was treated and discharged within 24-72hrs.

The questionnaire was administered by the principal investigator and three research assistants (orthopaedic surgery resident and two psychiatric nurses). An interpreter was used in cases of language barrier.

The systematic sampling method of the 7th patient was used in which the starting point was obtained by counting the first seven patients at the clinic and numbers 1 to 7 written on pieces of paper folded and put in a container. The first number was selected which became the starting point from which every 7th patient who met the inclusion criteria was interviewed. If the 7th patient does not meet the criteria the next patient is recruited if he/she meets the criteria. This is done till the 7th patient then the cycle is started again.

Patients who met the inclusion criteria were interviewed once. A patient who attends the clinic more than once during the study period was excluded if he or she was interviewed before.

Patients who satisfied the criteria for PTSD diagnosis according to DSM-IV-TR diagnostic criteria by having at least one or more intrusion symptoms, three or more avoidance symptoms and two or more arousal symptoms was referred to the Mulago Mental Health clinic for further evaluation and treatment.

3.9 Study variables

3.9.1 Independent variables

1. Socio-demographics
2. Cause of injury-MVA, fall, assault, occupational hazard, gunshot
3. Anatomic site-upper limb, lower limb, pelvis, spine
4. Severity of injury.
5. Duration of injury.
6. Presence or absence of death
7. History of smoking
8. History of alcohol consumption
9. Previous psychiatric illness

3.9.2 Dependant variables

1. Presence of PTSD

3.10 Data management

3.10.1 Data collection

A structured precoded and pretested questionnaire was administered by the principal investigator and three research assistants; an orthopaedic resident and two psychiatric nurses at the orthopaedic out- patient clinic.

The data were collected during each clinic day.

Each completed questionnaire was evaluated by the principal investigator or sometimes by the orthopaedic resident and all patients with the diagnosis of PTSD using the DSM-IV referred to the Mulago Mental Health clinic for further evaluation and treatment.

3.10.2 Data entry and analysis

The completed questionnaires were checked for completeness and fullness. Each completed questionnaire was entered into a computer EPI-DATA software version 3.1 and exported to STATA version 10.1 (copyright 1985-2011 Stata Corp LP, Texas, USA) for analysis with the help of a medical statistician.

Each entered questionnaire was coded and filed in a named file for safety and easy retrieval in future.

The socio-demographic variables and associated factors of PTSD were presented in tables and graphs where applicable. Univariate, bivariate and multivariate analysis of the variables was done by the Mantel haenszel chi-square method and multiple regression model. Using means, proportions, frequencies, percentages and level of significance by odds ratios and p-values.

The prevalence of PTSD was calculated with the numerator being the number of patients diagnosed and the denominator, the number of orthopaedic trauma patients who met the inclusion criteria and enrolled, presented in tabular form with percentages.

3.11 Quality control

The following was done to ensure quality of the data and findings:

- The questionnaire was pretested before the study was carried out by the principal investigator and research assistants.
- The three research assistants were trained before the commencement of the study.
- The data was entered into the computer software, cleaned and stored with the help of a statistician.
- The data was backed-up by being stored in a portable external storage disc.

3.12 Ethical consideration

- The research was carried out based on the principles of respect, confidentiality and beneficence with regards to the patients.
- An informed consent was obtained before interviewing any patient in the study and no patient was refused medical care for not consenting for the study.

- Permission and clearance was obtained from the Ethics and Research Committee of the Department of Orthopaedic Surgery and the Institutional Review Board of Makerere University and Mulago National Referral Hospital.

3.13 Study limitations

- The fact that this was a cross-sectional descriptive study limits the discovery of a cause and effect relationship in studied variables.
- The study was limited to only adult orthopaedic trauma patients attending the general outpatient clinic and not patient on admission and those attending private outpatient clinics. Therefore the study can only be generalized to similar study populations elsewhere but not all trauma or the general population patients.
- Also the unavailability of enough space to provide enough privacy to our patients during interviews could have led to some form of “social desirability bias “ regarding some socio-demographic variables like alcohol consumption, smoking and educational level.
- Finally the unavailability of time and money limited our study to the described sample size and only the diagnosis of PTSD and not other comorbid psychiatric conditions on DSM-IV like depression and anxiety disorders.

3.14 Dissemination

Findings of this study have been compiled into a dissertation, copies of which will be disseminated to:

- The Department of Orthopaedic Surgery, Makerere university/Mulago hospital
- Sir Albert Cook Library, Makerere University
- The school of post graduate studies, Makerere University
- School of Medicine, Makerere University
- Manuscripts will be submitted for publication in Indexed Journals

CHAPTER FOUR RESULTS

Below is a summary of the results of 297 patients who were enrolled into the study after a systematic random sampling and having met the inclusion criteria from April to September 2013. Among which 53 patients were found to meet the diagnosis of PTSD.

Figure 2: Study profile

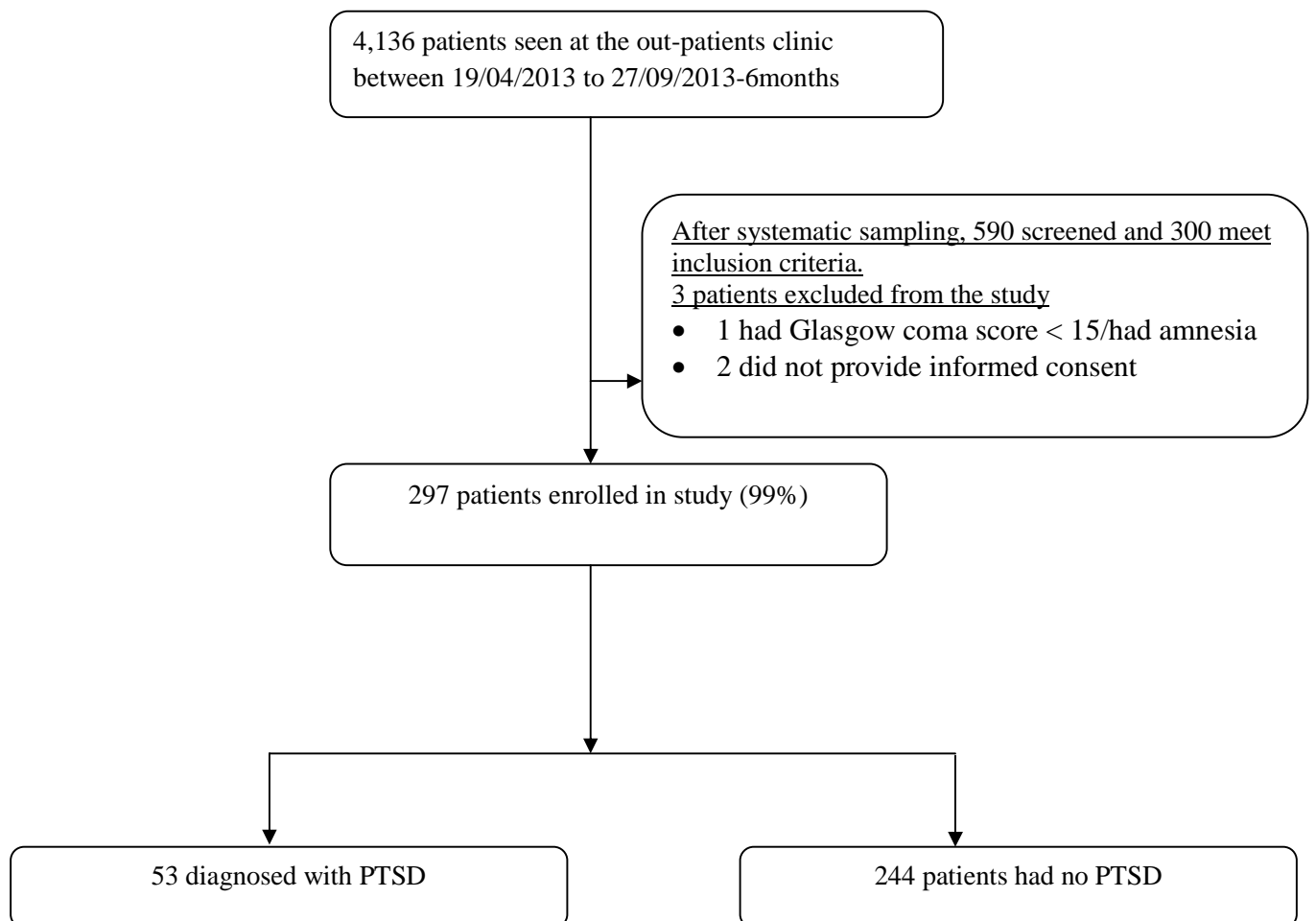


Table 1: Distribution of Socio-demographic characteristics of study participants

Characteristic	Participant distribution N= 297	
	Number	Percentage(%)
Age group in years		
1. 18-29	110	37.04
2. 30-41	96	32.32
3. 42-53	48	16.16
4. 54-65	26	8.75
5. 66-77	12	4.04
6. >77	5	1.68
Gender		
Male	197	66.33
Female	100	33.67
Education level		
Illiterate(can't read and write)	25	8.42
Primary/Secondary	220	74.07
University/College	52	17.51
Marital status		
Married/Co-habiting)	170	57.24
Single	93	31.31
Divorced	18	6.06
Widow/Widower	16	5.39
Employment status		
Unemployed	71	23.91
Self-employed	156	52.53
Government	17	5.72
Private employed	53	17.85
Income level (Million shillings)		
One(397 dollars)	240	80.81
One to five	52	17.51
> five	5	1.68

The Mean age of the study participants was 37.06(14.61) with majority of participants between the ages of 18 to 29years (37.04%).

Males 66.33% (197/297) and females 33.67% (100/297). The educational level of majority of these participants was primary/secondary 74.07% (220/297). Most of the participants were self employed 52.53% (156/297) and 80.81% (240/297) of participants had an income level of less than one million Ugandan shillings (397dollars) a year. Participant with prior orthopaedic trauma were 66.55% (197/297).

Table 2 Causes of Orthopaedic Injury among participants

Causes	Participant distribution	
	Number	Percentage (%)
Motor-Vehicle	205	69.49
Falls	51	17.29
Gunshot	7	2.37
Assault	15	5.08
Others	17	5.76

The commonest causes of orthopaedic trauma among participants were Motor vehicle accidents and fall, 69.49% (205/297) and 17.29% (51/297) respectively. The least resulted from others 5.76% (17/297) i.e. attack by animals, tree falling on someone, occupational injury and sliding falls etc.

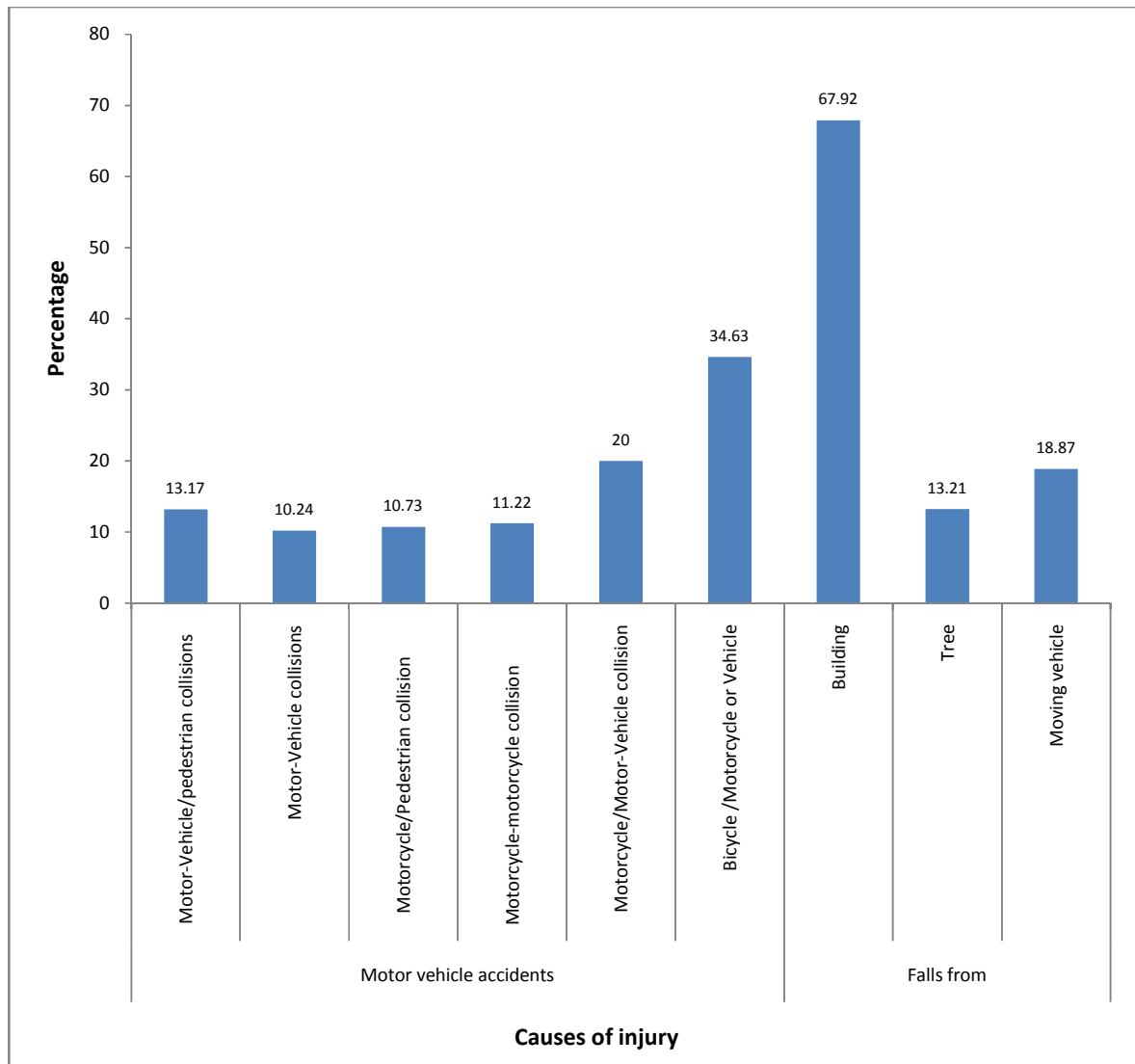


Figure 3: Distribution of the different causes of injuries that occurred among those who were involved in motor vehicle accidents and falls.

Among patients involved in motor vehicle accidents, Bicycle/Motorcycle or Vehicle Accidents accounted for 34.63 and Motor Vehicle collisions 10.24%. Among patients involved in fall, fall from a building was 67.92(Majority) and the least was falls from trees 13.21.

Orthopaedic Injury Characteristics of study participants

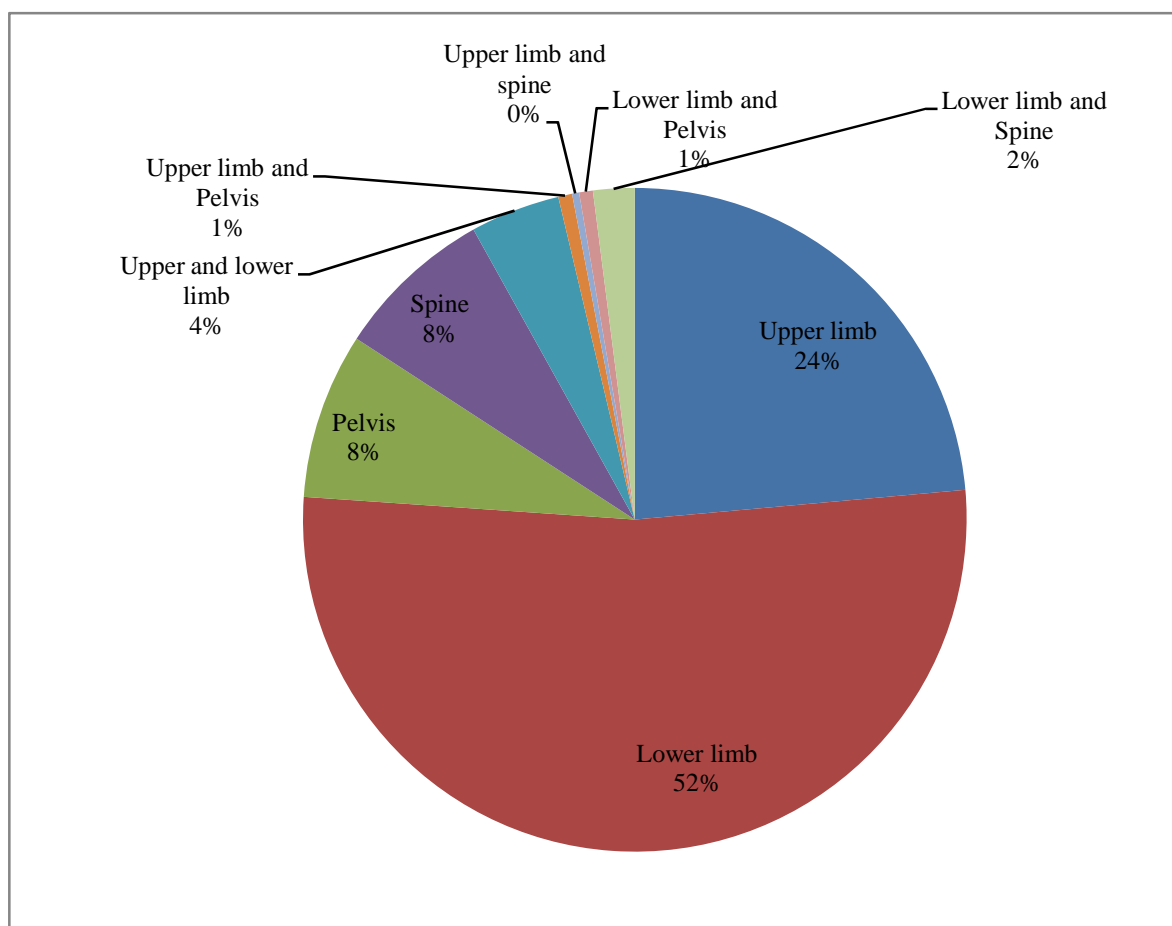


Figure 4 Anatomic sites of injury among study participants

Among the participants, the percentage distribution of involved anatomic sites where, lower limb 52%, upper limb 24%, pelvis and spine 8% each. Combined sites registered the least.

Table 3: Orthopaedic injury characteristics among participants

Injury Characteristics	Participant distribution	
	Number=297	Percentage(%)
Type of injury		
1. Open fracture	88	29.63
2. Closed fracture	167	56.23
3. Soft-tissue	40	13.47
4. Open and Closed fracture	2	0.67
Severity of injury		
1. Severe	80	26.94
2. Moderate	206	69.36
3. Mild	11	3.70
Duration after injury (months)		
1. One – three	115	38.72
2. Four to six	92	30.98
3. Seven to Twelve	55	18.52
4. > Twelve	35	11.78
Did anyone die in accident		
1. Yes	37	12.46
2. No	260	87.54
Have your fears from this injury been more difficult than the physical problems?		
1. Yes	250	84.18
2. No	47	15.82

Closed fractures 56.23% (167/297) accounted for majority of the injuries seen in this study and 69.36% (206/297) of these injuries were classified as moderate severity. 90.24 % (268/297) of the participants first point of call was the clinic /hospital.

68.70% (207/297) study participants were seen one to 6months after their injury. 84.18% (250/297) of the participants responded yes to the question of their fears from the injury being more difficult than the physical problems from the injury.

Table 4 Prevalence of Post traumatic stress disorder

	Participants, N=297	
	Number	Percentage(95%CI)
Presence of PTSD	53	17.85 (13.47-22.22)

Prevalence of PTSD among adult orthopaedic trauma patients at the out- patient clinic within a period of 6 months was **17.85 %**.

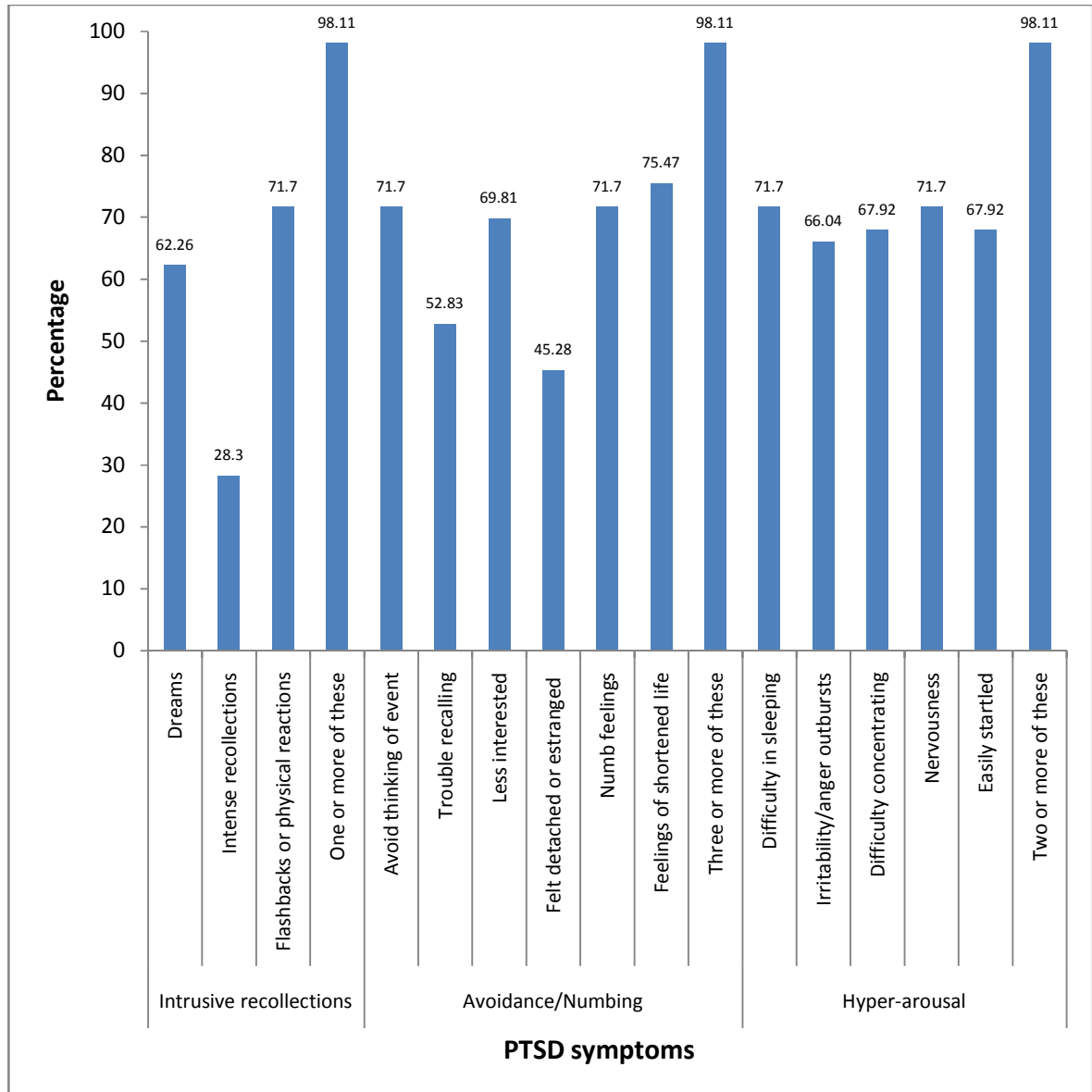


Figure 5: Frequency distribution of PTSD symptoms in participants with PTSD.

Majority of the study participants 75.47% (40/53) with PTSD had the symptom of feeling that their life will be shortened because of the trauma (avoidance /numbing) and the least reported symptom was intense recollections 28.3 % (15/53) (Intrusive recollections).

The common symptoms among participants with PTSD of >70% were flashbacks or physical reactions, avoidance of thinking of the event, numb feelings, difficulty in sleeping and nervousness.

FACTORS ASSOCIATED WITH PTSD

Table 5: Social Demographic Factors association with PTSD

Risk factor	Post-traumatic Stress Disorder		OR(95%CI)	p-value
	No N=244	Yes N=53		
Socio-Demographic factors	Number (%)	Number (%)	OR(95%CI)	p-value
Age group in years				
1. 18-29	94(38.52)	16(30.19)	Reference	
2. 30-41	77(31.56)	19(35.85)	1.45(0.70-3.01)	0.319
3. 42-53	38(15.57)	10(18.87)	1.55(0.64-3.71)	0.329
4. 54-65	21(8.61)	5(9.43)	1.40(0.46-4.24)	0.553
5. 66-77	10(4.10)	2(3.77)	1.18(0.24-5.87)	0.844
6. >77	4(1.64)	1(1.89)	1.47(0.15-14.00)	0.738
Gender				
Male	166(68.03)	31(58.49)	Reference	
Female	78(31.97)	22(41.51)	1.51(0.82-2.78)	0.183
Education level				
Illiterate	18(7.38)	7(13.21)	Reference	
Primary/Secondary	182(74.59)	38(71.70)	0.54(0.21-1.38)	0.195
University/College	44(18.03)	8(15.09)	0.47(0.15-1.48)	0.196
Marital status				
Married/Co-habiting)	143(58.61)	27(50.94)	Reference	
Single	76(31.15)	17(32.08)	1.18(0.61-2.31)	0.619
Divorced	14(5.74)	4(7.55)	1.51(0.46-4.95)	0.493
Widow/Widower	11(4.51)	5(9.43)	2.41(0.77-7.48)	0.129
Employment status				
Unemployed	58(23.77)	13(24.53)	Reference	
Self-employed	132(54.10)	24(45.28)	0.81(0.39-1.70)	0.581
Government	13(5.33)	4(7.55)	1.37(0.38-4.90)	0.625
Private employed	41(16.80)	12(22.64)	1.31(0.54-3.15)	0.553
Income level (Million)				
One	194(79.51)	46(86.79)	Reference	
One to five	46(18.85)	6(11.32)	0.55(0.22-1.37)	0.198
> five	4(1.64)	1(1.89)	1.05(0.12-9.66)	0.963

Majority of the participants with PTSD 66.04 % (35/53) were in the age group of 18-41 years. However the odds of developing PTSD as one ages showed an increased trend compared to the younger age group of 18-29 years but this was not statistically significant.

The mean age of those with PTSD was 37.89(14.71) and those without PTSD 36.88(14.62) a mean difference of 1.01, p-value (0.649) not statistically significant.

The odds of developing PTSD in females was a 51% more compared to the odds in males but was however not statistically significant, OR 1.51(0.82-2.78) ,p-value(0.183).

The association of PTSD and educational level was pointing more towards a decrease in odds as one attains a higher educational level but was not statistically significant for primary/secondary, university/college education compared with illiteracy, OR, 0.54(0.21-1.38),0.47(0.15-1.48) respectively.

Study participants who were married before/ after injury were found to have lower odds of PTSD prevalence compared to those who were single (18% more), divorced (51% more) or widow/widower (2 times more) before / after injury but this was not statistically significant with OR of 1.18(0.61-2.31), 1.51(0.46-4.95), 2.41(0.77-7.48) respectively.

The trend of association of employment status and PTSD was such that, those who were self-employed before/after injury had a 19% reduction in the odds of prevalence of PTSD than those who were government employees (37% more) or privately employed (31% more) compared to the odds of PTSD in the unemployed participants before and after injury with OR of 0.81(0.39-1.70), 1.37(0.38-4.90), 1.31(0.54-3.15) respectively but this was not statistically significant.

Table 6: Injury characteristics association with PTSD

Risk factor	Post-traumatic Stress Disorder		OR(95%CI)	p-value
	No N=244	Yes N=53		
Injury characteristics	Number (%)	Number (%)		
Prior history of orthopaedic trauma*				
Yes	158(65.02)	39(73.58)	Reference	
No	85(34.98)	14(26.42)	0.67(0.34-1.30)	0.233
Cause of accident				
Motor-Vehicle	170(70.25)	35(66.04)	Reference	
Falls	41(16.94)	10(18.87)	1.18(0.54-2.59)	0.671
Gunshot	6(2.48)	1(1.89)	0.81(0.09-6.94)	0.847
Assault	10(4.13)	5(9.43)	2.43(0.78-7.54)	0.125
Others	15(6.20)	2(3.77)	0.65(0.14-2.96)	0.575
Anatomical site				
Upper limb	59(24.18)	11(20.75)	Reference	
Lower limb	133(54.51)	23(43.40)	0.93(0.42-2.03)	0.850
Pelvis	19(7.79)	5(9.43)	1.41(0.44-4.58)	0.566
Spine	14(5.74)	9(16.98)	3.45(1.20-9.91)	0.022
Upper and lower limb	11(4.51)	2(3.77)	0.98(0.19-5.02)	0.976
Upper limb and Pelvis	1(0.41)	1(1.89)	5.36(0.31-92.32)	0.247
Upper limb and spine	1(0.41)	0	-	-
Lower limb and Pelvis	2(0.82)	0	-	-
Lower limb and Spine	4(1.64)	2(3.77)	2.68(0.44-16.47)	0.287
Type				
Open fracture	69(28.28)	19(35.85)	Reference	
Closed fracture	141(57.79)	26(49.06)	0.67(0.37-1.29)	0.232
Soft-tissue	32(13.11)	8(15.09)	0.91(0.36-2.30)	0.838
Open and Closed fracture	2	0	-	-
Severity				
Severe	66(27.05)	14(26.42)	Reference	
Moderate	167(68.44)	39(73.58)	1.10(0.56-2.16)	0.780
Mild	11(4.51)	0	-	-
Duration after injury (months)				
One – three	99(40.57)	16(30.19)	Reference	
Four to six	77(31.56)	15(28.30)	1.21(0.56-2.59)	0.632
Seven to Twelve	46(18.85)	9(16.98)	1.21(0.50-2.94)	0.673
> Twelve	22(9.02)	13(24.53)	3.66(1.54-8.69)	0.003
Did anyone die in accident				
Yes	23(9.43)	14(26.42)	Reference	
No	221(90.57)	39(73.58)	0.29(0.14-0.61)	0.001
More difficult fears than physical problems				
Yes	201(82.38)	49(92.45)	Reference	
No	43(17.62)	4(7.55)	0.38(0.13-1.11)	0.078

There was an unadjusted statistically significant association of the odds of PTSD prevalence between spine injury as an anatomic site compared to upper limbs (3.5 times higher), OR

3.45(1.20-9.91) and p-value (0.022). More than one anatomic site had a higher likelihood of developing PTSD.

There was an association of development of PTSD and the duration of injury. The odds of developing PTSD was 3 times in patients with injury duration >12 months compared to one to three months duration and was statistically significant with OR 3.66(1.54-8.69) and p-value (0.003).

The association of PTSD and the presence of death in an accident was found to be statistically significant p-value (0.001) with a 71% reduction in the odds of developing PTSD in the absence of death compared to presence of death , OR 0.29(0.14-0.61).

The odds of developing PTSD from falls or assaults as cause of injury was 18% more and 2 times respectively compared to motor-vehicle accidents. OR 1.18(0.54-2.59), 2.43(0.78-7.54) respectively which were not statistically significant. However gunshot injuries resulted in decrease prevalence of 19%, OR 0.81(0.09-6.94) but not statistically significant compared to motor-vehicle accidents.

The association of the severity of injury with PTSD was such that the odds of developing PTSD in participants with injuries of moderate severity was 10% more; OR 1.10(0.56-2.16) compared to those of severe injuries but was not statistically significant.

92.45 % (49/53) of participants with PTSD responded in the affirmative to the question “have your fears from this injury been more difficult than the physical problems” compared to 7.55%(4/53) who responded otherwise. The association of the response to this question and PTSD was not statistically significant but there was reduced odds of prevalence of PTSD by 62% in those whose response was “no” compared to “yes” OR 0.38(0.13-1.11), p-value (0.078).

Table 7: Social/family /Psychiatry history association with PTSD

Risk Factors	Post-traumatic Stress Disorder		OR(95%CI)	p-value
	No N=244	Yes N=53		
Social/family /Psychiatry history	Number (%)	Number (%)	OR(95%CI)	p-value
History of mental illness				
Yes	16(6.56)	5(9.43)	Reference	
No	228(93.44)	48(90.57)	0.67(0.24-1.93)	0.461
Family history of mental illness				
Yes	26(10.66)	6(11.32)	Reference	
No	218(89.34)	47(88.68)	0.93(0.36-2.40)	0.887
Smoking				
Yes	28(11.48)	3(5.66)	Reference	
No	216(88.52)	50(94.34)	2.16(0.63-7.39)	0.220
Alcohol consumption				
Yes	89(36.48)	10(18.87)	Reference	
No	155(63.52)	43(81.13)	2.47(1.18-5.15)	0.016

The odds of developing PTSD in participants not taking alcohol was 2 times those taking alcohol and was statistically significant, OR 2.47(1.18-5.15) p-value (0.016). Also non-smokers had 2 times higher odds of developing PTSD compared to smokers but this was not statistically significant, OR 2.16(0.63-7.39) p-value (0.220).

The history or presence of mental illness in the participant or in his/her family increased the odds of developing PTSD by 33% and 7% respectively compared to absence of mental illness in participant or family but was not statistically significant, OR 0.67(0.24-1.93) and 0.93(0.36-2.40) respectively.

Table 8: Multivariate regression model for significant factors P value <5

Risk Factors	Adjusted OR(95%CI)*	p-value
Anatomical site		
Upper limb	Reference	
Lower limb	1.00(0.44-2.26)	0.998
Pelvis	1.32(0.37-4.72)	0.666
Spine	2.76(0.83-9.16)	0.098
Upper and lower limb	0.33(0.05-2.01)	0.229
Upper limb and Pelvis	5.60(0.32-99.12)	0.240
Lower limb and Spine	1.70(0.25-11.61)	0.591
Duration after injury (months)		
1-3	Reference	
4-6	0.93(0.41-2.10)	0.856
7-12	0.91(0.36-2.35)	0.851
> 12	2.52(0.91-7.00)	0.075
Did anyone die in accident		
Yes	Reference	
No	0.25(0.11-0.56)	0.001
Alcohol consumption		
Yes	Reference	
No	2.89(1.29-6.44)	0.010

***adjusted for anatomical site, duration after injury, death occurrence and alcohol consumption**

The adjusted odds of developing PTSD was 3 times in spine injured patients and 5 times in patients with upper limb and pelvic injuries compared to upper limb injured patients but not significant. P-values of 0.098 and 0.240 respectively.

The odds of development of PTSD in patients who sustained injuries > 12 months was 2 times compared to the first 3 months after injury using the adjusted OR. But this association was not statistically significant p-value (0.075).

The association between the presence of death in an accident and PTSD was statistically significant after adjusting for the other factors. The odds of development of PTSD when

death is present in an accident was 75% higher compared to absence of death, OR 0.25(0.11-0.56), p-value (0.001).

The association between “no (absence of) alcohol consumption” and PTSD was also statistically significant after adjusting for the other factors. The odds of development of PTSD in patients not drinking alcohol before and after the injury was 3 times higher compared to those drinking alcohol before and after the injury, OR 2.89(1.29-6.44) ,p-value (0.010).

CHAPTER FIVE: DISCUSSION

5.1 Prevalence of post traumatic stress disorder (PTSD)

The prevalence of PTSD in adult orthopaedic trauma patients in this study was 17.85% which is comparable to the prevalence of PTSD of 13.3% among motor MVA survivors in Kenya. This also agrees with documented values for middle income and developed countries (15, 33-35). However a study in Nigeria documented a prevalence of 26.7% among road traffic accident victims (50) which is slightly higher than in other African countries. This could have been due to the smaller sample size (151) and also the study included only road traffic accident victims and not other forms of trauma as was the case in our study.

In this study, the likelihood of diagnosing PTSD increased with an increase in the time interval of injury to the interview with a statistically significant finding for patients of greater than 12 months duration of injury at bivariate analysis. The adjusted odds after multivariate analysis of PTSD diagnosis after 12 months duration of injury was twice that for the first three months but was not statistically significant which could be as a result of the sample size being small or due to interaction of variables at multivariate analysis. This finding is consistent with other studies (11, 31, 35) but is at variance with others (7, 13, 32, 33, 36). These differences in findings could be as a result of differences in study populations, methodology, and study design, period at which patients were interviewed and other sociodemographic factors that could have affected the prevalence of PTSD such as married respondents were less likely to develop PTSD.

It was found that even though majority of the patients with PTSD were involved in motor vehicle accidents (66%), the odds of PTSD among those involved in falls (19%) and assault (9%) was 18% more and twice that of motor vehicle accidents respectively but was however not statistically significant which could be as a result of the sample size being small. The proportions of the mechanisms of injury or cause of accidents is similar to that reported in a study in the US (11). Also the increase in the likelihood of PTSD development in patients in a fall or assault is consistent with findings in studies that found lower mental scores in patients involved in intravehicular and extravehicular accidents, simple falls, falls

from heights and occupational accidents which was attributed to increased anxiety related to these forms of trauma negatively affect the mental status of the patients(51, 52)

In this study it was found that the likelihood of PTSD among patients who were gainfully employed before and after orthopaedic trauma (i.e Government or privately employed) was over 30% more than those who were unemployed but was reduced by 19% among the self-employed. Also it was found that Patients who had an annual income of more than 5 million Ugandan Shillings (about 2000 US dollars) had slightly higher odds of developing PTSD.

However these associations were not statistically significant. This finding compares to other studies that found a positive association between loss of job and development of PTSD following accidents(44, 50) This could be as a result of the fear of disruption of business and loss of finances or loss of one's job after an orthopaedic trauma more so among those who were either privately employed or employed by Government as compared to the self-employed. Also post- trauma factors like financial difficulties have been found to be independently associated with development of PTSD(53) more so in Sub-Saharan Africa where there is poverty and most likely high dependency ratio and low patronage or limited availability of health insurance.

Despite the relatively high prevalence of PTSD found in this study, there is however no documented lifetime prevalence of PTSD in the general population in Uganda. However, a study done in Northern Uganda amongst the internally displaced ,the prevalence of PTSD was 54% which is among the highest globally(54) . Lifetime prevalence of PTSD in South Africa is 2.3%, 7.4% in Europeans and 6.8% in North Americans(55) .These variations in prevalence of PTSD in different population groups could be as a result of the different experiences of people in different situations as well as in different countries and differences in coping mechanisms to traumatic situations across continents. Variability in PTSD prevalence estimates worldwide could also be explained by different sampling strategies, measurement methods, inclusion and measurement of DSM-IV clinically significant impairment criterion, timing and latency of assessment and potential for recall bias(56)

5.2 Symptoms of post- traumatic stress disorder in orthopaedic trauma patients

In this study, 75.47% of participants with PTSD had the symptom of feeling that their life will be shortened because of the trauma (avoidance /numbing) and the least reported symptom was intense recollections 28.3 %(Intrusive recollections).

The common symptoms among participants with PTSD of >70% were flashbacks or physical reactions, avoidance of thinking of the event, numb feelings, difficulty in sleeping and nervousness. This is comparable to the study by Green Ben in patients attending PTSD clinics in a psychiatry department(40). This reveals that the symptoms of PTSD manifested by patients who have had orthopaedic trauma are not different from those of other study populations and as such same diagnostic criteria can be used in diagnosing PTSD in orthopaedic trauma patients.

It has been found that pain is one of the commonest complaints of patients with PTSD and that the severity of acute PTSD symptoms predicts the severity of later pain(37-39, 57, 58). Also recent reviews have reported that 10-50% of individuals with persistent pain meet the diagnostic criteria of PTSD and 21-80% of individuals with PTSD have comorbid pain(59, 60). In this study, it is possible that a reasonable number of patients came to the clinic because of pain even though the study was not primarily looking for the symptom of pain among participants but raises the alarm for orthopaedic surgeons to look out for symptoms of pain or PTSD among patients with chronic pain or symptoms of PTSD.

The response of patients to the question “have your fears from this injury been more difficult than the physical problems?” was such that 92.45% of those with PTSD said “yes” and 7.55% said “no”. The odds of developing PTSD among those who said “yes” was 62% more than those who said “no” but this was borderline of significance ($p=0.078$). This finding is similar with the finding by a study to the response to the question “have the emotional problems caused by this injury been more difficult than the physical problems?” which found a statistically significant relationship(11). This needs further research to come out with a conclusive recommendation to aid orthopaedic surgeons in diagnosing PTSD in trauma patients.

The association of PTSD and the presence of death in an accident was found to be statistically significant p-value (0.001) with a 75% reduction in the odds of developing PTSD in the absence of death compared to presence of death. This finding was significant after multivariate analysis adjusting for other variables. It could be used as a tool in predicting possible patients with the likelihood of developing PTSD after orthopaedic trauma. This is consistent with other studies which found high prevalence of PTSD in patients involved in accidents that someone died(13, 15)

5.3 Factors associated with post-traumatic stress disorder in orthopaedic trauma patients

5.3.1 Age and Sex

Majority of the participants with PTSD 66.04 % (35/53) were in the age group of 18-41 years which is comparable to other studies in which the younger age group had more PTSD(15, 19). However the odds of developing PTSD as one ages was over 30% more compared to the younger age group of 18-29 years but this was not statistically significant. This is similar to what was found in Nigeria(50) however a study in Iran did not find any association(35). However others found that there was an increased likelihood of older individuals developing PTSD as compared to younger individuals(2, 61). This variation in literature regarding association of PTSD and age could be due to the differences in the sample populations. Also in most African countries majority of the younger age groups are involved in traumatic situations leading to motor vehicle accidents accounting for the higher proportion in the younger age group than the elderly. However the odds of developing PTSD following trauma appears to be more likely in the older age group probably due to repeated exposure to trauma situations resulting in more stress reactions(2). Since most victims appear to be bread winners of families or are living alone without social support which might be the case in Uganda and other low income countries where there is high dependency ratio.

In this study even though the number of male participants was more than twice that of female participants, the prevalence of PTSD in females was 41.5 % (22/53) and males 58.5% (31/53) and the odds of developing PTSD in females was 51% more compared to the males but was however not statistically significant. This finding is consistent with others

studies in literature(15, 19, 41-43) . This observation has been attributed to the differences in the way men and women respond to danger and express distress in similar trauma situations such that women use more dissociative defense mechanisms than men which gives rise to the increase prevalence of PTSD(62, 63).

5.3.2 Marital status

In this study it was found that Married participants before/ after injury were found to have lower prevalence of PTSD compared to those who were single (18% more), divorced (51%more) or widow/widower (2 times more) before / after injury but this was not statistically significant.

This finding is similar to studies found in Spain among MVA survivors, and in the general population of South Africa and the rest(19, 44, 55) This finding however disagrees with the study that was done in Kenya where the prevalence of PTSD was higher among the married than the previously married or unmarried(15). These variations are expected in that psychosocial support in married persons varies from place to place and could either be positive or negative and in the case of a previously married person, stress from the circumstances surrounding separation or death of a partner could influence the presence or absence of PTSD as well as the gender variations of participants.

5.3.3 Previous psychiatric comorbidity, Alcohol consumption/History and Smoking / history of smoking.

The history or presence of mental illness in the participant or in his/her family increased the odds of developing PTSD by 33% and 7% respectively compared to absence of mental illness in participant or family but was not statistically significant. This is consistent with studies that identified an association between the history or presence of comorbid depressive or anxiety disorder in patient or family (19, 45, 46, 64) . However the study in Kenya reported a lower prevalence of PTSD among those with history of psychiatric illness even though those with previous psychiatric history had a higher risk for developing PTSD (15) .This disagrees with the study in Spain(44).

Also the odds of developing PTSD in participants not drinking alcohol was twice those drinking alcohol and was statistically significant. After multivariate analysis, the adjusted OR was statistically significant (p-value=0.010). This was not consistent with a study among veterans in Holland in which there was no relationship between alcohol consumption and PTSD(65). It's also not consistent in other literature (even though the study participants are different) in which PTSD was associated with alcohol dependence or abuse(18, 66-69). Since it is believed that alcohol use serves as a form of self-medication to relieve psychological suffering(70) this might explain the finding in this study among those not drinking alcohol. Probably the absence of alcohol lead to more psychological suffering from their injury leading to a higher likelihood of PTSD development in this group of patients compared to those drinking alcohol and most likely not addicted to it.

Also the odds of developing PTSD in non-smokers was twice compared to smokers but this was not statistically significant. This could be as a result of chance, bias or confounders since most (88%) of the enrolled patients were non-smokers. This finding disagrees with other studies which reported an increase in the likelihood of PTSD among smokers(65, 71). Our finding is somewhat consistent with the general notion that smoking is another habit which has the potential of reducing psychological tension or stress. This could be the reason why non-smokers in our study had a higher likelihood of PTSD than smokers.

Further studies into the association between alcohol use or dependence, smoking and PTSD among orthopaedic trauma patients are necessary.

5.3.4 Educational level

In this study 87% of the patients with PTSD had at least primary education and the association of PTSD and educational level was pointing more towards a decrease in prevalence as one attains a higher educational level compared to illiteracy but was not statistically significant. This could have been due to the fact that as people become more educated they become more financially independent, have more psychosocial support from family and better coping mechanisms to stressful situations. The finding was consistent with what was found in Spain where there was no significant association between PTSD and post-primary education(44) This was not consistent with what was found in Kenya where patients with post primary education had a significant risk of developing PTSD than those

with lower level of education (15). This could be as a result of the differences in stress exposure among the educated in the populations.

5.3.5 Anatomic site of injury and injury severity

There was a statistically significant association between spine injury as an anatomic site with the development of PTSD compared to upper limbs, OR 3.45(1.20-9.91) and p-value (0.022) and more than one anatomic site had a higher likelihood of developing PTSD. This finding was consistent with a study that found lower mental scores among patients with spine injuries and combined anatomic site injuries(51) . However further multivariate analysis in our study with adjusted odds ratios found no statistical significance meaning the finding could have been as a result of confounders.

The association of the severity of injury with PTSD was such that the odds of developing PTSD in participants with injuries of moderate severity was 10% higher compared to those of severe injuries but was not statistically significant. It was expected that PTSD should have increased with the increase in the severity of injury as in other studies(35, 72) but there was rather a decrease in this study which could be due to low variability in the categorization of the severe and moderate injury in this study. However in other studies there was no association between severity of injury and PTSD or psychological problems (13, 33, 73).

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

1. The 6-months prevalence of PTSD in adult orthopaedic trauma patients attending the out-patients clinic of Mulago hospital was 17.85% meaning that the presence of this problem in our trauma patients is significant and has clinical relevance to management of the patients. This is comparable to other African countries like Kenya and Nigeria as well as in America, Europe and Middle East.

2. Over seventy percent (75.47%) of participants with PTSD had the symptom of feeling that their life will be shortened because of the trauma (avoidance /numbing) and the least reported symptom was intense recollections 28.3 % (Intrusive recollections).

The common symptoms among participants with PTSD of >70% were flashbacks or physical reactions, avoidance of thinking of the event, numb feelings, difficulty in sleeping and nervousness. The response of patients to the question “have your fears from this injury been more difficult than the physical problems?” was 92.45% of those with PTSD said “yes” and 7.55% said “no”. The odds of developing PTSD among those who said yes was 62% more than those who said no but this was not statistically significant.

3. Factors such as anatomic site (spine), presence of death in an accident, duration of injury >12 months and no alcohol consumption in patients had a significant association with PTSD development after univariate analysis. But after multivariate analysis adjusting for these factors, presence of death in an accident and no alcohol consumption had a significant association with PTSD development in patients.

6.2 Recommendations

1. This study has shown that the prevalence of post-traumatic stress disorder in orthopaedic trauma patients is significant and its difficult to identify at risk factors but the study has pointed out some significant at risk factors (presence of death in accident and absence of alcohol consumption) that can be used by practitioners to suspect the possible development of PTSD.
2. There should be a collaboration between the Orthopaedic department and Mental health department of Mulago hospital to ensure a holistic management of trauma patients taking care of both their physical and psychological needs at the same time to promote better functional and occupational outcome of these patients.
3. Given the fact that, over 70% of our study participants and 66% of patients with PTSD were involved in motor vehicular accidents. All stakeholders and government should disseminate this information and promote road safety measures such as; use of seat belts, enforcement of speed limits, law enforcement on traffic offenders ,road infrastructure development and maintenance to reduce the incidence of road traffic accidents.
4. Further prospective studies are recommended in orthopaedic trauma centres to document the prevalence, factors associated with PTSD and the outcomes of PTSD in Orthopaedic trauma patients most especially in Africa.

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APPENDICES
APPENDIX I: BUDGET

ITEM	QUANTITY	UNIT COST	TOTAL COST
<i>Capital expenses</i>			
Flash Disc	1	50,000	50,000
Printer		400,000	400,000
<i>Recurrent/ Stationary expenses</i>			
Internet services		45,000per month By 12	540000
Photocopying and Printing			400,000
Wages of two research assistants for period of study		400,000 by 2	800,000
Data analysis fee			1000000
Sub total			4,590,000
Miscellaneous			459,000
Total			3,649,000 Ugandan shillings Dollars=1520.42

Justification of the Budget

Recurrent costs

A number of costs will be incurred on stationery; printing and photocopying of the proposal and dissertation, including binding. Other costs include the internet services due to irregularities in our internet services at the department; telephone communication for coordination during the research and wages of research assistants who will help collect data and refreshment for patients who will consent for the administration of the rather lengthy questionnaire.

Fixed costs

The printer and tonner will be used to produce the proposal and questionnaires. Facilities for data backup will also be purchased.

APPENDIX II: STUDY TIMETABLE

Study Period- July 2012- June 2014

ITEM	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J				
Proposal development	█																											
Presentation at dept and faculty					█																							
Data collection and entry									█																			
Data Analysis												█																
Dissertation write-up and submission																	█											

APPENDIX III: QUESTIONNAIRE

PREVALENCE OF POST-TRAUMATIC STRESS DISORDER AND ASSOCIATED FACTORS IN ORTHOPAEDIC TRAUMA PATIENTS SEEN AT MULAGO HOSPITAL.

Patient Reg No-----

Research Questionnaire

No—

Investigator-----

Date

A Socio- Demographic data

1. Age (yrs)

2. Sex 1. Male
2. Female

3 Marrital Status before Injury 1. Married(Co-habiting) 2. Single
3. Divorced 4. Widow/Widower

4 Marrital status After Injury 1.Married 2.Single 3. Divorced
4 Widow/Widower

5 Educational level 1. Illiterate 2 Primary/Secondary
3 University/college(post-secondary)

6. Employment Status before injury 1.Unemployed 2 Self-Employed
3 Government 4 Private employed

7 Employment Status after injury 1Unemployed 2 Self-Employed
3 Government 4 Privately employed

8. What is your income in a year ?

1 Less than 1 million 2 One million to 5 million
3 Greater than 5 million

9. Have you been involved in an orthopaedic trauma prior to this present injury?

1 Yes 2 No

B Mechanism of Injury

10. Motor-Vehicle Accidents-
1. Motor-vehicle/pedestrian collisions
2. Motor-vehicle collisions
3. Motorcycle/pedestrian collision
4. Motorcycle/motorcycle collision
5. Motorcycle/Motor-Vehicle collision
6. Bicycle /Motorcycle or Vehicle
11. Falls from --- 1. Building
2. Tree
3. Moving vehicle
12. Gunshot
13. Assault
14. Others

C Orthopaedic Injury Characteristics

15. Anatomic site of Injury
1. Upper limb 2 Lower limb 3 Pelvis 4 Spine
16. Type of injury. 1 Open Fracture 2 Closed fracture 3 soft-tissue injury
17. Severity of Injury. 1 Severe 2 Moderate 3 Mild
18. First point of care. 1 Traditional Bonesetters 2 Clinic/Hospital
19. Duration after Injury. 1. 1 -3 Months 2. 3- 6 months
3. 6 -1year 4. >1year
20. Did anyone die in the accident? 1.Yes 2. No

21. Have your fears from this injury been more difficult than the physical problems?

1. Yes 2. No

D Social/Family history

22. History of past Mental illness 1. Yes 2. No

23. Family History of Mental illness 1. Yes 2. No

24. History (Present) of Smoking 1. Yes 2. No

25. History(Present) of Alcohol Consumption 1. Yes 2. No

PTSD DIAGNOSIS CHECKLIST (Adapted from DSM-IV)

POSTTRAUMATIC STRESS DISORDER

I1 Have you ever experienced or witnessed or had to deal with an extremely traumatic event that included actual or threatened death or serious injury to you or someone else ?

1.Yes 2.No

I2 During the past month, have you re-experienced the event in a distressing way **.(Intrusive Recollections)**

1.Dreams Yes No

2. Intense recollections Yes No

3. Flashbacks or physical reactions Yes No

IS 1 OR MORE OF I2 ANSWERS YES? Yes No

I3 In the past month (Avoidance/Numbing)

1. Have you avoided thinking about the event, or have you avoided things that remind you the event ? 1.Yes 2. No

2. Have you had trouble recalling some important part of what happened ?
1.Yes 2. No

3. Have you become less interested in hobbies or social activities ? 1. Yes 2.No

4. Have you felt detached or estranged from others ? 1.Yes 2.No

5. Have you noticed that your feelings are numbed ? 1.Yes 2.No

6. Have you felt that your life would be shortened because of this trauma ?

1.Yes 2.No

ARE 3 OR MORE I3 ANSWERS CODED YES ?

Yes No

I4 In the past month (Hyper-arousal)

1. Have you had difficulty sleeping ? 1.Yes 2. No

2. Were you especially irritable or did you have out bursts of anger ? 1Yes 2.No

3. Have you had difficulty concentrating ? 1Yes 2.No

4 Were you nervous or constantly on your guard ? 1.Yes 2 No

5 Were you easily startled ? 1 Yes 2 No

ARE 2 OR MORE I4 ANSWERS CODED YES ?

Yes No

I5 During the past month, have these problems significantly interfered with

Your work or social activities, or caused significant distress 1.Yes 2.No

IS I5 CODED YES ? NO YES

POSTTRAUMATIC STRESS DISORDER

NO YES

Severity of physical injury will be classified into;

Severe- Multiple trauma, pelvic fractures, orthopaedic trauma injury requiring more than 24hrs stay in intensive care.

Moderate- Open or close fracture/soft tissue injury that stayed more than 72hrs before discharge from hospital.

Minor – Open or closed fracture/soft tissue injury that was treated and discharged within 24hrs

APPENDIX IV: CONSENT FORM

Title of study

Prevalence of post traumatic stress disorder and associated factors in orthopaedic trauma patients seen at Mulago hospital.

Investigator Dr Buunaaim Alexis D.B . Department of Orthopaedics Makerere University
Tel-0789956029 E-mail [_abuunaaim@yahoo.co.uk](mailto:abuunaaim@yahoo.co.uk)

Introduction

We are conducting a study to determine the prevalence of post traumatic stress disorder and its associated factors among adult orthopaedic trauma patients seen at Mulago hospital at least a month after their injury. This condition is one of the commonest psychiatric sequelae of patients exposed to trauma and happens to affect their, functional and occupational outcome after fracture treatment.

A questionnaire containing a number of questions will be administered to you after you have consented to participate in the study by me or a research assistant.

Significance of this study.

The study will help the orthopaedic surgeons that treat you understand the extent of this condition among their patients and also identify the factors associated with this condition so us to be able to refer you to the department responsible for the treatment of such conditions in time to prevent the condition from becoming chronic in you.

Risk of study

There is no identified risk associated with you being a participant of this study.

Benefits

The direct benefit of the study to you as an individual is that, if you are diagnosed of the condition under study you will be referred immediately to the department responsible for the treatment for such conditions for management. Also many other patients of the department of orthopaedic will benefit in future since this study will set the basis for the development of protocols for the diagnosis and management of patients with such conditions after orthopaedic trauma.

Cost of being a participant

Your participating in this study will not cost you anything financially.

Confidentiality

Information related to you will be treated in strict confidence to the extent provided by law. Your identity will be coded and will not be associated with any published results.

Rights as a participant

Your participation in this study is voluntary and you may withdraw from the study at any time if you so wish. Declining to participate in this study shall not jeopardize your medical treatment from Mulago hospital in anyway and shall not affect your relationship with Makerere College of Health Science. Should you at any one time have any queries with this research study especially in regard to your personal rights, you may contact the Chairman of ethics committee Dr Erisa Mwaka on +256 752575050.

Voluntary consent

I wish to declare that all the above have been explained to my understanding and all my questions answered. I have also been told in case of any questions in future concerning this study, the following can be contacted;

Dr Buunaaim Alexis D.B	Principal investigator	0789956029
Dr Sekimpi Patrick	Supervisor	0772470060
Dr Bangirana Alex	Supervisor	0772498313
Dr Abbo Catherine	Supervisor	0712700474

By signing this form I hereby voluntary agreed to be part of the study.

(Name of participant) (Signature of participant and Date)

(Name of person obtaining consent) (Signature of person obtaining consent/date)

(PI or Designee) (PI or Designee) and date

APPENDIX V: TRANSLATED CONSENT FORM –LUGANDA VERSION

OKUNYONYOLA N’OKUKKIRIZA – MU LUGANDA

OMUTWE OMUKULU:

Okunonyeleza ku bunji bwobulwadde bwomotwe obuva ku kwelalikilila oluvanyuma lwokufuuna obubenje mu balwadde bamagumba mu dwaliro ekullu erye Mulago.

Anoonyelezza: Dr Bunaaima Alexis D.B. Okuva mu dipatimenti yamagumba mu tendekeero lya Yunivasite ye Makerere.

Enamba; 0789956029 Ku Yintaneeti: -abuunaaim@yahoo.co.uk

Okwanjula:

Tukoola okunonyelezza ku bulwadde bwomotwe obujja oluvanyuma lwokugwa ku kabenje, nebintu ebinyinza okwekuusa ku bulwadde bunno mu balwadde bamagumba abalabibwa mu dwaliro lye’mulago oluvanyuma lwomweezi gummu okuyitawo nga baggudde ku kabenje. Obulwadde bunno bwebumu ku biva mu kugwa kububenje obumenya amagumba notuuka okwetagisa okujanjaba amagumba.

Foomu emu erimu ebibuuzo ebikukwatako eja kujuzibwa oluvanyuma lwokukiriiza okwetaba mu kunonyeleza kunno era nokussa omukono ku ndagaano eno.

Amakulu gokunonyeleza kunno:

Okunoonyeleza kunno kujja kuyamba abasaawo aba’magumba okumanya obunji bwobulwadde bunno era nebintu ebibwekuusako basobole okubanoonyeza obujanjabi obutuufu era nokubasindiika mu basaawo abatuffu bwekinnaba nga kyetagisizza olemme kulwawo nabalwadde bunno!

Obubenje mu kunonyeleza kunno:

Teri kabenje kajja kutuukako olwokusalawo okwetaba mu kunonyeleza kunno kamanyiddwa.

Ebyokuganyulwamu:

Oyo anaba azulidwa nobulwadde bunno anaganyulwa okufunirwa obujanjabi obwamangu era nemubissera ebijja ebinaava mukunonyeleza kunno binakozesebwa nga omusingi okunonyelezako abo abanaba bafunye obulwadde bunno.

Ebisaale byokweetabamu. Teri misoso gya ssente ginakutekebwako olwokukiriza okwetaba mu kunonyeleza kunno. **Ebyaama:**

Eddembe lyo nga eyetabyeemu:

Okweetabamu kunonyeleza kunno kwabwa nakyewa era oli waddembe okuvaamu wobeera oyagalidde. Okugaana okweetaba mu kunonyeleza kunno tekujja kujjako ddembe lyo lyokujanjabibwa mu dwaliro lye mulago oba okukosa enkoolagana yo nabasaawo abaava mu tendekeero lyabasawo erye makerere. Era bwonabeera nekyewebuuza ku kunonyeleza kunno naddala ebikwatta ku ddembe lyo, oli waddembe okubiira ssentebe wa kakiiko akakwasa empisa mu makerere ku namba ye'essimu Dr Erisa Mwaka **+256 752575050**.

Ebikukwatako byona binatwalibwa nga byakaama nga amateeka bwegalagiira era erinya lyo linaaba lyekusiifu nga buli omu wakuweebwa enamba eyekyaama nga yenkozesebwa so si erinya!

Endagaano yokukiriza:

Nzikiiza nti byonna ebyawaggulu binyonyodwa era ebibuuzo byange byonna bididwamu. Era nga nsoboola okwebuuza ku bantu banno wamanga.

Dr Buunaaim Alexis D.B	Anoonyeleza omukulu	0789956029
Dr Sekimpi Patrick	Akubiriiza kunonyeleza	0772470060
Dr Bangirana Alex	Akubiriiza kunonyeleza	0772498313
Dr Abbo Catherine	Akubiriiza kunonyeleza	0712700474

Okussa omukono gwange ku ndagaano eno kilaaga nti nakiriiza obwa nakyewa okuba mukunonyeleza kunno.

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(erinya lye'yetabyemu)	(omukono gwo nenaku zomwezi)
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(erinya lyoyo akuuwa endagaano eno)	(omukono gwoyo akuwa endagaano eno)
(anoonyeleza omukulu/omutuume)	(anoonyeleza omukulu/omutuume).