POST OPERATIVE PAIN THERAPY PRESCRIBING PATTERNS AND ADEQUACY OF POST OPERATIVE ANALGESIA, AT MUHIMBILI NATIONAL HOSPITAL DAR ES SALAAM TANZANIA

BY

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CERTIFICATION

The undersigned certifies that he has read and hereby recommends for acceptance by the University of Dar es Salaam a dissertation entitled: "Post operative therapy prescribing patterns and adequacy of post operative analgesia at Muhimbili National Hospital, Dar es Salaam" in partial fulfilment of the requirements for the award of Master of Medicine General Surgery.

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Date.....04 November 2004.....

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I declare that, this dissertation is original work of my own making and that it has not been submitted to any other University or academic institution for a similar or any other academic award.

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DEDICATION

To my father Mr. Wilbert Shitaeli Makia who passed away during the execution of this study.

ABSTRACT

A study was done to observe the post operative analgesics, pattern of prescription and adequacy of post operative analgesia in patients undergoing major surgery in the surgical and gynaecological wards at Muhimbili National Hospital.

The objectives of the study were to determine the pattern and adequacy of analgesia within 48 hours post operatively. Two hundred and fifty patients were recruited in the study. The prescribing patterns of post operative analgesics was recorded and each patient had to evaluate their pain perception by the use of a numerical visual analogue scale provided to them at 12, 24 and 48 hours post operatively.

In this study all patients who had surgery were given post operative analgesics. Pethidine was the most frequently prescribed analgesic. Ninety eight percent of the patients received this drug. Only 2% received Diclofenac sodium as the only post operative analgesic. Fifteen percent received both Pethidine and Diclofenac sodium for post operative pain. Both analgesics were given parenterally. Most common prescription was parenteral pethidine 100mg at eight hourly intervals for 24 hours.

It was shown in this study that 60% of patients recorded the intensity of pain as severe to intolerable within the first 12 hours. In the second 12 hours the proportion of patients who rated their pain as severe to intolerable was 19% and mild to moderate was 76%. At 48 hours post operatively three percent of the patients rated their pain as severe to intolerable pain. Seventy six percent rated mild to moderate. Postoperative pain management was found to be inadequate at Muhimbili Hospital in

98% of patients undergoing major surgery. It was observed that administration of analgesics was irregular. Most of the attending surgeons preferred prescribing pethidine at an eight hourly interval for 24 hours which was not the recommended frequency. In conclusion, the management of postoperative pain in Muhimbili National Hospital among surgical and gynaecological patients is inadequate. In an attempt to rectify the practice, there is need to update the knowledge of nurses and doctors on pain management.

Table of Contents

Certification ii

Declaration iii

Acknowledgement iv

Dedication vi

Abstract vii

List of contents ix

List of tables xi

List of figures xiii

CHAPTER ONE

1.1.0 Introduction 1

1.2.0. Literature review 5

1.2. Definition of Pain 5

Pathophysiology of pain 5

Methods of pain assessment 7

1.2. Complications of pain 9

1.2.2 Factors influencing need for analgesia 10

1.2.3. Methods of achieving pain relief 11

1.2.4 Types of Analgesia 11

Opioids 11

Non steroidal anti-inflamatory drugs (NSAIDS) .. 13

1.2.5. Routes of Administration 13

Intramuscular route 14

Intravenous route 14

Spinal route 14

Epidural Blockade 15

Oral and rectal routes 15

1.2.6 Patient controlled analgesia 16

CHAPTER TWO

2.0. Problem statement 17

2.1. Rationale of study 18

CHAPTER THREE

3.0. Objectives 20

3.1. Broad Objective 20

3.2. Specific objectives 20

CHAPTER FOUR

4.0. Methodology 21

4.1. Study design 21

4.2. Study period 21

4.3. Study area 21

4.4. Study Population 21

4.5. Methods 22

4.6. Sample size and analysis.. 24

4.7. Ethical considerations 25

CHAPTER FIVE

5.1. Results.. 26

5.2. Discussion 45

5.3. Conclusions 52

5.4. Recommendations 53

5.5 Limitations of the study 55

6.0. References 56

6.1. Appendices 63

LIST OF TABLES

1. Age and sex distribution 27

2. Types of Surgery 28

3. Doses and frequency of Pethidine prescription 29

4. Doses and frequency of Diclofenac Sodium

Prescription 30

5. First record at 12 hours post operative pain

perception.. 31

6. Second record at 24 hours post operative pain perception.. .. 32

7. Third record at 48 hours post operative pain perception 32

8. Correlation of frequency administration of Pethidine and pain

Perception in the first record at 12 hours post operation 34

9. Correlation of frequency of administration of pethidine and

Pain perception in the second record at 24 hours

Post operative 34

10. Correlation of frequency of administration of pethidine and
Pain perception in the third record at 48 hours post operative.. 35
11. Effect of Age in the First 12 hours post
Operative pain perception 38
12. Effect of Age at 24 hours post operative
pain perception 38
13. Effect of Age at 48 hours past surgery 39
14. Correlation of sex and pain perception in first
Record at 12 hours 41
15. Correlation of sex and pain perception in second
Record at 24 hours 42
16. Correlation of sex and pain perception in third
Record at 48 hours 42

LIST OF FIGURES

1. Correlation of frequency of administration of pethedine And pain perception in the first record at 12 hours post Operatively 36

2. Correlation of frequency of administration of pethedine and Pain perception in the second record at 24 hours post operatively 36

3. Correlation of frequency of administration of pethedine and pain Perception in the second record at 48 hours post operatively 37

4. Pain perception between males and females In first 12 hours 39

5. Pain perception between males and females in Second 24 hours 40

6. Pain perception between male and females in third 48 hours 40

7. Correlation between Age and pain perception in the first 12 hours 43

8. Correlation between Age and pain perception in Second 24 hours 43

9. Correlation between Age and pain perception in Third 24 hours 44

CHAPTER ONE

1.1.0. INTRODUCTION

Acute postoperative pain and its therapy is a great challenge for all health care providers in surgical disciplines[1]. Despite development of new analgesic drugs and different therapeutic modalities in pain management, acute post operative pain represents a negative experience for many surgical patients. Reasons of efficacy of analgesic therapeutic methods are multiple, one of them is the attitude of patients and health workers to pain[1,2]. Many of them consider pain as a natural and physiological consequence of different diseases and moderate to severe pain may be considered by some as acceptable consequence of surgery[3]. Another important factor is that severity of pain is not assessed and patients are reluctant to complain. To achieve optimal analgesia, pain management should be well understood by those providing this care.

A study done at the MNH 1994 by Mwafongo and Yongolo[4], showed misconception about analgesia in post-operative care among nurses, a factor that may contribute considerably to failure of adequate pain relief for patients. The aim of any medical practitioner is to cure disease, eradicate pain and alleviate suffering in any disease process. This may be achieved through various medical treatments including surgery and analgesia. One of the concerns of a surgeon is to eliminate pain in a patient. Diagnosis of pain and adequacy of its treatment in surgery is therefore of paramount importance. Post operative analgesia should provide objective comfort, in addition to inhibiting induced nocioceptive impulses responding to pain and

subsequently enhance restoration of function by allowing the patient to breath, coug
and ambulate easily[5].

HISTORICAL BACKGROUND

The history of pain relief is as old as medicine itself. Opium and alcohol had long been used as analgesics and people who lived in the beginning of the Christian era mentioned that the root of Atrop Mandragora (Mandarake) steeped in wine was given to patients before facing the knife[6] . Patients undergoing surgery were given a sponge which was soaked in opium, mandagora and hyoscalamine (henbane) to sniff and inhale before surgery to provide analgesia. Relief of pain in medical practice has since then been of concern by use of analgesics for temporary or permanent interruption of nocioceptive impulses. It was as early as 1800 when Sir Humphrey Davy recognised the analgesic properties of nitrous oxide and suggested its use for relief of the pain during surgery[7]. Dr. Sigmund Freud studied the several stimulant effects of cocaine and in 1884 Dr. Carl Koller tasted cocaine and noted that his tongue had become numb. He realized that cocaine was a potential topical anaesthetic[8]. Later in 1884 the first spinal block using cocaine was performed by Dr. Leonard Corning and fourteen years later cocaine for spinal block was used readily for surgical operations[8,9].

In 1901 two French physicians Dr. Jean Sicard and Dr. Fernand Cathlin, developed the less dangerous extradural (epidural) technique[10]. The development of anaesthesia and analgesia initially in the mid 1800 and the major advances in the 19th Century and throughout the 20th Century has enabled progress in pain relief in surgical and obstetric practices[11]. In ancient times, medicine plant derivatives were used such as cannabis, mandarake and opium and these were administered by inhalation or taken orally. In the year 1805 morphine was isolated from opium by

Freidrich Serturner[12,13]. Fifty years later after the development of the hypodermic needle and syringe, the parenteral route was initiated [13]. By this invention the adequacy of analgesia improved , leading to the developments in administration of analgesia by various routes.

LITERATURE REVIEW

1.2.0. Definition of Pain

Pain is a complex phenomenon involving physical, physiologic, psychologic and emotioned components[14]. The International Association for the study of pain defines pain as "An unpleasant sensory and emotional experience associated with actual or potential tissue damage" [15]. Based on this definition by the International Association for the Society of Pain, only patients can accurately describe their own pain.

Pain is anticipated following a surgical procedure. Measures can be instituted to minimize or completely eliminate pain after surgery. For this reason, analgesics are prescribed to relieve pain in patients who have undergone surgery. Analgesics such prescribed can be administered through various routes at an optimal dose and frequency.

Pathophysiology of pain

Pain as seen in surgical practice, is a result of primary activation of visceral or somatic nociceptors which are sensory receptors in body tissues. These nervous receptors which respond to extreme pressure temperature and other painful stimuli are connected to the rest of the nervous system either by myelinated or non-myelinated neurons. The axons of peripheral nerves are divided according to their sensory conduction velocity into A, B, C fibres. The A-Fibres are subdivided into Aα, Aβ, Aγ and Aδ in descending order of conduction velocity. A and B nerve fibres are myelinated, while the C nerve fibres are not myelinated. The Aδ fibres are

connected to the dorsal horn cells of the spinal cord through myelinated Aδ nerve fibres.[14] Aδ nerve fibres are sub divided into two groups; Those with small diameter and the other group with large diameter myelinated nerve fibres. This type of nerve fibres have nociceptors which are located mainly in the skin. They are activated by noxious stimuli such as pressure, ischaemia and trauma. The small diameter Aδ nerve fibres are also known as types II and types III are located in muscles and these carry pain sensation. The smallest myelinated C nerve fibres are also known as type IV which are located in smooth muscles and do carry pain sensation as well.

C nociceptors which are also reffered to as polymodal, are connected to the spinal cord dorsal horns cells via small diameter unmyelinated C afferent nerve fibres. They are polymodal because of their ability to respond to a mechanical, thermal or chemical stimulus. The stimulation of C-polymodal nociceptors in deep situated tissues such as muscle leads to the development of slow onset of pain characterised by ill defined dull ache as a result of the effects of substances released by damaged cells i.e. bradykinin, histamine, leukotrines, prostaglandins, platelet activating factor, serotonin and substance P released from sensitised C-Sensory afferent[15].

Melzack and Wall (1965)[16] developed the famous theory on pain mechanism which postulated that in each dorsal horn cell of the spinal cord there is a gate like mechanism which inhibits or facilitates the flow of afferent impulses into the spinal cord before it evokes pain perception and response. The theory stated that the opening or closing of the gate is dependent on the relative activity in Aβ (large

diameter fibres) and the Aδ and C small diameter fibres. The large diameter fibres tend to close the gate and activity in the small diameter fibres tend to open it. The gate control theory proposes that the substansia gelatinosa in the spinal cord is the essential site of control. The control mechanism is referred to as a gate[17]. Pain impulses can only pass through when the gate is open. If nociceptive input exceeds Aβ fibre input then the gate is open and the pain impulse ascends the spinal cord to the brain. If Aβ input exceeds nociceptive input then the gate is closed and the pain impulse is stopped or diminished due to the action inhibitory neurotransmitters[18].

Methods of Pain Assessment

In the studying of pain in patients one has to measure it. It is essential to measure pain so as to have an objective way of assessing response. There are various methods of pain assessment. One such method of measuring pain is by the use of Visual Analogue Scale (VAS) and this consists of either a vertical or horizontal line with either verbal, numerical or pictorial anchors indicating "no pain" up to "severe pain". The verbal rating scale specifically has only words along the line which indicate No pain, mild pain, moderate pain, severe and worst pain[19].

Verbal Rating Scale

|____|____|____|____|____|____|____|____|____|____|

No pain **Mild** **Moderate** **Severe** **Worst**

The numerical visual analogue scale, also known as the graphic rating scale has numerical anchors ranging from 0-10. Whereby '0' represents "no Pain" and "10" represents "intolerable pain".

Graphic Rating Scale

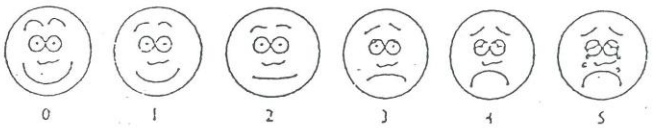
|____|____|____|____|____|____|____|____|____|____|____|

0 1 2 3 4 5 6 7 8 9 10

No pain Intolerant pain

Post operative pain from the 0-10 line can be graded using the duration – Intensity behaviour scales, as no pain, mild, moderate severe and intolerable. Mild pain represents a pain score 1-3. which is a sense of discomfort that can be ignored and does not prevent the patient from sleeping. Moderate pain: represents a pain score ranging from 4-6, this is pain that may disturb the patients sleep but does not prevent the patient from sleeping altogether. Severe pain represents a pain score ranging from 7-9, this is pain that prevents the patient from sleeping. Intolerable pain represents pain scale of 10 this is pain that makes the patients not able to withstand the pain.

Pain Faces Scale



0 = VERY HAPPY, NO HURT
1 = HURTS JUST A LITTLE BIT
2 = HURTS A LITTLE MORE
3 = HURTS EVEN MORE
4 = HURTS A WHOLE LOT
5 = HURTS AS MUCH AS YOU CAN IMAGINE
(Don't have to be crying to feel this much pain)

Pictorial scales are also referred to as the Face rating scales. These are developed primarily for the use with young children. However faces pain rating scale are also used with adults who have difficulty in using the numerical or graphic visual analogue scale. The most commonly used is the Wong Baker faces pain rating scale [20]. It is a visual scale and administered on a 0-5 scale facial expressions suggesting various pain intensities. A study by Bodian et al concluded that pain in individuals can be well measured in research studies by the use of visual analogue scales [21].

1.2.1. Complications of Pain

Unrelieved pain after surgery is often unhealthy. Fortunately it is preventable or controlled in majority of cases. After major abdominal surgery post operative analgesics significantly reduces post operative ileus and pulmonary complications such as atelectasis. It has been noted also that the risk of thrombo-embolic complications following lower body procedures is minimized[22,23,24]. Pain control

may have further benefit of improving clinical outcome by reducing the incidence of postoperative complications. The patient perception of pain may result in involuntary reduction of movement in the thorax and abdominal area referred to as "muscle splitting" which means muscle contraction. As a result of muscle splitting the patient is unable to cough and clear secretions leading to atelectasis[25]. Post operative pain may result, into a neurogenic shock. This comes about due to loss of vasomotor tone control, expansion of venous capacitance bed with peripheral pooling of blood, leading to inadequate ventricular filling. This manifests as an abrupt fall in blood pressure[26].

1.2.2. Factors influencing need for analgesia

As perception of pain is different in different individuals, there are factors which influence need for analgesia such as age, sex and other individual characteristics such as being intolerant of any discomfort to self-control of pain. Male patients operated and are given post operative analgesia had a high pain rating score during the post operative period in comparison to the female patients[27]. This accounts for individual variation in response to pain threshold. Site of operation may have a relationship with pain perception. In a study done by Zavala et al it was noted that the magnitude and site of surgery has significant differences on the perceived pain. Patients who underwent Orthopaedic surgery reported severe pain compared to those who underwent other procedures in General surgery and Gynecology[28].

1.2.3. Methods of achieving pain relief

Optimal application of pain control methods depends on the cooperation among health care team throughout the course of treatment. Inadequately treated pain may be a cause of long un-anticipated hospital stay. The anaesthetic technique and the type of anaesthetics used may influence analgesic requirement in the early postoperative period. The aim of analgesia should not only be to eradicate pain but also to provide early ambulation[29]. It has been noted that physicians exaggerate the dangers of addiction and are more likely to prescribe lower does of drugs in post operative patients leading to under treatment of patients for pain control[30]. On the same tune, nurses as a result of the same thinking or other misconceptions may under treat pain.

1.2.4. Types of Analgesia

Opioids

The conventional therapy for management of post operative pain comprises a prescription of an opioid. Opioids are classified as weak and strong opioids. These terms refer to the efficacy of the drug. Strong opioid has a wider range of efficacy and relieve severe pain. Weak opioids are used in mild to moderate pain, examples of weak opioids are Codeine and Dihydrocodeine. Codeine is structurely related to morphine and it has been suggested that it's analgesic property is due to the fact that codeine is metabolized to morphine. Dihydrocodeine is a synthetic compound with similar properties to morphine[31]. Opioids may also be classified in terms of receptor site affinities[32,33]. Opioids all work to relieve pain by attaching to opioid receptors or nerve cells in the dorsal horn cells of the spinal cord, thereby causing a

decrease in transmission of pain impulse to the brain. Opioid analgesics continue to be the main type of drugs used for postoperative analgesia because of its high efficacy in pain control[33]. However one of the biggest impediments to pain relief is fear of addiction. While some believe that addiction and dependence are problems in pain patients treated with opioids, studies show that these perceptions are exaggerated[34] . In a study done at Boston University Centre out of 11,882 patients who received narcotic analgesia only 4 were found to have addiction[35]. Research has shown that in reality while respiratory depression is indeed the chief hazard of opioid use, significant respiratory depression rarely occurs in patients whose doses of opioids are appropriately prescribed[36,37]. A dose of Pethidine 4 hourly is usually optimal – Pethidine given intramuscularly is effective in pain relief for 2 to 3 hours only although most attending surgeons tend to recommend 4 to 6 hourly administration.

Tramadol is a synthetic drug, which resembles opioids in its chemical and pharmacological properties and was introduced in order to achieve good analgesia with minimal side effects possessed by other opioids. Tramadol is now established in several clinical roles, with good efficacy in pain control with a relative lack of respiratory depression, major organ toxicity or abuse potential. It is of particular value in NSAID intolerant patients, the elderly and for those undergoing day surgery[37]. While initially tramadol is considered a weak opioid, the adverse effect profile of tramadol appears to be atypical of a pure opioid agonist and this led to the discovery of its other multimodal mechanisms of action. In surgical procedures of medium magnitude, tramadol can on its own be effective analgesia in postoperative

pain. The 18 studies quoted by Mcquay and Moore showed that all doses of tramadol were superior to placebo in both post surgical and dental pain[38].

Non Steroidal anti-inflammatory Drugs (NSAIDS)

Non steroidal anti-inflammatory drugs have analgesic effects and have been used in postoperative pain control. NSAIDS inhibit prostaglandin production by decreasing peripheral stimulation of nociceptors. In a study done by Chandralekha et al it was concluded that NSAIDS offer efficacious analgesia without respiratory depression effects[39]. However it has been observed that special precautions be taken in patients with bleeding disorders and asthmatics and peptic ulcer disease patients. NSAIDS when given preoperatively reduces initiation of pain in the periphery i.e. site of surgery and decreases the inflammatory response after surgery[40].

1.2.5. Routes of Administration

Various routes of administration of post operative analgesia are available. The choice of a particular route for any one given patient depends on the surgeon's preference with the aim of achieving optimal post operative pain control in addition to other pharmacokinetic factors of a particular drug.

Intramuscular route

Post operative analgesia may be achieved by prescribing intramuscular injections on regular basis as recommended depending on the drug in question. Haines et al[41] compared pain relief after abdominal surgery in patients given either intramuscular morphine, sublingual bupremorphine or self administered intravenous pethidine. It was shown that patients, who received regular prescribed intramuscular injections had an optimal pain relief as opposed to those who had post operative analgesics given through other routes of administration. Intramuscular route although widely used has some disadvantages such as slow absorption and adequate analgesia may not be obtained immediately especially when tissue perfusion is impaired by hypotension or peripheral vasoconstriction[42].

Intravenous route

This route provides pain control as long as a steady state of concentration of drugs given are maintained above the minimal effective analgesic blood concentrations. The steady state concentrations are dependent on systemic clearance related to the hepatic blood flow. Various authors have recommended a fixed continuous infusion rate of opioids based on the initial quantity of opiods administered and this is done by assessing the patients opioids requirements using intravenous opioids until adequate analgesia is achieved[43].

Spinal route

Duration of analgesia after spinal opiods is considerably longer than the analgesic effects following intramuscular injections. In combination with spinal anaesthetics,

small doses of opioids are injected into the subarachnoid space. These bind to opioids receptors in the spinal cord. The presence of opioid receptors is of high density in the dorsal horn of the spinal cord[44]. These produce excellent analgesia with less motor sensory and sympathetic block than local anaesthetics alone. In a study done in patients following cardiac surgery, analgesia of about 36 hours duration was achieved through one intrathecal injection of morphine[45].

Epidural Blockade

Epidural block allows the rapid onset of spinal block because the epidural space is vascular and contains fat. A large proportion of the epidural dose is taken up by extradural fat and by vascular absorption and so less drug is immediately available for neural blocking action. Catheters are safely used by the epidural route for analgesic administration.

Epidural blocks have been widely used for many years to provide pain relief during labour and has become popular as an anaesthetic in operation below the umbilicus eg. prostatic surgery, gynaecological surgery and orthopaedic surgery on the lower limbs. Epidural block allows the rapid onset and dense block of a spinal block and provides post operative analgesiavia an epidural catheter. Through this catheter analgesics may be administered intermittently for pain control[46].

Oral and Rectal routes

This method is used often in mild pain. Oral analgesics may be opioids or NSAIDS likewise ano-rectal suppositories. In anal suppositories, drugs are absorbed through

the rectal mucosa entering the blood circulation. However studies have been done comparing the efficacy of the drugs administered through this route. Lau et al[47] compared Diclofenac suppositories to intravenous parental Diclofenac (Keterolac) and results showed that suppositories provided equivalent post operative analgesia following inguinal hernia repair under general anaesthesia. It was concluded in the study that Diclofenac suppository is a cheaper alternative and easier to administer than intravenous Keterolac. Other studies showed that rectal suppositories could be used in combination with opiods in order to achieve optimal analgesia[48].

1.2.6. Patient Controlled Analgesia

This technique represents one of the most significant advances in management of post operative pain management. The concept was initiated in 1971 by Sechzer[49]. In this method the patient determines the dose and frequency of administration required to maintain adequate analgesia. The patient controlled analgesia apparatus administers only single bolus doses in response to activation of the machine[49,50]. Disadvantages however have been reported such as severe respiratory depression as a result of programming errors. Not all patients are suitable for the technique, such as very sick, in coma, the very young and those who cannot understand what is required.

CHAPTER TWO

2.0. STATEMENT OF THE PROBLEM

Despite availability and use of analgesics for pain management, many deficiencies still account for inadequate postoperative pain management. Patients may continue to receive inadequate doses or infrequent administration of analgesics leading to prolonged suffering and other complications associated with unrelieved pain in surgical patients.

Studies done in various institutions have shown that patients often experience suboptimal analgesia in the post-operative period[28,30,51]. Amata et al[51] in their study to assess the adequacy and efficacy of post operative pain management, showed that all patients do experience pain post operatively in major abdominal surgery, however only sixty one percent considered their pain severe, while thirty percent rated it moderate and nine percent mild. Bagi et al[52] in their comparative study of the treatment of post operative pain and analgesic prescription, parental pethidine given through the intramuscular route done in Khartoum, showed that ninety three percent of the patients had some degree of post operative pain where in sixty four percent of the cases the pain was either moderate, severe or intolerable. Moreover in their result it was noted that only 64.2% of the patients complained of pain to the attending doctor, while the rest kept silent despite their suffering. A multicentred drug utilization study, conducted in Spain showed that the percentage of patients in each centre who suffered severe to unbearable pain varied from 22% to 67%[53].

Although there is no doubt that complete pain relief cannot always be achieved, the goal of post operative pain treatment should be complete pain relief. Despite the availability of advanced techniques in post operative pain management, studies done in various centres show that post operative pain is sometimes managed poorly. This shows that the solution to the problem of inadequate pain relief lies not so much in the development of new drugs and new application techniques but probably in the effective strategy of delivering these to patients[54] . More diligent approach to the problem is needed. Probably adequate dose and more frequent administration of analgesics be given to post operative patients. Moreover patients need to be taught that moderate to severe pain is not an acceptable postoperative sequelae in surgery.

2.1. RATIONALE OF THE STUDY

There have been many research studies to evaluate the effectiveness of post operative pain relief, and it is from these studies we learn that post operative pain management has remained unsatisfactory[55]. This should be a reason for researchers to continue studying the problem. The solution to this problem should be found in order to give good relief to surgical patients.

The reasons for inefficiencies of many analgesics and therapeutic methods are multiple varying prescribing patterns and inadequacy in administration of analgesics prescribed represent some of the reasons[56]. In Tanzania no published study has been done to find out the correlation of these two parameters and the magnitude of inadequate post operative pain relief in patients undergoing surgery. The results of

such a study may help in the setting up of guidelines for post operative pain care to our surgical patients.

CHAPTER THREE

3.0. OBJECTIVE OF THE STUDY

3.1. BROAD OBJECTIVE

To determine adequacy of post operative analgesia in patients undergoing major surgery at Muhimbili National Hospital Dar es Salaam, Tanzania.

3.2. Specific Objectives

1. To determine type and dose of analgesia prescribed within 48 hours post operatively by various attending surgeons.
2. To determine the dose and frequency of analgesic administered to each patient within 48 hours post operatively.
3. To determine the adequacy of pain control within 48 hours post operatively.
4. To determine time of onset of administration of analgesia in relation to the time of prescribing.

CHAPTER FOUR

4.0 METHODOLOGY:

4.1 Study design

This was a prospective study which was based on observation of post operative pain therapy prescribing patterns and adequacy of post operative analgesia at Muhimbili National Hospital.

4.2 Study period

The duration of the study was eleven months i.e. from February 2003 to December 2003 inclusive.

4.3 Study area

The study was conducted at Muhimbili National Hospital. This is the National referral Hospital in the country and the University teaching Hospital of the Muhimbili University College of Health Sciences (MUCHS) of the University of Dar es Salaam. The hospital receives its patients from within Dar es Salaam city, the Coast region and referred patients from the regional and district hospitals from up country Tanzania. The hospital has a bed capacity of about 1500 beds. In March 2003 the hospital renovation project was commenced necessitating closure of some of the inpatient wards and hence a reduction in number of beds and surgical output.

4.4 Study population

The study involved both females and males of the ages above eleven years. These were patients in the departments of surgery and gynaecology who underwent major surgical procedures electively or as emergencies such as Laparotomy,



Thyroidectomy, Mastectomy, Colostomy closure, Urethroplasty, Herniorraphy etc by various surgeons in the hospital.

Exclusion Criteria

All patients below the age of eleven years those with multiple trauma, blind, dumb, Diabetics and those who underwent Thoracotomy were excluded from the study. Those patients who did not consent to the study were also excluded.

Materials

A numeric visual analogue scale was provided to the patient for self assessment of pain perception when fully awake from anaesthesia within the first 12 hours, 24 hours and 48 hours of surgery.

A Salter (Bathroom scale) weighing machine was used for body weight measurements of the patients.

4.5 Methods

All patients included in the study had their age, sex and body weight documented in a questionnaire. The questionnaire was filled in by the investigator and research assistants who are intern doctors working in those units managing the studied patients. For those patients who were scheduled for an elective surgery, their body weight was measured prior to surgery. Those patients who were very sick and were scheduled for an emergency surgery were weighed when they were able to ambulate.

The patients who consented to participate in the study were given an orientation of the visual analogue scale. Those who were scheduled for an elective surgical procedure had an orientation before surgery. And for those who were operated on emergency basis were given an orientation when they had recovered from anaesthesia and could communicate.

Patients were required to fill in the visual analogue scale at 12hrs, 24hrs, 48hrs after surgery. After every 12 hour period the principal investigator or assistants gave the visual analogue scale to the patients. The patients record of pain was then entered onto the questionnaire. In all patients, the numeric visual analogue scale was the pain scale used for assessment. The time at which the first dose of prescribed analgesic was given to patient was recorded in the questionnaire and the subsequent doses given were also recorded in the questionnaire.

The study dealt mainly with type of drug, dose, frequency and route of its administration as ordered by the attending surgeon in the postoperative orders. The frequency of administration was obtained from the patients nursing and treatment charts of the cases. In circumstances whereby the patient complained of intolerable pain, additional analgesia was offered and documented. Types of analgesics commonly used for post operative pain therapy in the hospital were opioids i.e Injection Pethidine and Morphine, these were available in the hospital pharmacy. Other analgesics that were commonly prescribed included Diclofenac sodium. There were no other parenteral analgesics available in the hospital pharmacy such as Tramadol.

4.6. Sample Size

Calculation of the sample size was based on the formula in the Lecture Notes in Biostatistics [57].

$$N = Z^2 p \frac{(1-p)}{d^2}$$

Where:

z = percentage of normal distribution corresponding to level of significance. If significance level is 5% Z = 1.96

p = prevalence of patients prescribed both Opioids and NSAIDS For this study 20%

d = error taken to be 5%

$$n = \frac{(1.96)^2 \times 0.2\ (1-0.2)}{(0.05)^2} = \frac{(1.96)^2 \times 0.2 \times 0.8)}{(0.05)^2}$$

$$= 246$$

Sample size = At least 246 patients to be recruited into the study.

4.7 Data analysis

At the end of the study, all data and results obtained were analysed manually as well as using the Epi Info Version 6 program, with the assistance of a Biostatistician.

4.8 Ethical issues

Ethical Clearance for the study was granted by the Ethical Research Committee of MUCHS. According to surgical standards it is recommended that patients should possibly experience no pain during the post operative period. This can be achieved if patients receive optimal analgesia as required. The different types of analgesics such as opioids and non-steroidal anti inflammatory drugs have a different effect on pain to patients.

CHAPTER FIVE

5.0 RESULTS

Patient Population

A total of two hundred and fifty patients were recruited into the study during the period of February 2003 to December 2003 inclusive. These were patients admitted in the Departments of Surgery and Gynaecology Muhimbili National Hospital. Patients included were those who underwent major surgery either as elective or emergency procedures.Among those recruited into the study, 170 patients (68%) were elective procedures while 80 patients (32%) were emergency cases.

5.1 Demographic Features of Patients

(i) Age and Sex

The youngest age group 11 – 20 years contributed 4.4% while the oldest age group of 61 years or more; constituted 4.8% of the studied population. The patients median age was 39.0 with a standard deviation of 12.3. The peak age group was 21-40 years, which accounted for 51.2% of all the patients studied.

Among these patients there were 77 (30.8%) males and 173 (69.2%) females. The female to male ratio was 2.2:1. Table 1 summarizes this information.

Table 1: Age and Sex Distribution.

AGE GROUP (YRS)	SEX		TOTAL (%)
	Male	Female	
11 – 20	7	4	11 (4.4)
21 – 40	32	96	128 (51.2)
41 – 60	31	68	99 (39.6)
61+	7	5	12 (4.8)
Total	**77 (30.8%)**	**173 (69.2%)**	**250 (100%)**

(ii) Type of surgery Done

Patients included in this study are those who underwent the following surgical procedures:

Laparotomy 206 (82.4%)

Thyroidectomy 14 (5.6%)

Mastectomy 6 (2.4%)

Wide excision of lesions e.g. lipomas, melanotic lesions accounted for 3 cases ie. (1.2%)

Other procedures including colostomy closures, urethroplasty, herniorraphy which were procedures with less than 3 cases each constituted 21 cases (8.4%). Table (2) summarizes this information.

Table 2: Type of Surgery

Type of Surgery	Frequency	%
Laparotomy	206	82.4
Thyroidectomy	14	5.6
Mastectomy	6	2.4
Wide Excision	3	1.2
Others	21	8.4
Total	**250**	**100%**

(iii) Type of Analgesic Prescribed

There were two types of analgesics prescribed post operatively during the period of study. These were Injection Pethidine and Injection Diclofenac sodium. Injection Pethidine was prescribed to 245 patients (98%) while 38 patients were prescribed both Pethidine and Diclofenac sodium. In these cases Pethidine was given initially then Diclofenac was given at alternate intervals. Only 5 patients (2.0%) had injection Diclofenac only for post operative analgesia.

(iv) Frequency and Dosage of prescribed analgesia

Of the 245 patients who were prescribed Pethidine by the attending surgeon, 191 patients (77.9%) were prescribed 100mg Injection Pethidine to be given at eight hourly intervals 50 patients (20.4%) were prescribed 100mg Injection Pethidine to be given at a six hourly interval. Only 2 patients constituting

0.8% had a prescription of injection 100mg Pethidine given as a single dose only. 2 patients (0.8%) were given a prescription of Pethidine 100mg to be given as need arises. Table 3 summarizes this information.

Table 3: Doses and Frequency of Pethidine Prescription

Dose and Frequency	**Route of administration**	**Number of Patients**	**%**
100mg 6 hourly	Intramuscular	50	20.4
100mg 8 hourly	Intramuscular	191	77.9
100mg single dose.	Intramuscular	2	0.8
100mg as required (prn)	Intramuscular	2	0.8
Total		**245**	**100%**

Diclofenac sodium injection only was prescribed to 27 patients (62.8%) a dose of 75mg at eight hourly interval and 12 patients (27.9%) were prescribed Diclofenac sodium injection 50mg eight hourly intervals. Four patients had a prescription of 50mg at eight hourly intervals. Table 4 summarizes this information.

Table 4: Doses and Frequency of Diclofenac Sodium prescribed to the studied patients

Dose and Frequency	Route of administration	Number of Patients	%
75mg – 8 hourly	Intramuscular	27	62
75mg – 6 hourly	Intramuscular	4	9.3
50mg – 8 hourly	Intramuscular	12	27.9
Total		**43**	**100%**

(v) Patients perception of Pain within 48 hrs Post operatively

Patients recorded their pain perception on the visual analogue scales given to them in 12 hours, 24 hours and 48 hours respectively.

The visual analogue scale values were grouped and were interpreted as follows:-

0 - No pain

1-3 - Mild pain

4-6 - Moderate

7-9 - Severe

10 - Worst pain (excruciating)

In the first twelve hours 85 (34.0%) of patients had worst pain, 65 (26.0%) had severe pain, 91 (32.4%) had moderate pain and 17 (6.8%) had mild pain. Only 2 (0.8%) had no pain. Table 5 summarizes this information.

Table 5: First 12 hours post-operative pain perception

Score	Perception	Number of cases	Percentage
0	No pain	2	0.8%
1-3	Mild pain	17	6.8%
4-6	Moderate	81	32.4%
7-9	Severe	65	26.0%
10	Worst	85	34.0%
		250	**100%**

In the 2nd 12 hours after surgery the patients pain score was a total of 130 patients (52.0%) had moderate pain, 60 patients (24.0%) had mild pain, 29 patients (11.6%) scored their pain as severe, 60 patients (24.0%) scored their pain perception as mild. 20 patients (8.0%) scored their pain perception as worst pain and only 11 (4.4%) patient had no pain. Table 6 summarizes this information.

Table 6: Second 12 hours post-operative pain perception

Score	Perception	Number of cases	Percentage
0	No pain	11	4.4%
1-3	Mild	60	24.0%
4-6	Moderate	130	52.0%
7-9	Severe	29	11.6%
10	Worst	20	8.0%
Total		**250**	**100%**

After 48 hours post surgery the patients pain score was 117 patients (46.8%) had mild pain. Followed by 65 patients (26.0%) who had moderate pain. 59 patients (23.6%) had no pain. However 6 patients (2.4%) had severe pain and 3 patients (1.2%) had intolerable pain. Table 7 summarizes this information.

Table 7: 3rd 12 hours Post Operative Period

Score	Perception	Number of cases	Percentage
0	No pain	59	23.6%
1-3	Mild pain	117	46.8%
4-6	Moderate	65	26.0%
7-9	Severe	6	2.4%
10	Worst	3	1.2%
Total		**250**	**100%**

(iv) Time of Administration of the initial dose of analgesia in the ward post surgery

In this study it was found that the earliest time for the administration of the first dose was at one hour fifty minutes after post surgery. The latest time of administration of the first dose was at twenty four hours. Most patients received their first dose of post operative analgesic after 8 hours. These were (34.5%.), other patients were given analgesics at different time duration between the above mentioned range.

(v) Correlation between frequency of administration of Pethidine and pain perception.

The pain perception with correlation of frequency of administration of Pethidine in the first twelve hours was observed that in both six, eight and twelve hourly intervals of administration, most patients perceived moderate to worst pain. In the second twelve hours post operative period, most patients still perceived moderate. And at fourty eight post operatively most patients perceived mild pain. Table 8, 9 and 10 summarise this information and figure I, II, III represents this graphically.

Table 8: Correlation between frequency of administration of Pethidine and pain perception in 1st 12 hours.

Pain perception	Administration Frequency		
	Six hourly	Eight hourly	Twelve hourly
No pain mild	7.4%	8.6%	10%
Moderate	42.6%	25.7%	35%
Severe	24.1%	31.3%	20.0%
Worst	25.9%	33.6%	35.0%

Table 9: Correlation between frequency of administration of Pethidine and pain perception in 24 hours.

Pain perception	Administration Frequency		
	Six hourly	Eight hourly	Twelve hourly
No pain mild	38.9%	28.1%	20.0%
Moderate	38.9%	52.3%	65.0%
Severe	13.0%	10.9%	10.0
Worst	9.3%	8.6%	5.0%

Table 10: Correlation of frequency of administration of Pethidine and pain perception in 48 hours.

Pain perception	Administration Frequency		
	Six hourly	Eight hourly	Twelve hourly
No pain mild	85.0%	64.1%	75.0%
Moderate	13.0%	32.0%	20.0%
Severe	0%	3.1%	5.0%
Worst	1.9%	0.8%	0%

(vi) Correlation between Age and Pain perception

The Pain perception with correlation to age groups of the patients, it was observed that in the first 12 hours the age group of 11-20 yrs and those above the age of 61 years majority experienced intolerable pain. And within the period of 24 hours post operative, the group between 11-20 years and those above the age of 61 experienced moderate pain. In 48 hours post operative period the age group between 11-20 and those above the age of 61 years still had moderate pain as compared to the other age groups. Tables 11, 12, 13 summarize this information and figures IV, V, VI, represents this graphically.

Figure I: **Correlation between frequency of administration of Pethidine and pain perception in first 12 hours.**

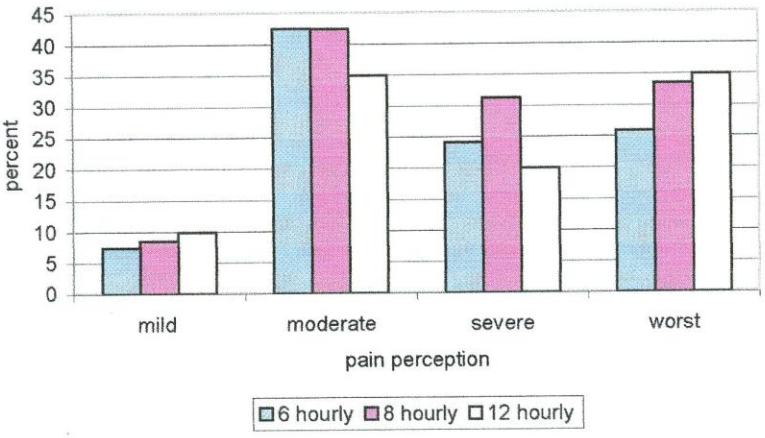


Figure II: **Correlation between frequency of administration of Pethidine and pain perception in second 12 hours.**

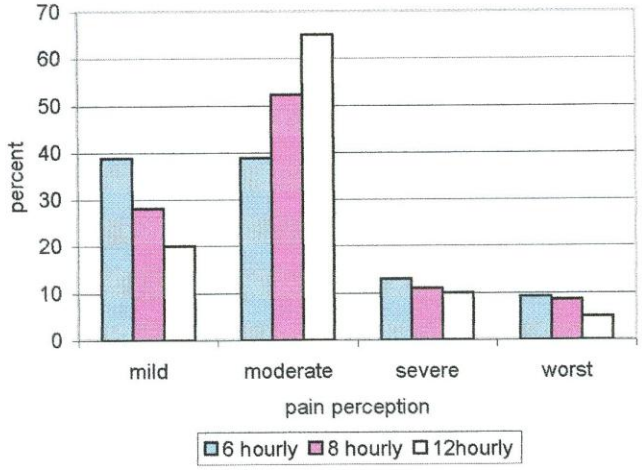


Figure III: Correlation between frequency of administration of pethidine and pain perception in third 12 hours.

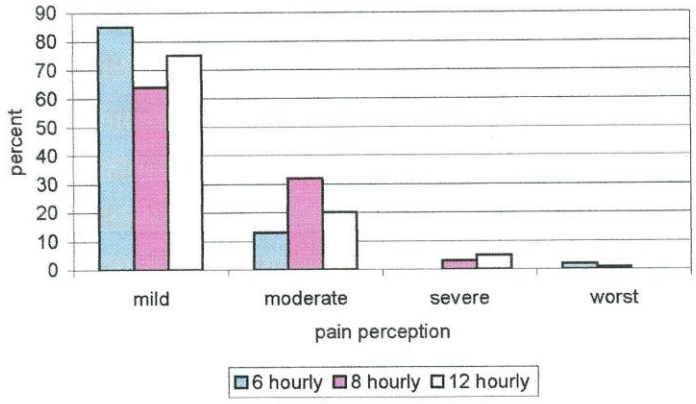


Table 11: Effect of Age in the First 12 hours post operative pain perception

PERCEPTION	AGE GROUPS			
	11-20 Yrs.	**21-40 Yrs.**	**41-60 Yrs.**	**60^{+} Yrs.**
No pain	0 (0.0%)	1(0.8%)	1(1.0%)	0(0.0%)
Mild	0(0.0%)	5(3.9%)	12(12.1%)	0(0.0%)
Moderate	3(27.3%)	35(27.3%)	41(41.4%)	2(16.7%)
Severe	2(18.2%)	40(31.3%)	21(21.2%)	2(16.7%)
Worst	6(54.5%)	47(36.7%)	24(24.2%)	8(66.7%)

Table 12: Effect of Age in the Second 12 hours post operative pain perception

PAIN PERCEPTION	AGE GROUPS			
	11-20	**21-40**	**41-60**	**60^{+}**
No pain	0(0.0%)	5(3.9%)	5(5.1%)	1(8.3%)
Mild pain	0(0.0%)	28(21.9%)	31(31.3%)	1(8.3%)
Moderate	6(54.5%)	75(58.6%)	44(44.4%)	5(41.7%)
Severe	4(36.4%)	10(7.8%)	13(13.1%)	2(16.7%)
Worst	1(9.1%)	10(7.8%)	6(6.1%)	3(25.0%)

Table 13: Effect of Age at 48 hours post operative pain

	AGE GROUPS			
	11-20	**21-40**	**41-60**	**60^{+}**
No pain	0(0.0%)	30(23.4%)	27(27.3%)	2(16.7%)
Mild pain	4(36.4%)	63(49.2%)	48(48.5%)	2(16.7%)
Moderate	5(45.5%)	33(28.5%)	20(20.0%)	7(58.3%)
Severe	2(18.2%)	1(0.8%)	2(2.0%)	1(8.3%)
Worst	1(0.0%)	1(0.8%)	2(2.0%)	0(0.0%)

Figure iv. **Correlation of age groups and pain perception in the first 12 hours**

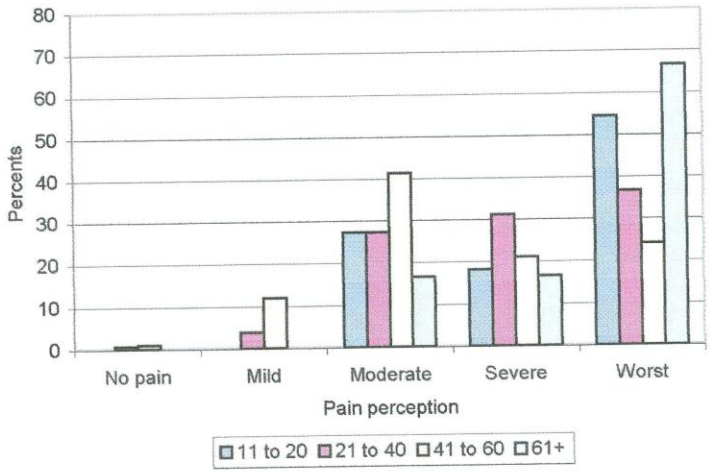


Figure v. **Correlation of age groups and pain perception in the second 24 hours**

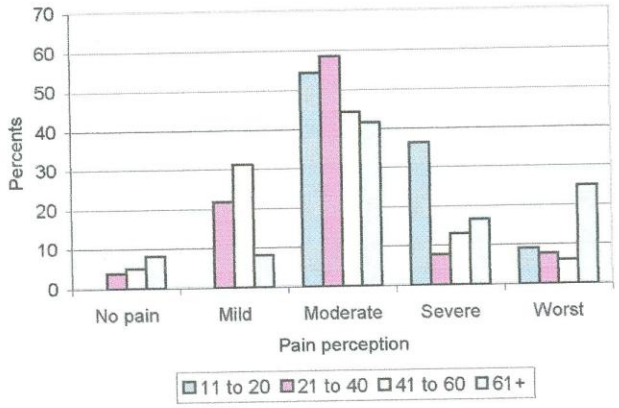
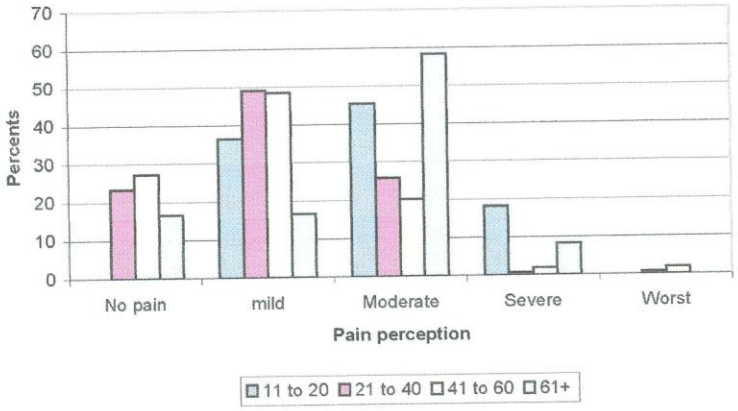


Figure vi. **Correlation of age groups and pain perception in 48 hours**



(vii) Correlation between sex and pain perception in patients

In this study it was found that within the first 12 hours post operatively males patients perceived the worst pain more than the female patients. And during the second 12 hours duration the majority of male patients, perceived moderate pain and this was also noted in the 48 hours post operative period where the male patients perceived moderate pain. Tables 10, 11, and 12 summarize this information and figures VII, VIII, IX, represents this graphically.

Table 14: Correlation of Sex and Pain Perception in first 12 hours.

PAIN PERCEPTION	MALE	FEMALE
None pain	1(50.0%)	1(50.0%)
Mild	3(17.6%)	14(82.4%)
Moderate	20(26.0%)	61(35.3%)
Severe	7(9.1%)	58(33.5%)
Worst	46(59.2%)	39(22.5%)
TOTAL	77(30.8%)	173(69.2%)

Table 15: Correlation of Sex and Pain perception in second 12 hours.

PAIN PERCEPTION	MALE	FEMALE
None pain	3(3.9%)	3(4.6%)
Mild	9(11.7%)	51(29.5%)
Moderate	50(64.9%)	80(46.2%)
Severe	11(14.3%)	18(10.4%)
Worst	4(5.2%)	16(9.2%)
TOTAL	77(30.8%)	173(69.2%)

Table 16: Correlation of Sex and Pain perception in third 12 hours.

PAIN PERCEPTION	MALE	FEMALE
None pain	24(31.2%)	35(20.2%)
Mild	20(26.0%)	97(56.1%)
Moderate	30(39.0%)	35(20.2%)
Severe	3(3.9%)	3(1.7%)
Worst	0(0.0%)	3(1.7%)
TOTAL	77(30.8%)	173(69.2%)

Figure vii. Correlation of sex and pain perception in the first 12 hours

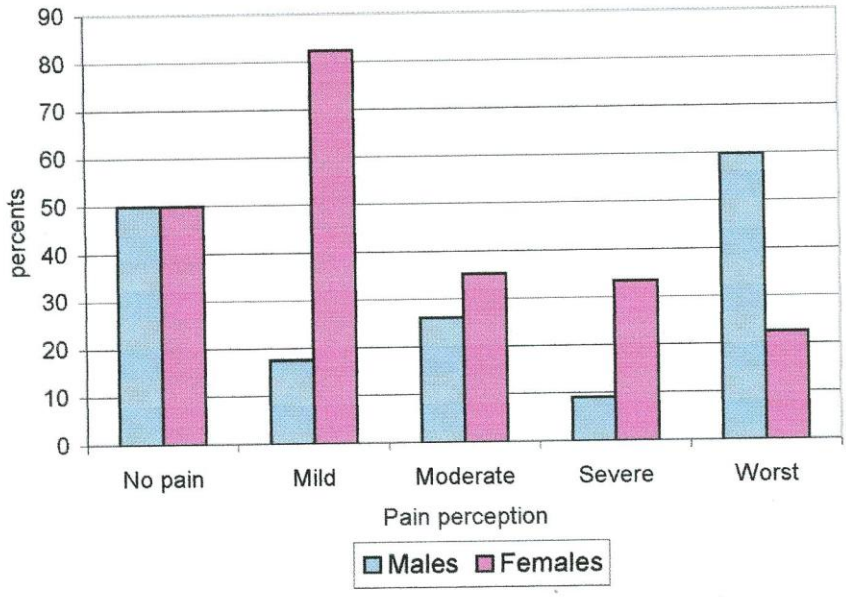


Figure viii. **Correlation of sex and pain perception in the 24 hours**

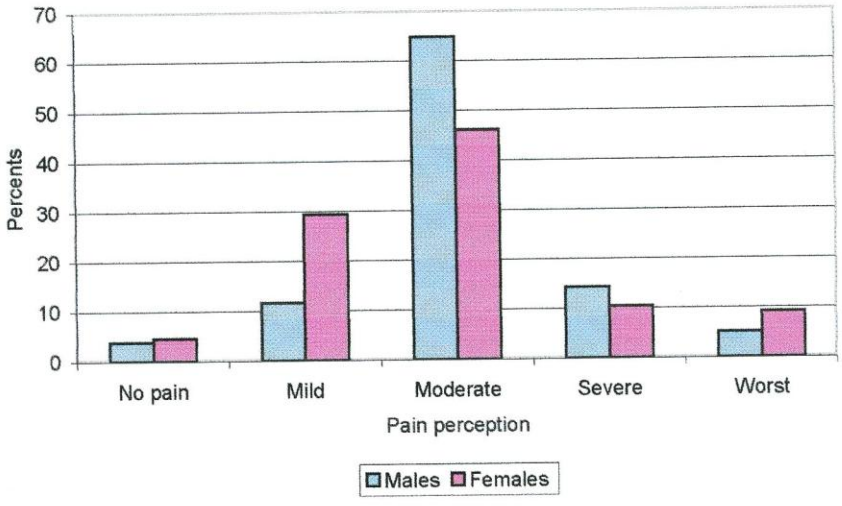
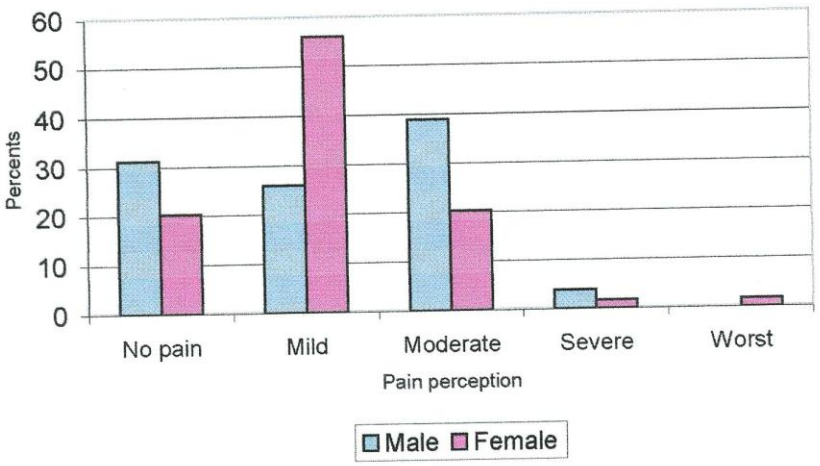


Figure ix. **Correlation of sex and pain perception in 48 hours**



5.2 DISCUSSION

5.2.1 Type of Analgesic Prescribed

In this study the type of analgesic commonly prescribed was Pethidine and 98% of the patients received this. Only 2% of the patients were prescribed Diclofenac Sodium injection as the only analgesic post-operatively. However 38 patients (5.2%) had a prescription of both Pethidine and diclofenac sodium as post operative analgesia.

Parenteral Pethidine and morphine are the only opioids available in the main pharmacy of the hospital. Pethidine is the only opioid available in the wards for analgesia while morphine is only used at the operating theatre. Many doctors attending patients prescribe Pethidine for post operative analgesia, A few patients however were allergic to Pethidine and had Diclofenac sodium injection prescribed for their post operative analgesia. Some doctors preffered prescribing two analgesics, Diclofenac sodium and Pethidine to be given alternately, most probably due to their practical experience in the past of achieving optimal analgesia in some patients they had used that pattern of prescription. In this study is was noted that patients who had Pethidine prescribed could readily get the drug in the ward since it was available in the ward while those who had injection Diclofenac sodium prescribed had to purchase the drug from the hospital pharmacy since it was not readily available in the wards.

Findings in this study are comparable with the study done by Bagi at al[52] and Ocitti et al[57] done in Kenya showing that 97% of the patients were prescribed Pethidine as

a post operative analgesic. Six other studies[30,36,53,58,60,61] have shown that Pethidine is the most frequently prescribed drug for post operative pain management.

5.2.2 Doses and Frequency of prescribed Analgesia

In this study most surgeons and doctors preferred prescribing 100mg Pethidine injection at an 8 hourly interval which is not the recommended frequency of administration of Pethidine to achieve optimal analgesia. The efficacy of the drug to sustain its analgesic effect ranges from three to four hours. Therefore the attending surgeons and doctors are supposed to prescribe injection Pethidine at a dose of 1-2mg/kg body weight intramuscularly or intravenously on a regular four hour intervals so as to achieve optimal analgesia to their post operative patients.

In a study done by Faponle et al [56,59] found that Pethidine was prescribed at an interval between six to eight hourly intervals. These findings are comparable to this study. However Bagi et al[52] in their study found that Pethidine was only prescribed once as a single dose. Pethidine has a half life of 3-5 hours and useful analgesia lasts between two and four hours after parenteral administration[36,63].

The quality of analgesia may be improved by prescription of intramuscular injection on a regular 4 hourly basis [41,64] as also found on study done by Inturrisi et al[65].

5.2.3 Adequacy of Pain Control

In this study it was demonstrated that majority of the patients experienced pain throughout the study period of 48 hours post operatively. It was demonstrated that

the proportion of perception of pain in patients ranged from severe to worst in 60%, while those with mild to moderate was 39.2% in the first 12 hours. Ninety eight percent of these patients were prescribed pethidine for the post operative analgesia. At 24 hours the proportion of the patients who perceived mild to moderate pain was seventy six percent and the proportion with severe to worst pain was nineteen percent. At 48 hours there were seventy six percent of the patients who perceived mild to moderate pain and three percent of the patients perceived severe to worst pain. Ninety eighty percent of these patients were prescribed only injection pethidine for post operative analgesia and 58.2% of those who received pethidine were given pethidine at an 8 hourly interval.

With these results it shows that adequate pain control is not achieved throughout the forty eight hours post operative period despite receiving analgesia. This shows that the analgesic given does not relieve pain as it is supposed to, due to the wrong prescription intervals or due to incorrect administration time. In general these patients receive suboptimal analgesia in the post operative period. The average weight of the patients in this study was 64 kilograms body weight. The dose of 100mg pethidine was within the recommended dose of 1-2 mg/kg body weight.

Findings of this study are comparable with the results of studies done by Amata et al[51] which showed that all patients in their study experienced pain post operatively 61% considered their pain severe while 30% rated it moderate and 9% rated their pain mild. Vallano et al[52] in a multi centered drug utilization study showed that the percentage of patients in each centre who suffered from severe to unbearable pain

varied from 22% to 67%. Several other studies have shown that patients often experience suboptimal analgesia in the postoperative period[28,30,52,56,58,59,61]. One limitation in this study was the types of analgesia given versus pain perception this was not studied, however an attempt was made but the number of those who had Diclofenac sodium injection prescribed was too small to give a significant result.

5.2.4 Time of Administration of the Initial dose of analgesic in the ward post surgery

In this study, the time of administration of the first dose of analgesic to the post operative patients in the ward showed a varying range from 1.50 hours to 24 hours with a mode of 8 hours. Most patients 34.5% received their first done of analgesic after 8 hours post operatively regardless of the surgeons' prescription. The subsequent doses were given as prescribed in post operative orders.

Reasons for patients not receiving the prescribed dose at regular time intervals as indicated on their post operative prescription were that in some days the shortage of the attending nursing staff made it difficult to cope with the nursing duties they had especially during the night shifts where only one senior nurse was in charge of a ward with 45 patients to care. Another reason is the nurses attitude towards drug addiction, they might have been afraid that their patients could be addicted, and with this the nurses were more concerned with addiction and had a tendency to ignore the patients post operative pain perception. Studies have shown that patients with acute pain cannot be addicted to the analgesics provided during the post operative period[35]. As all patients who were prescribed pethidine had already received one

initial dose during induction, of anaesthesia in the operating room, the ward nurses counted the eight hourly intervals from the time the first dose was given at the operating theatre. This was because the time to administer the first dose is not clearly indicated in all of the post operation prescriptions. There should therefore be a specified time as to when the analgesic doses should be initially administered.

From these results it is shown that the administration of analgesics was not as prescribed by the surgeon. 77. 9% had pethidine prescribed at 100mg intramuscularly for eight hours intervals. Only 34.5% received the drug as prescribed by the attending surgeon, 11% of the patients who were prescribed 100mg pethidine injection at eight hourly intervals received only their first dose 3-4 hours post operatively however continued receiving their subsequent doses at eight hourly intervals. In a study done by Bagi et al[52] where most of the patient who had a prescribed analgesic received once or two doses, 68.9% received a single dose while 22.9% received two doses. Faponle et al[56,59] in his study found that inadequate doses were given to post operative patients. Another study done by Vijayan R et al[67] showed that in a total of one hundred and eighty three patients who underwent surgery 37.7% patients had moderate to severe pain and this was because their prescribed analgesic injections were not given promptly or were not given at all.

5.2.5 Correlation between frequency of administration of pethidine and pain perception.

In this study it was found that 96% patients who had Pethidine administered at both six, eight and twelve hourly intervals perceived moderate to severe pain, this

indicates that the patients were not receiving the optimal analgesia as required to achieve pain control post surgery. Average body weight of patients in this study was 64 kilograms. The recommended dose of pethidine 1-2mg/kg body weight given at three to four hourly intervals of administration could provide optimal analgesia to the patients[41,69]. In all the patients 100%, no prescription was given with the correct recommended frequency of administration.

In the first 12 hours 91% of patients who had pethidine administered at six hours interval had moderate to intolerable pain. In those who had pethidine administered at eight hours interval, 90% of patients had moderate to intolerable pain. In the second twelve hours 61% of the patients who had pethidine administered at six hourly interval had moderate to intolerable pain, 72% of patients who had pethidine administered at eight hourly intervals had moderate to intolerable pain. During the third twelve hours (48hours) post operatively it was noted that only 15% of the patients who had pethidine administered at six hours interval had moderate to intolerable pain, 85% had mild pain. Those who had pethidine administered at twelve hours interval, 36% had moderate to intolerable pain, the rest 64% had mild pain. The results show a reduction of pain intensity which can be associated with the end of the acute phase of post operative pain.

5.2.6. Correlation of Age and Sex between Pain perception in patients

In this study it was found that the age of the patient had some effect on pain perception. The lowest age group 11-20 years and the highest age group 61^{+} perceived more pain than the other age groups. Regarding sex the male patients were

found to perceive more pain in comparison to the female patients. Females seem to have a higher threshold of pain than their male counterparts. This is comparable to what was observed by Pasero at al[27] where age and sex had an effect on patients during the post operative period[68].

5.2.7 CONCLUSIONS

1. The management of post operative pain at our centre is grossly inadequate.

2. Post operative pain management within the first 12 hours is most poorly managed.

3. Most surgeons 77.6% prefer prescribing Pethidine at a frequency of eight hourly intervals disregarding the recommended frequency of four to six hourly intervals of Pethidine The pattern of pethidine prescriptions by all attending surgeons is not according to the recommendation in a pharmacological understanding.

4. Health care staff tends to be insensitive towards prompt pain care in post operative patients.

RECOMMENDATIONS

1. There is lack of knowledge on pain management and prescription of pethidine as the only analgesic in post operative patients among surgeons, doctors and nurses. A pain unit should be instituted in the hospital and a pain management protocol should be established which will guide the health care staff on prescription and administration of drugs prescribed for pain management.

2. The health care staff managing post operative patients should be updated on regular continuing medical education sessions on pain management, opioid limitations in medical practice as well as alternative safer analgesia. This can be done in departmental seminars which will include not only surgeons and nurses but specialists, anaesthesiologists and physicians.

3. Range of analgesics available in the Hospital Pharmacy should be expanded. There are various other analgesics available in the market which can be stocked in the hospital pharmacy and give optimal analgesic effect for post operative pain e.g. Tramadol, and other non-steroidal anti-inflammatory analgesics; Piroxicam, selective cyclo-oxygenase -2 inhibitors such as Rofiz, Muvera , Rofedol, Rofecoxib which may be given for pain relief. These drugs are currently not in the essential drug list recommended by the Ministry of Health although they are available in the market and are sold at a reasonable cheap price of approximately 100 Tsh.

4. Apart from the intramuscular and intravenous routes, no other routes are practised for administration of post operative analgesia. There is a need to practise them as studies show that they are more effective in some cases therefore there is a need of training health care staff on the different routes and methods of administration.

5. The concept of pain management in medical school and nursing school seems to be taught with no emphasis to the magnitude of harm which may result due to inadequacy of post operative analgesia. Pain management as a subject should be emphasized in medical and nursing schools curricular. And with the presence of a pain unit in the hospital students will therefore be able to rotate in the unit so as to acquire skills of pain management.

5.2.9 Limitations of the study

1. In this study it was difficult to correlate the effect of Pethidine and Diclofenac on efficacy of pain control with Pethidine versus its combination with Diclofenac sodium or with Diclofenac sodium alone, due to the fact that very few patients received Diclofenac sodium for post operative pain control.

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