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A PROSPECTIVE OBSERVATIONAL STUDY ASSESSING PAIN MANAGEMENT PROTOCOLS IN MEDICAL INTENSIVE CARE UNIT (MICU) PATIENTS

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Abstrac
Pain is one of the most common and under-recognised clinical problems among critically ill patients admitted to the Medical Intensive Care Unit (MICU). Inadequate pain management may lead to prolonged hospitalisation, delayed recovery, psychological stress, and poor clinical outcomes. The present study was conducted as a prospective observational study to evaluate pain management protocols and the effectiveness of analgesic therapy in MICU patients. A total of 72 patients were included over a six-month study period. Pain intensity was assessed using the Visual Analogue Scale (VAS), and patients were categorised based on severity as mild, moderate, and severe pain. Demographic analysis revealed that male patients (58.33%) were more predominant than females (41.66%), with the majority belonging to the age group of 51–60 years (31.44%). Among departments, cardiology accounted for the highest proportion of pain cases (26.38%). Diabetes mellitus (33.33%) and hypertension (31.94%) were the most common co-morbidities. Mild pain was the most frequently observed category (90.27%), followed by severe pain (6.94%) and moderate pain (2.77%). Among analgesics, paracetamol was the most commonly prescribed non-opioid (37.5%), tramadol was the most used opioid (20.83%), and pregabalin was the predominant adjuvant analgesic (2.77%). Monotherapy showed better pain relief outcomes compared to dual and triple therapy. The findings suggest that non-opioid analgesics, especially paracetamol, and opioids such as tramadol are effective in pain management. Regular pain assessment and individualized therapy can significantly improve patient comfort and treatment outcomes in MICU settings.

Keywords: *Pain management, MICU, Visual Analogue Scale, Opioid analgesics, non-opioid analgesics, Tramadol, Paracetamol.*

INTRODUCTION

Pain is one of the most frequent and distressing symptoms experienced by critically ill patients admitted to the Medical Intensive Care Unit (MICU). It is defined by the International Association for the Study of Pain as an unpleasant sensory and emotional experience associated with actual or potential tissue damage. In critically ill patients, pain may arise due to underlying disease processes, invasive procedures, mechanical ventilation, surgery, trauma, and routine nursing interventions [1]. Effective pain management is therefore an essential component of critical care practice.Uncontrolled pain in MICU patients can produce significant physiological and psychological consequences. It activates the sympathetic nervous system, leading to increased heart rate, blood pressure, oxygen consumption, and stress hormone release, which may worsen the patient's condition [2]. Inadequate pain relief may also contribute to anxiety, agitation, sleep disturbances, delayed wound healing, prolonged mechanical ventilation, and increased length of hospital stay [3].

Pain assessment in critically ill patients remains challenging due to altered consciousness, sedation, and inability to communicate effectively. Several validated tools such as the Visual Analogue Scale (VAS), Numeric Rating Scale (NRS), and Behavioural Pain Scale (BPS) have been developed to evaluate pain intensity in ICU settings [4]. Regular pain assessment is considered the cornerstone for appropriate pain management and improved clinical outcomes.Pharmacological therapy remains the mainstay for pain management in ICU patients. Commonly used analgesics include non-opioid agents such as paracetamol and NSAIDs, opioid analgesics like fentanyl, morphine, and tramadol, and adjuvant agents such as gabapentin and pregabalin [5]. Opioids are highly effective for moderate to severe pain but may be associated with adverse effects such as respiratory depression, constipation, and sedation [6]. Non-

opioid analgesics provide effective relief for mild pain and are often used alone or in combination with opioids to reduce opioid consumption [7].

Recent evidence suggests that multimodal analgesia, combining opioids, non-opioids, and adjuvant medications, may improve pain control while minimising adverse effects [8]. However, pain management practices vary widely across ICUs, and many patients continue to experience undertreated pain due to a lack of standardised protocols and inadequate pain assessment [9,10].The present prospective observational study was undertaken to assess the current pain management protocols in MICU patients, evaluate the effectiveness of different analgesic regimens, and analyse patient outcomes based on pain severity. The study also aimed to compare the utilisation of opioid and non-opioid analgesics and identify the most effective treatment strategies in routine critical care practice.

MATERIALS AND METHODS

Study Design

The present study was conducted as a prospective observational study to assess the effectiveness of pain management protocols in patients admitted to the Medical Intensive Care Unit (MICU). The study aimed to evaluate pain severity, analgesic utilisation patterns, therapeutic outcomes, and adverse effects associated with pain management in critically ill patients.

Study Site

The study was carried out at Gleneagles Hospital, Lakdikapul, Hyderabad, Telangana, a tertiary care multispecialty hospital with advanced critical care facilities.

Study Duration

The study was conducted over a period of six months.

Sample Size

A total of 72 MICU patients who fulfilled the inclusion criteria were enrolled in the study.

Source of Data Collection

Data were collected from multiple hospital-based and clinical sources, including:

- Nursing notes
- Patient data collection forms
- Patient past medical history records
- Medication charts
- ICU treatment records
- Clinical observation reports

Eligibility Criteria

Inclusion Criteria

Patients fulfilling the following criteria were included in the study [11]:

- Patients admitted to MICU aged 18 years and above
- Patients who were neurologically appropriate and capable of giving meaningful responses regarding pain assessment
- Patients who were conscious and cooperative
- Patients willing to participate in the study

Exclusion Criteria

The following patients were excluded from the study [12]:

- Unconscious patients unable to respond
- Paralyzed patients
- Patients with severe cognitive impairment
- Patients unable to communicate pain effectively

Pain Assessment Procedure

Pain severity was assessed using the Visual Analogue Scale (VAS), a standardized pain assessment tool widely used in critical care settings. Based on the VAS score, pain was categorized into:

- Mild pain: 1–3
- Moderate pain: 4–6
- Severe pain: 7–10

Pain assessment was performed regularly during the patient's ICU stay and before and after analgesic administration to evaluate treatment response [13].

Data Collection Procedure

A well-structured patient data collection form was developed according to the study requirements. The following parameters were documented:

- Demographic details (age, gender)
- Department of admission

- Co-morbidities
- Pain severity score (VAS)
- Type of analgesics prescribed
- Therapeutic regimen (monotherapy, dual therapy, triple therapy)
- Drug efficacy and patient response
- Drug half-life and context sensitivity
- Adverse effects associated with analgesics

Drug Utilization Analysis

Pain medications prescribed during the study were categorized into:

1. Non-opioid Analgesics
- Paracetamol
- NSAIDs

2. Opioid Analgesics
- Fentanyl
- Tramadol

3. Adjuvant Analgesics
- Gabapentin
- Pregabalin

4. Corticosteroids
- Methylprednisolone

The prescribing pattern and therapeutic efficacy of these drug classes were analyzed.

Outcome Measures

The primary outcomes assessed in the study included:
- Frequency and severity of pain episodes
- Effectiveness of analgesic regimens
- Improvement in VAS score after treatment
- Comparison between monotherapy, dual therapy, and triple therapy
- Incidence of adverse drug reactions

Statistical Analysis

The collected data were compiled and analysed using Google Sheets and basic statistical tools.
- Continuous variables were expressed as mean ± standard deviation (SD)[14-18].
- Categorical variables were expressed as frequencies and percentages.
- A comparative evaluation was carried out to assess the efficacy of various pain management protocols.

Ethical Considerations

Before initiation of the study, ethical approval was obtained from the Institutional Ethics Committee of Gleneagles Hospital. Informed consent was obtained from all eligible participants, and patient confidentiality was maintained throughout the study.

RESULTS AND DISCUSSION

Gender-wise Distribution of Patients

A total of 72 patients were included in the study. Among them, 42 patients (58.33%) were males and 30 patients (41.66%) were females, indicating a higher prevalence of pain among male patients admitted to MICU. This may be due to higher exposure to trauma, cardiovascular conditions, and surgical interventions in male patients. The findings are represented in Table 01.

Table 01: Gender-wise distribution of patients

Gender	Number of Patients	Percentage (%)
Male	42	58.33
Female	30	41.66

Age-wise Distribution of Patients

Age-wise analysis revealed that the majority of patients belonged to the 51–60 years age group (23 patients, 31.44%), followed by 61–70 years (12 patients, 16.66%) and 31–40 years (11 patients, 15.27%). This indicates that middle-aged and elderly individuals are more prone to pain-related ICU admissions. The data are presented in Table 02 and Figure 01.

Table 02: Age-wise distribution of patients

Age Group (Years)	Number of Patients	Percentage (%)
11–20	1	1.38
21–30	2	2.77
31–40	11	15.27
41–50	9	12.50
51–60	23	31.44
61–70	12	16.66
71–80	10	13.88
81–90	1	1.38
91–100	3	4.16

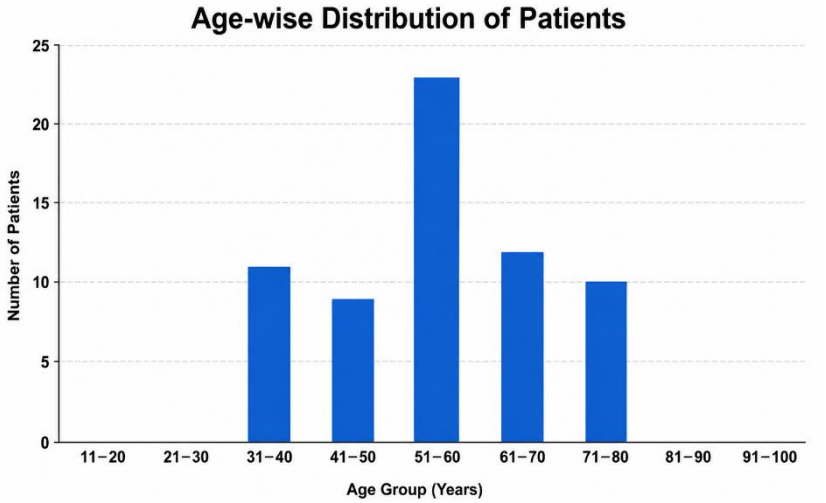

Figure 01: Age-wise distribution of MICU patients included in the study.

Department-wise Distribution

The highest number of pain cases was reported from the Cardiology department (19 patients, 26.38%), followed by Pulmonology (14 patients, 19.44%) and Gastroenterology (8 patients, 11.11%). This indicates that pain is commonly associated with cardiac and pulmonary conditions in MICU settings.

Distribution of Co-morbidities

Among co-morbidities, Diabetes Mellitus (24 patients, 33.33%) and Hypertension (23 patients, 31.94%) were the most common, followed by coronary artery disease (8 patients, 11.11%). These co-morbid conditions can contribute to increased pain severity and complications during ICU admission. The findings are summarised in Table 03 and Figure 02.

Table 03: Distribution of co-morbidities

Co-morbidities	Number of Patients	Percentage (%)
Hypertension	23	31.94
Diabetes Mellitus	24	33.33
Hyperthyroidism	1	1.38
Hypothyroidism	6	8.33
CAD	8	11.11

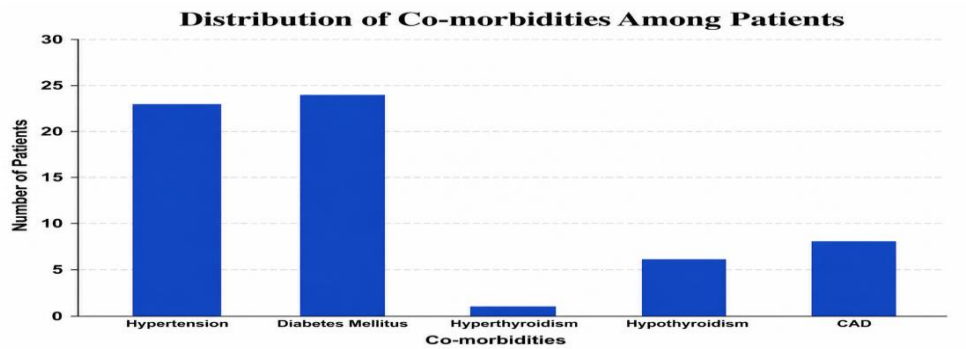

Figure 02: Distribution of co-morbidities among MICU patients included in the study.

Distribution Based on VAS Score

Pain severity assessment using the Visual Analogue Scale (VAS) showed that 65 patients (90.27%) had mild pain, 2 patients (2.77%) had moderate pain, and 5 patients (6.94%) had severe pain. This indicates that the majority of MICU patients experienced manageable pain levels. The data are shown in Table 04.

Table 04: Distribution based on VAS score

VAS Score	Number of Patients	Percentage (%)
Mild Pain (1–3)	65	90.27
Moderate Pain (4–6)	2	2.77
Severe Pain (7–10)	5	6.94

Drugs Used for Pain Management

Among the analgesics used, Paracetamol (27 patients, 37.5%) was the most commonly prescribed drug, followed by Tramadol (15 patients, 20.83%) and Fentanyl (11 patients, 15.27%). This suggests that non-opioid analgesics were preferred for initial pain management. The details are shown in Table 05 and Figure 03.

Table 06: Drugs used for pain management

Drugs	Number of Patients	Percentage (%)
Paracetamol	27	37.5
NSAIDs	2	2.77
Fentanyl	11	15.27
Tramadol	15	20.83
Gabapentin	1	1.38
Pregabalin	2	2.77

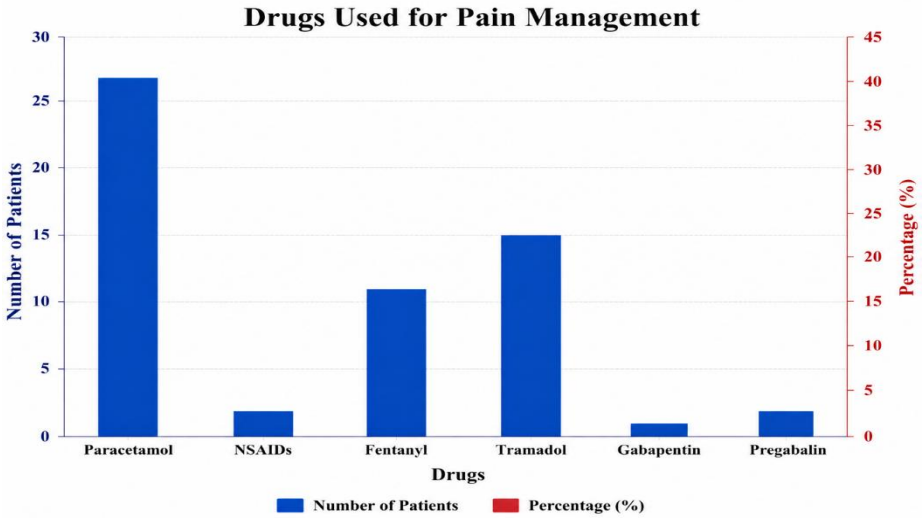

Figure 03: Distribution of drugs prescribed for pain management among the study population.

Comparative Analysis of Analgesic Utilisation and Therapeutic Efficacy in MICU Patients

Among the analgesics used for pain management in MICU patients, opioid analgesics such as Tramadol (20.83%) and Fentanyl (15.27%) were commonly prescribed, with tramadol being preferred due to its effective analgesic action and lower risk of respiratory depression. Among non-opioid analgesics, Paracetamol (37.5%) was the most frequently used, whereas NSAIDs were prescribed only in 2.77% of cases, reflecting the better safety and tolerability of paracetamol in critically ill patients. In the category of adjuvant analgesics, Pregabalin (2.77%) showed higher utilisation compared to Gabapentin (1.38%), suggesting its preference in managing neuropathic pain. Regarding treatment efficacy, monotherapy demonstrated good pain relief, with 25% of patients showing a good response, indicating its effectiveness in mild to moderate pain conditions. Dual therapy provided improved outcomes, especially in moderate pain, where 15.27% of patients showed a better response, suggesting enhanced analgesic benefit with combination therapy. Triple therapy was used in fewer severe pain cases and showed better response in 5.55% of patients, but did not demonstrate significant superiority over monotherapy or dual therapy. Overall, the findings suggest that individualised pain management protocols with appropriate use of opioids, non-opioids, and adjuvant analgesics can effectively improve pain control and patient outcomes in MICU settings.

CONCLUSION

This prospective observational study highlights the importance of structured pain assessment and effective pain management in MICU patients. The use of the Visual Analogue Scale (VAS) helped in identifying the severity of pain and guiding appropriate therapy according to the WHO pain ladder. The study found that most patients experienced mild pain and responded effectively to monotherapy, particularly with non-opioid analgesics such as paracetamol. Opioid analgesics like tramadol also demonstrated significant effectiveness in moderate to severe pain conditions. Combination therapies were used in a smaller subset of patients but did not show clear superiority over monotherapy. The findings emphasize that timely pain assessment, rational drug selection, and individualized treatment strategies can improve patient comfort, reduce complications, and enhance recovery outcomes. Further studies with larger sample sizes are recommended to establish standardized pain management protocols in MICU settings.

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Nil

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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AUTHOR CONTRIBUTIONS

K. Vijay Kumar conceived and supervised the study, interpreted the findings, and critically reviewed the manuscript. S. Lavan, P. Sai Sri Harsha, and T. Kavya contributed to data collection, data analysis, literature review, manuscript preparation, and revision. All authors read and approved the final version of the manuscript.

ETHICAL STATEMENT

The ethical committee clearance was obtained from Gleneagles Global Hospital before initiating the study. Reference number: AIPS/ 04/ IEC/05

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