

# The Comparison of Analgesic Effects of Fentanyl-Ketorolac Combination with Fentanyl-Tramadol in Orthopedic Surgical Pain Patients in Trauma Center of Dr. M. Djamil Central General Hospital, Indonesia

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**ABSTRACT:** Acute pain is the most common problem in 80% of total orthopedic surgery patients, with moderate to severe pain intensity. The combination of analgesics that is often used to treat orthopedic surgical pain is a combination of fentanyl-ketorolac with fentanyl-tramadol. This combination of drugs can reduce the pain threshold which can be measured using the Visual Analog Scale (VAS) score. This study aims to determine the comparison of the analgesic effects of the fentanyl-ketorolac combination with fentanyl-tramadol in patients with orthopedic surgical pain in the Trauma Center of Dr. M Djamil Padang General Hospital (on January to March, 2023). This type of research is an analytical observational study with a Cross Sectional method and data collection was carried out retrospectively. A total of 58 patients have met the inclusion criteria in this study, with the group using the fentanyl-ketorolac combination as many as 49 patients and the fentanyl-tramadol group as many as 9 patients. Statistical analysis in this study used SPSS, namely the Mann-Whitney test. Based on the results, it can be concluded that there is no significant difference in the analgesic effect of the combination of fentanyl-ketorolac with fentanyl-tramadol with a p value = 0,386 ( $p > 0.05$ ) in patients with orthopedic surgical pain in the trauma center room of Dr. M. Djamil Padang General Hospital. This means that the combination of the two groups produces an equivalent analgesic effect on acute intraoperative orthopedic pain.

**KEYWORDS:** Analgesics; Fentanyl; Ketorolac; Tramadol; Orthopedics; Acute Pain

## I. INTRODUCTION

Postoperative acute pain is still difficult to manage. After surgery, patients may experience acute pain, which is pain that is clearly felt and

disappears after the damage has healed. If this pain is not properly managed, it can become chronic pain. Research shows that 80% of patients who undergo surgery report moderate, severe, or extreme pain afterward. A large survey in America in 2013 found that more than 75% of patients experienced moderate to severe pain immediately after surgery and it could last throughout their hospital stay. Not managing pain well can have negative impacts such as increased disease, physical function problems, lower quality of life, longer recovery times, prolonged use of pain relief medications, and higher medical costs (Mayestika&Hasmira, 2021).

Orthopedic surgical pain is a common issue experienced by most patients, with around 80% experiencing acute pain and 20% experiencing severe pain. Millions of adults undergo orthopedic surgery in the US, and the cost of pain relief medications reaches billions of dollars each year. In England, thousands of orthopedic surgeries and hip fractures are treated each year, and the number of knee arthroscopy surgeries is also increasing (Suharyo et al., 2021). The results of the Basic Health Research by the Health Research and Development Agency in 2018 showed that the prevalence of orthopedic surgery in Indonesia due to fracture incidents was 5.5%. The prevalence of injuries by body part, the lower extremities have the highest prevalence at 67.9% (Ministry of Health of the Republic of Indonesia, 2018).

The most commonly used analgesics in managing post-surgical fracture pain at RSUP DR. M. Djamil Padang are injectable ketorolac and injectable tramadol. Ketorolac is an analgesic that is often administered at almost every level of pain without prior assessment of the pain degree. However, it is advisable that the administration of analgesics in pain management should be preceded

by an assessment of the degree of pain, as the consideration of the type and intensity of pain is important in evaluating the effects of analgesics. (Handayani et al., 2019).

## II. EXPERIMENTATION

The research method is non-experimental with a retrospective design and uses a cross-sectional method. Data were taken from the medical records of orthopedic surgery patients in Trauma Center of Dr. M. Djamil Padang Central General Hospital Padang, Indonesia during the period of January to March, 2023. The population in this study consists of all orthopedic surgery patients in Trauma Center Room of RSUP Dr. M Djamil Padang during the period from January to March 2023, totaling 97 patients. The sample of this study consists of orthopedic surgery patients who received a combination therapy of fentanyl-ketorolac with fentanyl-tramadol in the Trauma Center Room of RSUP Dr. M. Djamil Padang, who met the inclusion criteria using the Time Limited Sampling method.

## III. RESULT AND DISCUSSION

This research was conducted in the medical records of RSUP. Dr. M. Djamil Padang in

February-March 2023. Based on the research conducted, a total of orthopedic surgical pain patients were found in the Trauma Center of RSUP. Dr. M. Djamil Padang (Period January-March 2023), with 97 patients, of which 58 patients met the inclusion criteria for this study.

This research has passed the ethical review with number (DP.04.03/D.XVI.XI/57/2024), which is useful for protecting the rights and welfare of the research subjects. Characteristics of orthopedic surgical pain patients in the Trauma Center of RSUP. Dr. M. Djamil Padang (Period January-March 2023) based on gender, the majority are male with 32 patients and female with 26 patients (**Table 1**). This is in line with the research conducted by Rohmayani et al (2019), which found that the majority of fracture surgery patients are male, as males are more active and engage in more activities than females. Outdoor activities have a higher risk of injury. Fractures occur more frequently due to traffic accidents. The high rate of traffic accidents among men is due to their tendency to drive at high speeds, resulting in more fatal accidents compared to women (Rohmayani et al, 2019).

**Table 1.** Profile of Orthopedic Surgery Patients in the Trauma Center of RSUP. Dr. M. Djamil Padang Based on Gender

| Gender | Number of patients (N) | Percentage(%) |
|--------|------------------------|---------------|
| Male   | 32                     | 55,17         |
| Female | 26                     | 44,825        |
| Total  | 58                     | 100           |

Based on the data, the age groups with the highest distribution are 18-25 years old and 26-35 years old (**Table 2**). This is consistent with the research by Riswanda et al. (2017) which states that the majority of fracture patients at RSUD DR. Soetomo Surabaya from 2013-2016 were young adults (15-24 years old) at 36%. Furthermore, according to Vithya et al. (2017), research on patients with fractures in the surgical polyclinic of

RSUP M. Djamil Padang from 2010 to 2012 showed that many cases occurred in young adults (17-26 years old). This is related to the accident rate, which is the main cause of fractures in young people. In other words, the age group that frequently experiences traffic accidents is young people due to their less controlled driving speed (Manjas& Arifin, 2019).

**Table 2.** Profile of Orthopedic Surgery Patients in Trauma Center of RSUP. Dr. M. Djamil Padang Based on Age

| Age (Years old) | Number of patients (N) | Percentage (%) |
|-----------------|------------------------|----------------|
| 18-25           | 12                     | 20,68          |
| 26-35           | 12                     | 20,68          |
| 36-45           | 7                      | 12,06          |
| 46-55           | 11                     | 18,96          |

|       |    |       |
|-------|----|-------|
| 56-65 | 10 | 17,24 |
| >65   | 6  | 10,34 |
| Total | 58 | 100   |

Distribution of patients based on the use of analgesic drugs in orthopedic surgical pain patients in Trauma Center of RSUP. Dr. M. Djamil Padang (Period January-March 2023) found that 49 patients received the analgesic drug Fentanyl-Ketorolac, and 9 patients received Fentanyl-Tramadol (**Table 3**). The most commonly used analgesic for orthopedic surgical pain patients at RSUP. Dr. M. Djamil

Padang is the combination of fentanyl-ketorolac, which was used by 49 patients (84.48%). Fentanyl is an opioid analgesic. Clinically, fentanyl at a dose of 1x100 mcg via IV route exerts pharmacological effects primarily on the central nervous system. Ketorolac is an NSAID commonly used as a pain reliever.

**Table 3.** The Use of Fentanyl-Ketorolac and Fentanyl-Tramadol Combination Analgesics in Orthopedic Surgical Patients in Trauma Center of RSUP. Dr. M. Djamil Padang

| No. | The type of Analgesics used (injection) | Number of patients (N) | Percentage (%) |
|-----|-----------------------------------------|------------------------|----------------|
| 1.  | Fentanyl 100 mcg-Ketorolac30 mg/8jam    | 49                     | 84,48          |
| 2.  | Fentanyl 100 mcg-Tramadol 100 mg        | 9                      | 15,51          |
|     | Total                                   | 58                     | 100            |

The type of surgery is one of the factors that influence the level of postoperative pain, as the type of surgery will determine the extent of surgical manipulation and the tissue damage that will occur. The location and size of the incision are among the factors that influence postoperative pain. From the statistical analysis of the types of surgery in both groups, no differences were found (Nurchahyo et al., 2019).

Based on the types of orthopedic surgery at RSUP. Dr. M. Djamil Padang from January to March 2023, the most common types of surgery were trauma/fracture (72.41%), neoplasm tumors

(3.44%), bone/joint tuberculosis (20.68%), and lastly osteomyelitis (3.44%) (**Table 4**). The most common type of orthopedic surgery was trauma/fracture (72.41%). In trauma/fracture cases, the combination of NSAID-opioid is mostly accepted by patients with multiple fractures where the fracture lines on the bones are not just in one place. So, the intensity of the pain experienced is stronger. In addition, in the case of an open fracture, where the trauma can simultaneously damage the soft tissue around the fracture, skin, muscles, nerves, and blood vessels (Reksoprodjo, 1970).

**Table 4.** Types of Orthopedic Surgery in Trauma Center of RSUP. Dr. M. Djamil Padang

| No. | Types of Orthopedic Surgery  | Number of patients (N) | Percentage (%) |
|-----|------------------------------|------------------------|----------------|
| 1.  | Trauma/Fracture              | 42                     | 72,41          |
| 2.  | Neoplasmtumor                | 2                      | 3,44           |
| 3.  | Tuberculosis of bone & joint | 12                     | 20,68          |
| 4.  | Osteomyelitis                | 2                      | 3,44           |
|     | Total                        | 58                     | 100            |

The pain scale is a tool for measuring the level or intensity of pain experienced by an individual. The pain scale range usually spans from 0 to 10, where 0 indicates no pain at all and 10 indicates the most severe pain. The pain scale with a

range of 1-3 is used to assess mild pain, while the range of 4-6 is used to assess moderate pain (Rohmayani et al., 2019).Based on the final pain scale of post-orthopedic surgery at RSUP. Dr. M. Djamil Padang from January to March 2023, in the

combination of fentanyl-ketorolac analgesics, pain scale 2 was reported in 9 patients, pain scale 3 in 23 patients, pain scale 4 in 10 patients, pain scale 5 in 5 patients, and pain scale 6 in 2 patients. Whereas in

the combination of fentanyl-tramadol, pain scale 3 was recorded in 3 patients and pain scale 4 in 6 patients (**Table 5, Table 6**).

**Table 6.** Pain Scale in the Fentanyl-Ketorolac Combination Group Compared to the Fentanyl-Tramadol Group in Orthopedic Surgical Pain Patients in Trauma Center of RSUP. Dr. M. Djamil Padang (Pre-Operative)

| Type of analgesics | Pain Scale (Pre-Operative) |    |    |          |   |
|--------------------|----------------------------|----|----|----------|---|
|                    | Mild                       |    |    | Moderate |   |
|                    | 2                          | 3  | 4  | 5        | 6 |
| Fentanyl-Ketorolac | -                          | 24 | 14 | 8        | 2 |
| Fentanyl-Tramadol  | 1                          | 4  | 4  | 1        | - |
| Total of patients  | 58                         |    |    |          |   |

**Table VI.** Pain Scale in the Fentanyl-Ketorolac Combination Group Compared to the Fentanyl-Tramadol Group in Orthopedic Surgical Pain Patients in Trauma Center of RSUP. Dr. M. Djamil Padang (Post-Operative)

| Type of analgesics | Pain Scale (Post-Operative) |    |    |          |   |
|--------------------|-----------------------------|----|----|----------|---|
|                    | Mild                        |    |    | Moderate |   |
|                    | 2                           | 3  | 4  | 5        | 6 |
| Fentanyl-Ketorolac | 9                           | 23 | 10 | 5        | 2 |
| Fentanyl-Tramadol  | -                           | 3  | 6  | -        | - |
| Total of patients  | 58                          |    |    |          |   |

The distribution of patients based on Length of Stay (LOS) in orthopedic surgical pain patients in the Trauma Center of RSUP. Dr. M. Djamil Padang (Period January-March 2023) was found in the fentanyl-ketorolac combination, with a stay of 1-3 days for 15 patients, 4-6 days for 14 patients, 7-10 days for 4 patients, and >10 days for 5 patients. And also in the combination of fentanyl-tramadol, the length of stay was 1-3 days for 2

patients, 4-6 days for 3 patients, 7-10 days for 3 patients, and >10 days for 1 patient (**Table 7**). The duration of treatment with the fentanyl-ketorolac combination was most common in the 1-3 day range, with 15 patients. Meanwhile, the duration of treatment with the fentanyl-tramadol combination was most common in the 4-6 day range with 3 patients and in the 7-10 day range with 3 patients.

**Table 7.** Length of Hospital Stay (LOS) for Orthopedic Surgery Patients in Trauma Center of RSUP. Dr. M. Djamil Padang

| Length of Stay (LOS) | Type of analgesics     |                       |
|----------------------|------------------------|-----------------------|
|                      | Fentanyl-Ketorolac (N) | Fentanyl-Tramadol (N) |
| 1-3 days             | 15                     | 2                     |
| 4-6 days             | 14                     | 3                     |
| 7-10 days            | 14                     | 3                     |
| > 10 days            | 6                      | 1                     |
| Total                | 58                     |                       |

The statistical test used to compare the analgesic effects of the fentanyl-ketorolac and fentanyl-tramadol combinations can be seen from the normality and homogeneity tables. In the normality table, the Kolmogorov-Smirnov test was used, and the final pain scale showed that the data was not normally distributed (Sig. <0.05). In the homogeneity table, the results were homogeneous

with a value of (Sig. >0.05). Therefore, the Mann-Whitney test was conducted, yielding a result of 0.386 (Sig. >0.05). The results of the data analysis indicate that there is no significant difference between the two groups, the fentanyl-ketorolac combination and the fentanyl-tramadol combination.

#### IV. CONCLUSION

Based on the research conducted on 58 patients, it can be concluded that there is no significant difference in the analgesic effects of the fentanyl-ketorolac injection combination compared to the fentanyl-tramadol injection combination in orthopedic surgical pain patients in the trauma center of RSUP. Dr. M. Djamil Padang (Period January-March 2023).

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