IJACT, Volume 3, Issue 8, 2025 ISSN: 2995-5378
https://medicaljournals.eu/index.php/IJACT

INTERNATIONAL JOURNAL OF ALTERNATIVE AND CONTEMPORARY THERAPY

Comparative Study Between the Effect of Paracetamol and Mefenamic Acid on The Relief of Pain Following Dental Extraction of Teeth: Randomized Clinical Trial

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Abstract: Dental extraction involves removing a tooth from its socket, often due to dental caries, periodontal disease, or orthodontic needs etc. Proper extraction techniques are essential to minimize complications, including infection and alveolar bone damage. Pain management post-extraction is crucial for patient recovery, with Acetaminophen (Paracetamol) and Mefenamic acid (Ponstan) being common analgesics. Paracetamol, an analgesic and antipyretic, is safe for patients with contraindications to NSAIDs. In contrast, Mefenamic acid effectively reduces pain and inflammation, making it a viable option for managing postoperative discomfort. Aims of study to compare the effect of paracetamol and mefenamic acid on the relief of pain following dental extraction of teeth and to detect whether the paracetamol can be used as an alternative to mefenamic acid in patients who are contraindicated to mefenamic acid and other NSAIDs. A randomized trial study was conducted at the Oral and Maxillofacial Surgery Unit, Bilad Al-Rafidain College Clinics in Baqubah City. A total of 40 participants, aged ≥18 years, were randomly assigned into two group, one group received Acetaminophen (500 mg) and another group received Mefenamic acid (500 mg) post-dental extraction. The researcher was blind to type of drugs selected by the patient pre-extraction. Assessment of pain relief was done at 5 hours post extraction using a Numerical rating scale. The result of the study showed a significant difference in pain relief between the Paracetamol and Mefenamic acid groups, with a p-value of <0.001, indicating a substantial difference in pain relief effectiveness between paracetamol and Mefenamic acid groups. Mefenamic acid group demonstrates a marked efficacy, with 95.0% of participants scoring 0 and 5.0% scored 1 while in paracetamol group 65.0% of users scored 1, and 20.0% scored 2. The data strongly suggest that Mefenamic acid is superior to paracetamol for managing post-dental extraction pain. Its dual analgesic and anti-inflammatory action, makes it a more potent choice in cases requiring robust pain management. Although the superior effect of mefenamic acid in pain reduction as compared to paracetamol, paracetamol also showed a low score of pain (65% scored 1), so paracetamol can be used as an alternative drug to mefenamic acid in patients who are contraindicated for NSAIDs.

Keywords: Extraction, Paracetamol, Mefenamic

Introduction

Dental extraction is the process of removing a tooth from the alveolar socket in the bone. Indications for extraction include dental caries, periodontal disease, and orthodontic reasons, among others. Successful extraction requires proper assessment and technique to minimize complications such as alveolar bone damage or infection. In cases where surgical removal is necessary, postoperative pain management becomes critical to ensure patient comfort and recovery [1].

A systematic approach to managing the removal of impacted teeth or teeth in difficult positions can reduce postoperative complications and ensure healing without adverse effects [2].

Paracetamol, also known as acetaminophen, is widely used as an analgesic and antipyretic agent. Its mechanism of action involves the inhibition of cyclooxygenase (COX) enzymes in the central nervous system, which reduces pain perception and lowers body temperature. Due to its favorable safety profile, paracetamol is frequently used for managing mild to moderate pain following dental procedures, including extractions [3]. It is particularly suitable for patients where NSAIDs are contraindicated, such as those with peptic ulcers or those at risk for gastrointestinal side effects [4].

Mefenamic acid, marketed as Ponstan, is a non-steroidal anti-inflammatory drug (NSAID) that exerts its effects by inhibiting cyclooxygenase (COX) enzymes, leading to reduced production of prostaglandins

involved in pain and inflammation. In dental settings, Ponstan is often prescribed to manage postoperative pain following extractions, especially when inflammation is a significant factor**,** its dual analgesic and anti-inflammatory effects make it an effective option for managing both pain and swelling [5].

Methodology

A randomized trial study was conducted at the Oral and Maxillofacial Surgery Unit, Bilad Al-Rafidain College Clinics in Baqubah City. According to the ethical principles and in compliance with the Declaration of Helsinki and its later amendments. A thorough clinical and radiological examination by an independent maxillofacial surgeon was performed on all patients in this study, and only healthy, none smoker patients were included in this study. A total of 40 healthy participants, aged ≥18 years, were randomly assigned into two group, one group received Acetaminophen (500 mg) and another group received Mefenamic acid (500 mg) post-dental extraction. The researcher was blind to type of drugs that selected randomly by the patient.

The sample size of this study was calculated by using G-power software. Block randomization was achieved by patient selection to one of two papers (one paper contain mefenamic acid drug and another contain paracetamol drug) to avoid the bias of operator as shown in figure 1 and 2.

Figure 1. Randomization (Selection of drug).

Paracetamol (® Doliprane) Mefenamic acid (ponstan)

Figure 2. Drugs used in the study: Paracetamol (Doliprane) and Mefenamic acid 500 mg (Ponstan).

For more standardization of study in pain assessment, the inclusion criteria included patients without signs and symptoms to any system diseases and patients who required extraction of asymptomatic retained root. Written consent was obtained from each participant, explaining the purpose, risks, and benefits of the study.

The patients were operated under the local anesthesia obtained by block injection of 1.8 ml of 2%

lidocaine hydrochloride with epinephrine 1 : 80,000 (Huon's Co., Ltd., Korea) into the inferior alveolar nerve with infiltration anesthesia into the lingual nerves , tooth extraction was done by using dental elevators or forceps.

Assessment of pain relief was done at 5 hours post extraction using a Numerical rating scale from a zero score to 10 score, where zero represents the lowest pain value, and ten is the highest as shown in Figure 3.

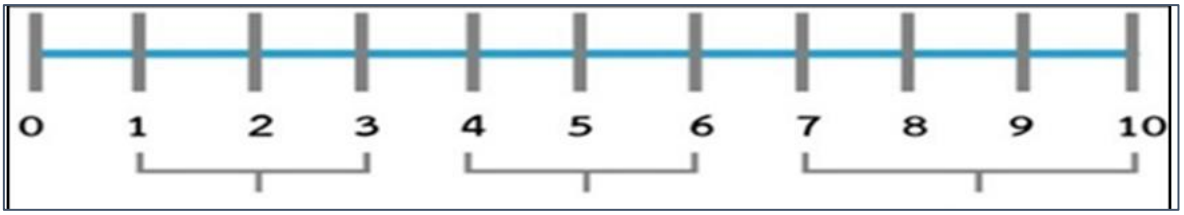

Figure 3. Numerical rating scale used in the study for assessment of pain.

Statistical Analysis was performed using SPSS v26. Comparative analysis was done between the two drug groups using a chi-square test to determine statistical significance ($p<0.05$ was considered significant).

Results and Discussion

Comparison of pain scores between the two groups using paracetamol and Mefenamic acid, showed a highly significant differences with a p-value of <0.001, indicating a substantial difference in pain relief effectiveness between paracetamol and Mefenamic acid groups.

For paracetamol group, the distribution shows that 65.0% of users scored 1, and 20.0% scored 2. A small proportion (5.0%) reported scores of 3 or 4.

In contrast, Mefenamic acid group demonstrates a marked efficacy, with 95.0% of participants scoring 0, indicating a complete pain relief. Only 5.0% reported a score of 1, and none scored 2 or higher. This suggests that Mefenamic acid is significantly more effective than paracetamol in managing pain in this study. Overall, the data clearly indicate that Mefenamic acid provides superior pain relief compared to paracetamol, as evidenced by the higher proportion of participants achieving a pain score of (0) as shown in Table 1 and Figure 4.

Table 1. Comparison of pain between groups.

Drug		Pain scores					Total	P Value
		0	1	2	3	4		
Paracetamol	Count	1	13	4	1	1	20	< 0.001
	% within Drug	5.0%	65.0%	20.0%	5.0%	5.0%	100.0%	
Mefenamic acid	Count	19	1	0	0	0	20	
	% within Drug	95.0%	5.0%	0.0%	0.0%	0.0%	100.0%	

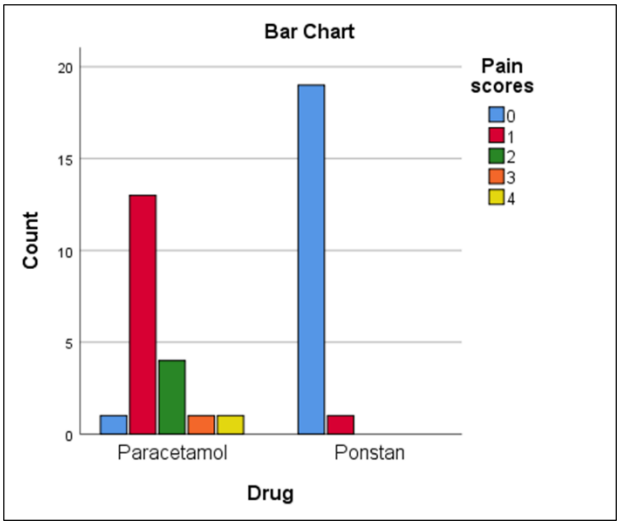

Figure 4. Comparison of pain between groups.

Discussion

The findings of this study revealed a significant difference in pain relief provided by the two drugs, with Ponstan demonstrating superior analgesic efficacy compared to paracetamol. Paracetamol is a widely used over-the-counter analgesic and antipyretic agent. It acts primarily by inhibiting prostaglandin synthesis in the central nervous system, leading to reduced pain perception [5].

Despite its widespread use, paracetamol's mechanism is limited to mild to moderate analgesia, and in cases of more intense postoperative dental pain, it may not provide sufficient relief, as evidenced by the fact that only 5% of users reported complete pain relief (score 0).

Mefenamic Acid (Ponstan), a non-steroidal anti-inflammatory drug (NSAID), works by inhibiting cyclooxygenase (COX) enzymes, thereby reducing prostaglandin production and providing both analgesic and anti-inflammatory effects. Unlike paracetamol, NSAIDs such as Ponstan not only reduce pain but also address the inflammatory response, which is a significant factor in dental postoperative pain [6], [7].

The results clearly demonstrate the superior effectiveness of Mefenamic acid. In Table 1, 95.0% of Mefenamic acid users reported a pain score of 0, indicating complete pain relief, with no patients reporting scores higher than 1. This finding is supported by Mefenamic acid’s ability to manage not only pain but also the inflammation associated with dental extraction. Mefenamic acid's dual action on pain and inflammation likely contributed to these impressive results, as inflammation is a common cause of postoperative pain in dental procedures.

The direct comparison between Paracetamol and Mefenamic acid in Table 1 reveals a significant difference in pain relief efficacy between the two drugs (p-value < 0.001). While paracetamol achieved moderate success, with 65.0% of participants scoring 1, indicating partial pain relief, Ponstan showed a much higher percentage of complete pain relief. This suggests that for patients experiencing moderate to severe pain after dental procedures, Ponstan may offer more consistent and effective relief.

From a pharmacological standpoint, Mefenamic acid’s superior performance can be attributed to its NSAID properties. In dental extractions, the underlying cause of pain often involves both nociceptive pain and inflammation. Paracetamol, lacking anti-inflammatory effects, may not adequately address this dual component, while Mefenamic acid’s COX inhibition and reduction in prostaglandins make it more effective. For patients with mild to moderate pain, patients at risk of gastrointestinal bleeding and contraindications such as those with peptic ulcer disease or renal impairment, paracetamol remains a viable option.

Conclusion

The data strongly suggest that Mefenamic acid is superior to paracetamol for managing post-dental extraction pain. Its dual analgesic and anti-inflammatory action, makes it a more potent choice in cases requiring robust pain management. Although the superior effect of mefenamic acid in pain reduction as compared to paracetamol, paracetamol also showed a low score of pain (65% scored 1), so paracetamol can be used as an alternative drug to mefenamic acid in patients who are contraindicated for NSAIDs.

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