JOURNAL OF PHARMA INSIGHTS AND RESEARCH

RESEARCH ARTICLE

A Comprehensive Study Involving Comparison of Analgesics for Effective Pain Management in Pancreatitis

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Publication history: Received on 6th April; Revised on 8th May; Accepted on 15th May 2024

Article DOI: 10.5281/zenodo.11490500

Abstract: Analgesics, formulated to alleviate pain without causing unconsciousness, are broadly categorized into two groups: opioids and non-steroidal anti-inflammatory drugs (NSAIDs). Pancreatitis is an inflammatory condition of the pancreas, which serves as both an exocrine organ for food digestion and an endocrine organ for regulating blood sugar levels. The disease is typically accompanied by moderate to severe pain, necessitating the use of analgesics for effective pain management. This research aims to evaluate and compare the efficacy of various analgesics in alleviating pain associated with pancreatitis. The study seeks to identify the most efficient analgesic medications for reducing pain levels in individuals with pancreatic diseases. Additionally, it investigates the mechanisms through which analgesics function in pancreatic patients, offering valuable insights into their overall effectiveness. Ultimately, the study aims to gain a comprehensive understanding of the outcomes resulting from different pain management strategies in individuals with pancreatitis. A comparative research study was conducted at Basaveshwara General Hospital in Kalaburagi, Karnataka, over a period of six months, involving 100 patients selected from both general and university hospital settings. The findings revealed that out of 100 patients, 76% were males, and 24% were females affected by pancreatitis. Throughout the study, a total of 164 analgesics were administered, with the highest frequency of potent analgesics prescribed within the age group of 5-46 years. Notably, Nalbuphine emerged as the most commonly prescribed analgesic via the parenteral route, constituting 39% of the total prescriptions. For cases with mild to moderate pain, Paracetamol was the preferred analgesic, accounting for 35.3% of the prescriptions. This research investigates the variations in analgesic prescriptions for pancreatitis pain management, tailoring prescriptions to the severity of pain, with non-opioid analgesics recommended for mild to moderate pain levels

Keywords: Pancreatitis; Exocrine; Endocrine; Analgesics; Opioids; Anti-inflammatory drugs.

1. Introduction

Analgesics are drugs designed to relieve pain without inducing unconsciousness, primarily targeting the nervous system. Commonly referred to as painkillers, they offer a range of administration routes to address nociceptive and neuropathic pain symptoms. [1-3] Opioid analgesics, also known as narcotics, are controlled substances with potential for abuse and act as mu-opioid receptor agonists, affecting cognition and modulating responses to both central and peripheral pain. Additionally, medications like Tramadol and Tapentadol not only serve as mu agonists but also inhibit norepinephrine reuptake, modifying the ascending pain pathway for enhanced pain management. [4-6] Analgesics are classified into several categories:

A) Non-selective cyclooxygenase (COX) inhibitors (traditional NSAIDs)

- Salicylates: Aspirin
- Propionic acid derivatives: Ibuprofen, Naproxen, Ketoprofen
- Anthranilic acid derivatives: Mefenamic acid
- Aryl-acetic acid derivatives: Diclofenac, Aceclofenac
- Oxicam derivatives: Piroxicam, Tenoxicam

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- Pyrrolo-pyrrole derivatives: Ketorolac
- Indole derivatives: Indomethacin
- Pyrazolone derivatives: Phenylbutazone, Oxyphenbutazone

B) Preferential COX-2 inhibitors: Nimesulide, Meloxicam, Nabumetone

C) Selective COX-2 inhibitors: Celecoxib, Etoricoxib, Parecoxib

D) Analgesic-antipyretics with poor anti-inflammatory action

- Paraminophenol derivatives: Paracetamol (Acetaminophen)
- Pyrazolone derivatives: Metamizol (Dipyrone)
- Benzoxazocine derivatives: Nefopam

Pain is a complex combination of unpleasant sensations and emotional responses linked to actual or potential tissue damage. The underlying mechanisms involve intricate neural pathways in the brain, influenced by incoming stimuli, resulting in the sensation we recognize as pain. [7-9] Nociceptive pain, the most common type, is categorized into somatic pain, arising from the skin, muscles, bones, and related tissues, and visceral pain, originating from internal organs like the colon or pancreas. Somatic pain often manifests as a pulsating discomfort in specific areas, while visceral pain might seem to emanate from different structures or present as more localized sensations. The incidence of acute pancreatitis ranges from 12 to 20 cases per year, with idiopathic causes being the most common, ranging from 21% to 82.25%. Necrotizing pancreatitis (2.5% to 22.5%) is the most common complication, which is higher compared to Western countries, and the mortality rate ranges from 1.6% to 3.6%. Pancreatitis is an inflammatory condition of the pancreas, originating from acinar cells and triggering local and distant organ involvement. NSAIDs are a frontline treatment for associated pain, typically administered intravenously in hospitals. Pain management is crucial to prevent complications. Symptoms include upper abdominal pain, and the disease's pathophysiology starts from acinar cell damage, leading to local inflammation, systemic reactions, and potential sepsis. [10-14] The underlying mechanisms involve cytokine release, oxidative stress, and pancreatic enzyme leakage. Pancreatitis is categorized as acute or chronic. Acute pancreatitis varies in severity, ranging from mild edema to necrotic pancreatitis, increasing the risks of infection and organ failure. It is a short-term condition managed with medication, typically resolving within days to months. Unlike chronic pancreatitis, it usually does not lead to gross structural damage. Various drugs can trigger acute pancreatitis, and symptoms include upper abdominal swelling due to ileus. Alcohol is a common cause. Despite advances in intensive care, the mortality rate remains around 10%. Gallstones and alcohol consumption are the primary causes of acute pancreatitis, with gallstones accounting for the majority of cases and alcohol accounting for 70-80%. Other risk factors include structural and functional issues in the sphincter of Oddi and pancreas, gallbladder obstruction, toxins, infections, genetic factors, iatrogenic causes, kidney diseases, blunt abdominal injury, vascular issues, and certain medications like aminosalicylic acid, acetaminophen, and corticosteroids. Chronic pancreatitis is an inflammatory condition of the pancreas that affects both its exocrine and endocrine functions. Exocrine impairment results in pancreatic insufficiency, steatorrhea, and weight loss. Severe cases may lead to organ damage, with pancreatic insufficiency occurring when over 90% of the pancreas is affected. Endocrine dysfunction can progress to pancreatogenic diabetes. Symptoms vary, ranging from asymptomatic periods to constant abdominal pain requiring hospitalization. [15, 16] Digestive and hormonal functions are compromised, impacting nutrient absorption and blood sugar regulation. Typically afflicting individuals aged 30-40, chronic pancreatitis is more prevalent in males. Recurrent acute pancreatitis episodes can culminate in chronic pancreatitis due to persistent inflammation and tissue scarring. Fibrosis impairs pancreatic gland function, resulting in reduced enzyme and hormone production. Ultimately, chronic pancreatitis leads to malabsorption, diarrhea, and diabetes mellitus. While acute pancreatitis is an acute response to pancreatic injury, chronic pancreatitis can result in permanent damage to the structure and endocrine and exocrine functions of the pancreas. [17] Through this study, we aimed to identify the effectiveness of analgesics in pain management in pancreatitis. We are confident that this study will help identify effective analgesics for pain relief in patients with pancreatitis.

2. Materials and Methods

2.1. Materials used

2.1.1. Patient Consent Form

Informed consent was obtained from every patient before conducting the study.

2.1.2. Patient Data Collection Form

A proforma was designed and pre-tested for entry of patient-specific information, including demographics, history of present illness, past medical history, family history, socioeconomic status, diagnosis, drug details (name, dosage form, frequency, route of administration, and duration of treatment) [18]

2.2. Study site, Design, and Period

A comparative study of analgesics in pain management of pancreatitis was undertaken at the 500-bed Basaveshwara General Hospital Gastroenterology department in Kalaburagi for a period of 6 months.

2.3. Sample size

A total of 100 prescriptions were included in the study, and the patients were followed for comparative analysis of analgesic prescriptions.

2.4. Study approval

The study protocol and written informed consent form were approved by the institutional ethical committee of the hospital.

2.5. Study criteria

The study population consisted of inpatients admitted to the Basaveshwara General Hospital Gastroenterology department.

2.5.1. Inclusion Criteria

- Patients receiving medications with analgesics in the Gastroenterology department.
- Inpatients of both genders.
- Pancreatitis patients receiving analgesic medication for pain management.
- Patients aged 6-88 years.

2.5.2. Exclusion Criteria

- Patients unwilling to provide consent.
- Pregnant women and lactating mothers.
- Patients with pulmonary diseases.
- Patients with diseases other than gastroenterology-related conditions.
- Children below 5 years of age.

2.5.3. Source of Data

- Patient data collection form
- Patient case sheets
- WHO prescribing indicators

2.5.4. Study Procedure

Patients were enrolled in the study based on the inclusion and exclusion criteria. Every inpatient's details, including patient identification number, gender, laboratory investigations, and other relevant information, were recorded in the self-designed patient data collection form. All enrolled patients were monitored from the day of admission until discharge for any changes in drug therapy. The criteria for evaluation included the class of drug, cost, and efficacy of the drugs. [19-24]

2.5.5. Test Tool

The desired outcome was used as a tool to assess the efficacy of the study, including:

1. Subject identity number (Patient ID)
2. Age of the patient
3. Gender of the patient
4. Drug prescribed to the patient
5. Dose of the prescribed drug
6. Frequency of the prescribed drug
7. Duration of treatment

8. Laboratory investigations
9. Number of drugs prescribed with generic names
10. Number of days the patient stayed in the hospital

3. Results and Discussion

A total of 100 patients were included in this study. Out of the total (n=100) patients, 76% were males, and 24% were females affected by pancreatitis. In the study, a total of 164 analgesics were administered, with the most potent analgesics prescribed in the age group of 5-46 years. Nalbuphine (39%) was the most commonly prescribed analgesic via the parenteral route. For mild to moderate pain, Paracetamol (35.3%) was prescribed. Figure 1a presents the distribution of subjects based on gender, revealing that 76% were males, and 24% were females. Figure 1b show the distribution of subjects based on age groups. Out of the total 100 patients, 30 individuals belonged to the age group of 5-25 years, 33 individuals belonged to the age group of 26-46 years, 28 individuals belonged to the age group of 47-67 years, and 9 individuals belonged to the age group of 68-88 years. Out of the 100 patients, 64 were diagnosed with acute pancreatitis (48 males and 16 females), and 36 were diagnosed with chronic pancreatitis (28 males and 8 females). Figure 1c illustrate the distribution of analgesics prescribed based on the route of administration. Figure 1d present the distribution of analgesics prescribed based on their potency. Figure 1e show the distribution of analgesics prescribed based on their generic or brand names.

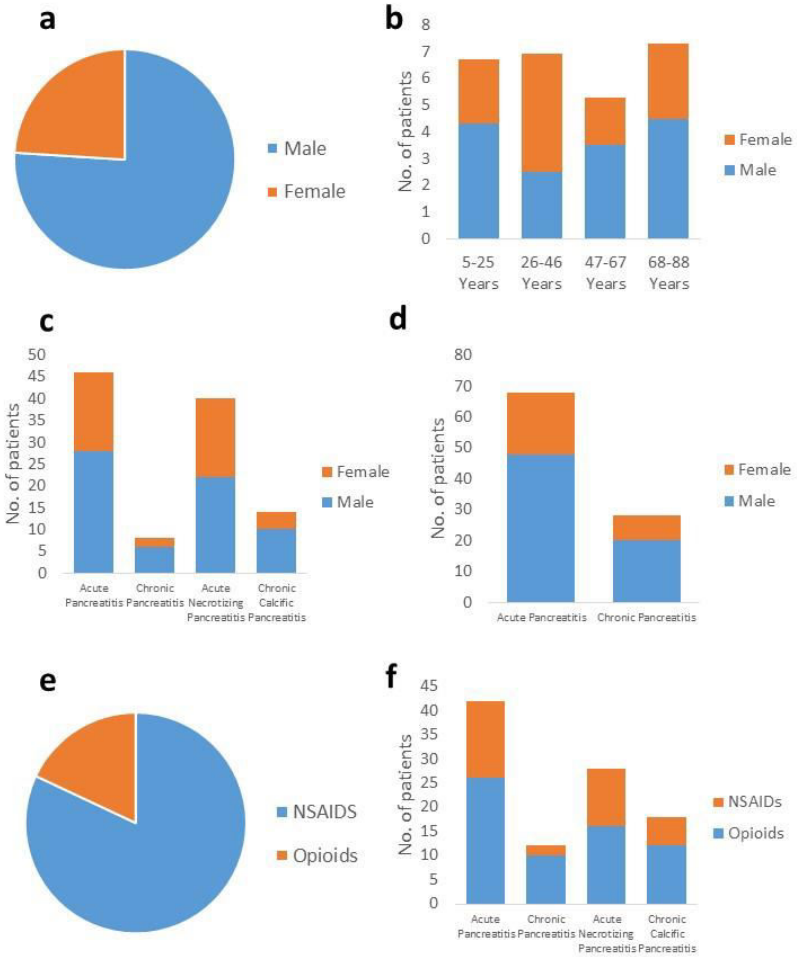

Figure 1. Graph showing a. Distribution of subjects based on gender b. Distribution of subjects based on age c. distribution of analgesics prescribed based on the route of administration d. distribution of analgesics based on their potency e. distribution of analgesics prescribed f. distribution of analgesics for different pancreatitis

Out of the total 164 analgesics prescribed, 124 (75.6%) were generic drugs, while 40 (24.4%) were brand-name drugs. The findings of this study highlight the importance of effective pain management in patients with pancreatitis, as moderate to severe pain is a common symptom of this condition. Analgesics play a crucial role in alleviating pain and improving the overall quality of life for these patients. The study revealed that Nalbuphine, a potent opioid analgesic, was the most commonly prescribed analgesic via the

parenteral route, constituting 39% of the total prescriptions. This suggests that patients with severe pain or those unable to take oral medications were often treated with parenteral administration of Nalbuphine. [25, 26] Opioid analgesics are effective in managing severe pain associated with pancreatitis, as they act on the mu-opioid receptors in the central nervous system, modulating pain perception and response. For cases with mild to moderate pain, Paracetamol (acetaminophen) was the preferred analgesic, accounting for 35.3% of the prescriptions. Paracetamol is a non-opioid analgesic and antipyretic agent that has a favorable safety profile when used at recommended doses. [27-29] It is often considered the first-line treatment for mild to moderate pain due to its efficacy and relatively low risk of adverse effects compared to other analgesics, such as NSAIDs. The study also revealed that the majority of analgesics prescribed were generic drugs (75.6%), which can be attributed to cost-effectiveness and the availability of generic medications in the hospital formulary. Generic drugs are typically less expensive than their brand-name counterparts, making them a more accessible option for patients, especially in resource-limited settings. Furthermore, the findings indicated that the majority of analgesics (61%) were non-potent, which could be related to the management of mild to moderate pain levels in patients with pancreatitis. Non-potent analgesics, such as Paracetamol and certain NSAIDs, are often preferred for milder pain due to their better safety profile and lower risk of adverse effects compared to potent opioid analgesics. The distribution of analgesics based on the route of administration showed that 59.7% of the analgesics were administered parenterally, while 40.3% were given orally. The choice of the route of administration depends on various factors, including the severity of pain, the patient's ability to take oral medications, and the bioavailability of the analgesic. Parenteral administration is often preferred in cases of severe pain or when oral administration is not feasible, as it provides faster onset of action and more consistent drug levels in the bloodstream. [30, 31] It is noteworthy that the study population consisted of both acute and chronic pancreatitis patients, with 64% of the patients diagnosed with acute pancreatitis (48 males and 16 females) and 36% with chronic pancreatitis (28 males and 8 females). The management of pain in these two conditions may require different approaches, as acute pancreatitis is a short-term condition, while chronic pancreatitis is a long-standing inflammatory process that can lead to structural and functional damage to the pancreas. The age distribution of the study population showed that the highest number of patients belonged to the age group of 26-46 years (33%), followed by the age group of 5-25 years (30%), suggesting that pancreatitis can affect individuals across various age groups. Overall, this study provides valuable insights into the patterns of analgesic prescriptions for pain management in patients with pancreatitis. The findings highlight the importance of tailoring analgesic therapy based on the severity of pain, with potent opioid analgesics being more commonly prescribed for severe pain, and non-potent analgesics, such as Paracetamol, being preferred for mild to moderate pain. Additionally, the study emphasizes the need for careful consideration of the route of administration, the use of generic medications for cost-effectiveness, and the potential differences in pain management approaches for acute and chronic pancreatitis

4. Conclusion

The present study offers a comprehensive analysis of analgesic prescriptions for effective pain management in patients with pancreatitis. The findings reveal that Nalbuphine was the most commonly prescribed potent analgesic via the parenteral route, while Paracetamol was the preferred choice for mild to moderate pain. The majority of analgesics prescribed were generic drugs, highlighting the importance of cost-effectiveness in healthcare settings. The study also underscores the need for tailored pain management strategies based on the severity of pain and the differences between acute and chronic pancreatitis. Further research is warranted to explore the long-term outcomes and potential adverse effects associated with different analgesic regimens in the management of pancreatitis-related pain..

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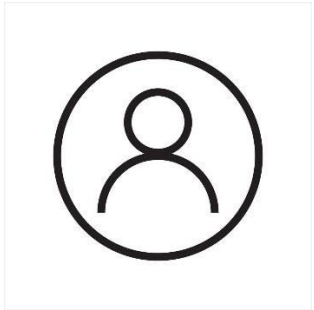
Author's short biography

Dr. Syed Afzal Uddin Biyabani

Dr. Syed Afzal Uddin Biyabani, a distinguished research scholar, focuses his expertise on diabetes. His journey began with a deep-rooted interest in endocrinology during his early academic pursuits. Dr. Biyabani's commitment to understanding diabetes stems from his clinical experiences, where he witnessed its profound impact on individuals. Through rigorous research, he delves into the intricacies of diabetes, aiming to unravel its complexities. With numerous scientific publications to his name, he enriches the medical community with groundbreaking insights. Dr. Biyabani's work extends beyond academia, as he actively advocates for public health initiatives targeting diabetes prevention and management. His dedication to patient care and community outreach empowers individuals to lead healthier lives. Recognized globally for his contributions, Dr. Biyabani remains a driving force in the fight against diabetes, inspiring hope for better outcomes.

Dr. Neelkantreddy Patil



Dr. Neelkantreddy Patil is a distinguished professor and head of the department at Rajiv Gandhi University of Health Sciences. With a strong background in healthcare, he has emerged as a leading authority in medical education and research. Dr. Patil's leadership has been instrumental in shaping the academic curriculum and fostering innovation within the department. his research interests encompass a broad spectrum of healthcare topics, including public health and medical ethics. Dr. Patil's contributions to the field have been widely recognized, with numerous publications in esteemed journals. beyond academia, he is actively involved in community service and healthcare advocacy initiatives. Dr. Patil's commitment to improving healthcare accessibility and quality reflects his dedication to societal welfare. his expertise and leadership continue to inspire both students and colleagues alike. in his role as head of the department, Dr. Patil has facilitated the growth and success of numerous healthcare professionals. his legacy as a scholar and leader in healthcare education is profound and far-reaching.

Dr. Syed Raziuddin Faisal

Dr.Syed Raziuddin Faisal is a dedicated research scholar at Rajiv Gandhi University of Health Sciences in Bangalore. With a keen interest in healthcare innovation, he actively engages in pioneering research endeavors. Dr. Faisal's commitment extends beyond research, as he serves as a mentor, guiding aspiring scholars in their academic pursuits. His contributions to the field have earned him recognition for his expertise and dedication. Through his work, Dr. Faisal seeks to advance healthcare practices and improve patient outcomes. He is known for his meticulous approach to research and his passion for driving positive change in the healthcare sector. As a mentor, he inspires and nurtures the next generation of healthcare professionals. Dr. Faisal's research endeavors continue to make a meaningful impact on healthcare education and practice.

Dr. Mohammed Irfan Ali

Dr. Mohammed Irfan Ali is a distinguished expert in Hospital management, specializing in optimizing healthcare operations and administration. With a PharmD degree under his belt, he brings a unique blend of pharmaceutical knowledge and managerial skills to his field. Dr. Ali's expertise lies in streamlining processes, improving efficiency, and enhancing patient care within hospital settings. Through his innovative approaches, he has earned a reputation for his contributions to healthcare management. Dr. Ali's commitment to excellence is evident in his leadership roles, where he has demonstrated a keen understanding of both clinical and administrative aspects of healthcare. His dedication to advancing hospital management practices continues to have a positive impact on healthcare delivery systems.