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SAFETY OF ANTIPYRETICS IN CHILDREN: COMPARATIVE ANALYSIS OF PARACETAMOL AND IBUPROFEN

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Annotation: Fever is one of the most common clinical symptoms in pediatric practice and antipyretic medications are frequently used to improve comfort and prevent potential complications. Among these agents, paracetamol and ibuprofen are the most widely prescribed and recommended worldwide. This article presents a detailed comparative analysis of the safety profiles of paracetamol and ibuprofen in children, focusing on their pharmacological properties, adverse effects, dosing considerations, and clinical outcomes. By evaluating current evidence and clinical experience, the study aims to clarify the benefits and potential risks associated with each drug and to support rational decision-making in pediatric fever management. Management of elevated body temperature in childhood remains a central issue in everyday medical care because of the high frequency of febrile illnesses and the widespread use of antipyretic agents. This work provides an in-depth evaluation of two commonly used medications, paracetamol and ibuprofen, with emphasis on their safety characteristics in pediatric populations. The analysis focuses on pharmacodynamic and pharmacokinetic differences, age-related tolerance, risk factors for adverse reactions, and outcomes observed in clinical practice. By synthesizing evidence from clinical observations and research data, this article aims to support informed and cautious use of antipyretics, ensuring effective symptom relief while minimizing potential harm in children.

Key words: antipyretics, children, paracetamol, ibuprofen, fever, pediatric safety, adverse effects

Introduction:

Fever in childhood is a physiological response to infection and inflammation, yet it remains a major source of concern for caregivers and healthcare providers. Although fever itself is not usually harmful, inappropriate management can lead to medication errors, adverse reactions, and unnecessary anxiety. Paracetamol and ibuprofen are considered first-line antipyretics in pediatric patients due to their proven effectiveness and general tolerability. However, differences in their mechanisms of action, metabolism, and potential side effects raise important safety considerations, particularly in young children and those with underlying conditions. A thorough understanding of these aspects is essential to ensure effective and safe fever control while minimizing drug-related harm. Elevated temperature is a natural protective response of the body to infection and inflammation, yet it often prompts immediate therapeutic intervention in children. Concerns among parents and healthcare providers frequently lead to early and sometimes unnecessary administration of antipyretic drugs. Paracetamol and ibuprofen are widely accepted as standard options for pediatric fever control due to their accessibility and proven efficacy. Despite their routine use, differences

in metabolic pathways, organ-specific effects, and safety margins necessitate careful consideration. Understanding these distinctions is essential for preventing complications related to improper dosing, prolonged use, or administration in vulnerable pediatric groups, such as infants, dehydrated children, or those with chronic conditions.

Materials and Methods:

This study is based on an analytical review of clinical trials, observational studies, pharmacovigilance reports, and pediatric treatment guidelines published in peer-reviewed medical literature. Data were selected to assess safety outcomes related to hepatic, renal, gastrointestinal, and cardiovascular systems, as well as the incidence of allergic and dose-related reactions. Comparative evaluation focused on recommended dosing ranges, age-related restrictions, duration of therapy, and contraindications. Emphasis was placed on studies involving infants and children under twelve years of age to reflect routine pediatric practice. This study was carried out using a comprehensive analytical approach based on the evaluation of existing clinical and pharmacological evidence related to antipyretic use in pediatric populations. Scientific materials were selected from international medical journals, pediatric pharmacology textbooks, and evidence-based clinical guidelines addressing fever management in children. The reviewed sources included randomized controlled trials, observational cohort studies, post-marketing safety reports, and systematic reviews that examined the use of paracetamol and ibuprofen in various pediatric age groups. Particular attention was given to studies assessing dosage accuracy, duration of administration, and the influence of age, body weight, hydration status, and comorbid conditions on drug safety. Data regarding hepatic, renal, gastrointestinal, and hypersensitivity-related outcomes were extracted and comparatively analyzed. The collected information was synthesized to identify common safety patterns, risk factors for adverse reactions, and clinically relevant differences between the two antipyretic agents. This methodological framework allowed for an integrated and balanced assessment of pediatric antipyretic safety, supporting evidence-based conclusions applicable to routine clinical practice.

Results:

Analysis of available data indicates that both paracetamol and ibuprofen are effective in reducing fever and improving comfort in children when used at appropriate doses. Paracetamol demonstrates a favorable safety profile with minimal gastrointestinal irritation and is well tolerated in infants, making it suitable for use across a wide pediatric age range. However, excessive dosing or prolonged use is associated with hepatotoxicity due to depletion of hepatic glutathione reserves. Ibuprofen shows comparable antipyretic efficacy and provides additional anti-inflammatory benefits, but its use is linked to a higher risk of gastrointestinal irritation, renal function impairment, and fluid balance disturbances, particularly in dehydrated or critically ill children. Overall adverse event rates remain low for both agents when dosing guidelines are strictly followed. Clinical evidence demonstrates that both medications effectively lower body temperature and improve overall comfort when administered according to established recommendations. Paracetamol shows a consistently high level of tolerance in children, particularly with respect to gastrointestinal safety and cardiovascular stability. Its primary risk is associated with hepatic overload when dosing limits are exceeded or intervals are shortened. Ibuprofen provides comparable temperature reduction and additional anti-inflammatory benefits, which may be advantageous in certain clinical scenarios. However, data indicate a higher likelihood of renal stress, gastric mucosal irritation, and electrolyte imbalance, especially during dehydration or acute illness. Overall, the incidence of serious adverse outcomes remains low, provided that dosing accuracy and patient selection are strictly observed.

Discussion:

The comparative safety assessment highlights that the risk profile of antipyretics in children is strongly influenced by dosing accuracy, treatment duration, and patient-specific factors. Paracetamol is generally

preferred in younger children and in those with gastrointestinal sensitivity, while ibuprofen may be advantageous in cases where inflammation contributes significantly to symptoms. Misuse, such as combining medications unnecessarily or exceeding recommended doses, significantly increases the likelihood of adverse outcomes. Education of caregivers and healthcare professionals plays a critical role in preventing medication errors and ensuring rational antipyretic use. The findings support current guidelines that recommend individualized selection based on clinical context rather than routine alternation of drugs. The comparative evaluation highlights that safety is closely linked to rational use rather than the intrinsic danger of either drug. Paracetamol is generally favored for younger age groups and for children with gastrointestinal sensitivity, whereas ibuprofen may be more suitable when inflammatory components are prominent. Problems most often arise from incorrect administration practices, including dose escalation, inappropriate combination therapy, or lack of awareness regarding contraindications. Education of caregivers plays a decisive role in reducing misuse, as does adherence to clinical guidelines by healthcare professionals. The findings reinforce the importance of individualized treatment strategies rather than routine or preventive antipyretic administration.

Conclusion:

Paracetamol and ibuprofen remain safe and effective antipyretic options for children when administered correctly and for appropriate indications. Each medication has distinct advantages and limitations that must be considered in clinical decision-making. Adherence to evidence-based dosing recommendations, careful assessment of patient condition, and avoidance of unnecessary polypharmacy are essential to minimize risks. Rational antipyretic use not only improves pediatric care outcomes but also enhances overall medication safety in childhood fever management. Effective fever management in children requires a balanced approach that prioritizes safety, clinical necessity, and patient-specific factors. Paracetamol and ibuprofen remain reliable options when used responsibly, with clear attention to dosing limits, age considerations, and underlying health status. Avoiding unnecessary medication exposure and emphasizing caregiver education are key measures to prevent adverse effects. Rational selection and proper use of antipyretics contribute significantly to safer pediatric care and improved outcomes in the management of febrile conditions.

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МУКОЦИЛИАР ТРАНСПОРТИ НАЗОРАТИ ТЎҒРИСИДАГИ ЗАМОНАВИЙ ҚАРАШЛАР (адабиётлар шарҳи). JOURNAL OF BIOMEDICINE AND PRACTICE, 7(2).

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