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Evaluating the Anti-Inflammatory Potential of Reality Extra Compared to Conventional NSAIDs

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A B S T R A C T

The critical response of the immune system to infections and tissue injuries, known as inflammation, is the foundational mechanism for various pathological conditions in human diseases. This inflammatory process is vital to ensure survival during adverse events. This study aimed to examine the anti-inflammatory effects of Reality Extra *in vitro* and compare its efficacy with those of ketoprofen and ibuprofen. Three drugs were used at concentrations of 5, 10, and 20 µg/ml, and the albumin denaturation method was used to elucidate their anti-inflammatory effects. Data were analyzed using a statistical software program (SPSS 26). In this study, we determined that Reality Extra exhibited higher anti-inflammatory activity than ketoprofen and ibuprofen. The IC_{50} value of Reality Extra was 1.59 µg/ml, whereas the IC_{50} values of ketoprofen and ibuprofen were 3.52 and 5.89 µg/ml, respectively. The findings of this study demonstrate that Reality Extra exhibits more pronounced anti-inflammatory effects than ketoprofen and ibuprofen. Additional studies are warranted to elucidate com-prehensive toxicity profiles.

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INTRODUCTION

Inflammation is a critical immune response that ensures survival during infections and tissue injury [1]. Maintenance of normal tissue homeostasis relies heavily on the inflammatory response. Inflammation involves a moderately complex molecular mechanism initiated when specific molecular patterns associated with infection or tissue damage are detected [2]. Numerous critical regulators govern the inflammatory response and facilitate selective production of molecules that induce inflammation [3]. Extended inflammation is often associated with severe, harmful side effects, such as headaches. Headaches and body pain can occur at any time and cause significant discomfort [4]. Common types of body pain can be caused by inflammation, including pain in the back, lower back, neck, and knees [5]. Most cases of inflammation and pain can be treated with a range of drugs, including heat rubs, paracetamol, aspirin, heat patches, nonsteroidal anti-inflammatory drugs (NSAIDs), and cold packs [6]. To relieve inflammation, pain, and headaches, a common over-the-counter medication available in Libya is Reality Extra, which is marketed for this purpose. This drug consists of paracetamol (325 mg), caffeine (35 mg), and diclofenac sodium (50 mg).

Acetaminophen, also known as paracetamol, is the most widely used non-prescription medication worldwide [7]. Currently, paracetamol is considered to have multiple effects, and its pain-relieving and fever-reducing properties are attributed to various metabolic processes [8]. It is also believed that caffeine stimulates the action of paracetamol, which is available for marketing purposes. Caffeine acts as a CNS stimulant [9]. Lastly, diclofenac sodium is a phenylacetic acid derivative [10], a non-steroidal, anti-inflammatory, and analgesic agent used in the treatment of rheumatoid arthritis, degenerative joint disease, as well as in the management of pain or inflammation resulting from minor surgery, trauma, and dysmenorrhea.

In this study, ketoprofen and ibuprofen were used as anti-inflammatory agents for comparison with the activity of Reality Extra. Ketoprofen and ibuprofen are non-steroidal anti-inflammatory medications with pain-relieving and fever-reducing properties. These drugs have been widely utilized in medical practice, with ibuprofen being among the

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most commonly used pharmaceutical products worldwide. The chemical compositions of these drugs were comparable to those derived from phenyl propionic acid (Fig. 1). The main difference lies in the specific group attached to the phenyl radical: ketoprofen features a benzoyl group, whereas ibuprofen has a tertbutyl group [11].

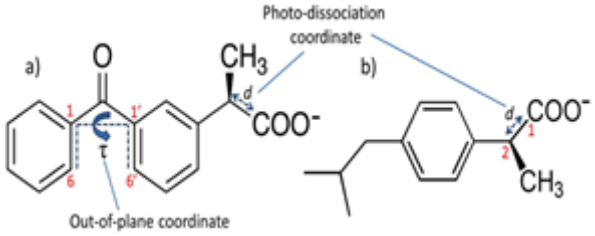

Fig. 1: Chemical compositions of ketoprofen (a) and ibuprofen (b) are depicted, highlighting the coordinates d and τ, which represent the two separate photo-physical routes.

Similar to many other NSAIDs [12], ketoprofen and ibuprofen inhibit the cyclooxygenase enzyme and decrease the production of prostaglandin inflammatory precursors [13]. Indeed, the anti-inflammatory activity of reality extra has not yet been confirmed. Therefore, using the egg albumin denaturation method, our study aimed to evaluate the anti-inflammatory activity of Reality Extra compared to common anti-inflammatory drugs such as ketoprofen and ibuprofen.

MATERIALS AND METHODS

Chemicals and Drugs

The chemicals used in this study were egg albumin (Fisher Scientific Company) and phosphate-buffered saline (PBS) (Sigma-Aldrich), and the drugs used are listed in Table 1.

Table 1. Relevant information on the packaging of varying drug brands:

Name of drugs	Production Company	Country of manufacture	Active Ingredient	Batch Number	Manufacture date	Expiry Date	Concentrations (µg/ml)
Reality Extra	Amn Life Private Limited.	India	Paracetamol Diclofenac Sodium Caffeine	AT582	12/2022	11/ 2025	405
Ketoprofen	European Egyptian Pharmaceutical Industries	Egypt	Ketoprofen	5405008	03/2024	03/ 2027	50
Ibuprofen	Kahira Pharmaceuticals and Chemical Industries Company	Egypt	Ibuprofen	50049/3 J-L.E	08/2023	07/ 2026	400

Albumin denaturation method

This study applied the same method as that used by Kumari, Yasmin [14], with certain adjustments, including halving the volume. Drugs at 0.02% (20 µg/ml) were introduced into each tube at concentrations of 5, 10, and 20 µg/ml, respectively. Subsequently, 1400 µL of phosphate-buffered saline (PBS) and 200 µL of egg albumin were added. The mixture was incubated at 37°C for 15 min, followed by heating at 70°C for 5 min. A Jasco V-630 Spectrophotometer (Pharmacopoeia) was used to measure the absorbance at 660 nm, and the Spectra Manager system processed the resulting data. The percentage of inhibition of protein denaturation was calculated using a specific formula.

Denaturation inhibition (%) = (ANC−AS/ANC) × 100%

Where ANC is the absorbance of the negative control, and AS is the absorbance of the drug.

Statistical analysis

Each experiment was conducted in triplicate, and the results are presented as mean ± Standard Deviation (M±SD) and percentages (%). Statistical analysis of all assay data was performed using Statistical Package for the Social Sciences (SPSS) software (version 21.0; SPSS Inc., Chicago, IL, USA).

RESULTS

The egg albumin method was used to assess the anti-inflammatory effects of drugs against denaturation. The highest inhibition rate was observed for Reality Extra (77.11%), followed by ketoprofen (71.98%), whereas ibuprofen exhibited the lowest inhibition rate (61.16%) at 20 µg/ml. Reality Extra demonstrated significantly higher inhibition than other drugs at all concentrations tested, as illustrated in Fig. 2. The values of IC_{50} of Reality Extra, ketoprofen, and ibuprofen were 1.59, 3.52, and 5.89 µg/ml, respectively, as shown in Fig. 3.

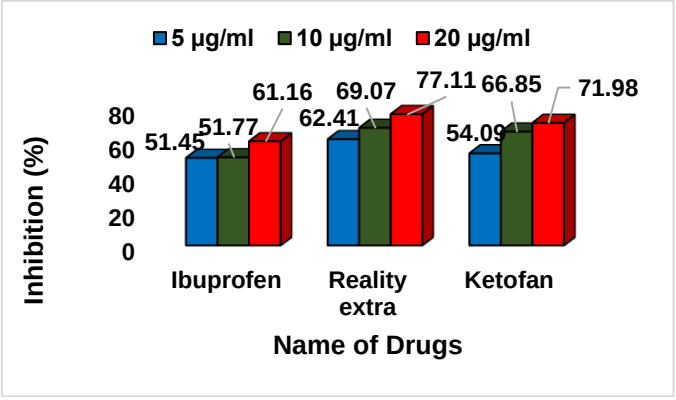

Fig. 2: In vitro anti-inflammatory activity (%) of drugs against albumin denaturation.

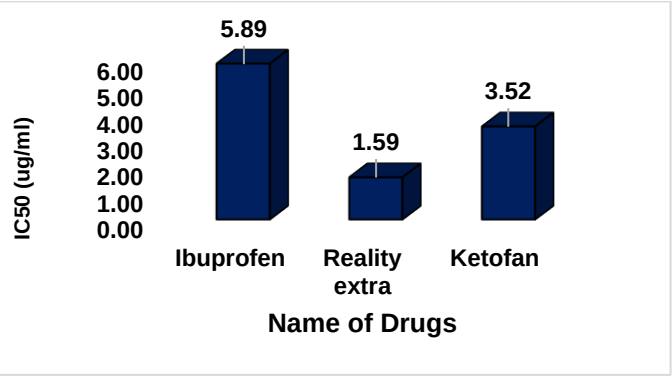

Figure 3: *In vitro* anti-inflammatory activity (IC_{50}) of drugs against albumin denaturation.

DISCUSSION

The discovery of drugs for the treatment of inflammation and pain is a significant area of research. Owing to their potent analgesic effect, Reality Extra analgesics are among the most frequently used NSAIDs in the local market. Employing protein denaturation methods, we evaluated the anti-inflammatory activity of reality as well as the most commonly used NSAIDs (ketoprofen and ibuprofen) available in the market at the time of this study, and determined the drug with superior anti-inflammatory activity.

In this study, the Reality Extra exhibited a significant and consistent increase in anti-inflammatory activity as the concentration increased, demonstrating superior performance to the other two drugs at all concentrations. Reality Extra displayed the lowest IC_{50} value, indicating greater efficacy in preventing albumin denaturation than ketoprofen and ibuprofen.

The Oral Reality Extra was composed of paracetamol 325 mg, diclofenac sodium 50 mg, and caffeine anhydrous 30 mg. Unlike non-steroidal anti-inflammatory drugs (NSAIDs), paracetamol lacks anti-inflammatory properties. Diclofenac sodium (50 mg) is the only anti-inflammatory drug used in this formula. In most cases, caffeine is used as an analgesic adjuvant along with other NSAIDs [15, 16]. Koga, Tsuchida [17] recently reported that caffeine can influence the solubility and interaction of diclofenac in water-based solutions. This knowledge is vital for improving drug formulations, boosting pharmaceutical stability, and managing unexpected overdoses.

A study conducted by Sarzi-Puttini, Bagnasco [18] demonstrated that oral ketoprofen exhibits superior efficacy in alleviating moderate-to-severe rheumatic pain and enhancing functional status and general condition, with an overall safety profile comparable to that of diclofenac and ibuprofen. In this study, ketoprofen was found to be less effective than Reality Extra. This outcome may be attributed to the synergistic effect of paracetamol and diclofenac.

While most studies have focused on the synergistic analgesic effects of combining diclofenac and paracetamol, Miranda, Puig [19] discovered significant interactions between paracetamol and NSAIDs. These findings support the therapeutic use of these combinations for pain management. Few studies have explored their anti-inflammatory activities, finding that the combination of diclofenac and paracetamol offers anti-inflammatory effects similar to those of individual drugs (20). According to this specific in vitro study, Reality Extra demonstrates the highest potential as an anti-inflammatory agent. However, it is important to note that in vitro studies may yield results that differ from those obtained *in vivo*. Therefore, additional clinical investigations are required.

CONCLUSION

The main conclusions of the experimental work should be presented. The contribution of the work to the scientific community and its economic implications should be emphasized. Inflammation remains a significant concern, although most NSAIDs exhibit varying degrees of activity. Reality Extra demonstrated superior efficacy in this study compared to ketoprofen and ibuprofen. Further research is required to evaluate in vivo toxicity.

REFERENCES

1. Sattler S. The role of the immune system beyond the fight against infection. The immunology of cardiovascular homeostasis and pathology. 2017:3-14.
2. Meizlish ML, Franklin RA, Zhou X, Medzhitov R. Tissue homeostasis and inflammation. Annual review of immunology. 2021;39(1):557-81.
3. Ahmed AU, Williams BR, Hannigan GE. Transcriptional activation of inflammatory genes: mechanistic insight into selectivity and diversity. Biomolecules. 2015;5(4):3087-111.
4. Ashina S, Mitsikostas DD, Lee MJ, Yamani N, Wang S-J, Messina R, et al. Tension-type headache. Nature Reviews Disease Primers. 2021;7(1):24.
5. Popescu A, Lee H. Neck pain and lower back pain. Medical Clinics. 2020;104(2):279-92.
6. Mansour DZ, Nguyen BT, Brandt NJ. Over-the-Counter Topical Analgesics: Benefits and Risks for Older Adults. Topics in Pain Management. 2024;40(3):1-7.
7. Bloukh S, Wazaify M, Matheson C. Paracetamol: Unconventional uses of a well-known drug. International Journal of Pharmacy Practice. 2021;29(6):527-40.
8. Allegaert K. A critical review on the relevance of paracetamol for procedural pain management in neonates. Frontiers in Pediatrics. 2020;8:89.
9. Zduńska A, Cegielska J, Zduński S, Domitrz I. Caffeine for headaches: Helpful or harmful? A brief review of the literature. Nutrients. 2023;15(14):3170.
10. Tomar DR, Jayakumar SV. Novel synthetic methodology of Diclofenac derivatives and its spectrochemical studies. Materials Today: Proceedings. 2023;80:141-9.
11. Ledieu L, Simonneau A, Thiebault T, Fougère L, Destandau E, Cerdan O, Laggoun F. Spatial distribution of pharmaceuticals within the particulate phases of a peri-urban stream. Chemosphere. 2021;279:130385.

12. Bellotti P, Huang H-M, Faber T, Glorius F. Photocatalytic late-stage C–H functionalization. Chemical reviews. 2023;123(8):4237-352.
13. Theodosis-Nobelos P, Tziona P, Poptsis A, Athanasekou C, Kourounakis PN, Rekka EA. Novel polyfunctional esters of ibuprofen and ketoprofen with hypolipidemic, lipoxygenase inhibitory and enhanced anti-inflammatory activity. Medicinal Chemistry Research. 2017;26:461-72.
14. Kumari CS, Yasmin N, Hussain MR, Babuselvam M. Invitro anti-inflammatory and anti-artheritic property of Rhizopora mucronata leaves. International Journal of Pharma Sciences and Research. 2015;6(3):482-5.
15. Laska EM, Sunshine A, Mueller F, Elvers WB, Siegel C, Rubin A. Caffeine as an analgesic adjuvant. Jama. 1984;251(13):1711-8.
16. Asadi HK, Jamalpour MR, Saeedi A. Clinical trial of combination of acetaminophen, ibuprofen and caffeine on pain relief and analgesic use after impacted lower third molar surgery. Shiraz E-Medical Journal. 2017;18(7).
17. Koga R, Tsuchida T, Tsunoda C, Kataoka H, Suenaga S, Goto S. Physicochemical Properties of Diclofenac Regulated by its Intermolecular Interactions with Caffeine Evaluated via Vector Space Model, Nuclear Magnetic Resonance, and Fourier-Transform Infrared Analyses. Materials Chemistry and Physics. 2024:130158.
18. Sarzi-Puttini P, Bagnasco M, Lanata L, Atzeni F. AB0505 Risk and Benefit Profile of Nsaids: A New Overall Analysis on Efficacy and Safety of Ketoprofen vs Ibuprofen and Diclofenac. BMJ Publishing Group Ltd; 2015.
19. Miranda HF, Puig MM, Prieto JC, Pinardi G. Synergism between paracetamol and nonsteroidal anti-inflammatory drugs in experimental acute pain. Pain. 2006;121(1-2):22-8.
20. Malhotra SD, Rana DA, Patel VJ. Comparison of analgesic, anti-inflammatory and anti-pyretic efficacy of diclofenac, paracetamol and their combination in experimental animals. Int J Basic Clin Pharmacol. 2013;2(4):458e65.