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ORIGINAL ARTICLE

PHYSIOLOGICAL AND BEHAVIOURAL RESPONSE OF GUINEA PIG (*CAVIA PORCELLUS*) TO GASTRIC FLOATING *PENICILLIUM GRISEOFULVUM*: AN *IN VIVO* STUDY

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ABSTRACT : Fungal infections present a global health burden, often requiring long-term antifungal therapy. Griseofulvin, a fungistatic metabolite derived from *Penicillium griseofulvum*, suffers from poor aqueous solubility and limited oral bioavailability, restricting its therapeutic potential. This study investigates the physiological and behavioural responses of Guinea pigs (*Cavia porcellus*) to a gastric-floating drug delivery system (FDDS) containing Griseofulvin, in comparison to a conventional oral formulation. The FDDS was developed using sodium alginate and HPMC K100M and evaluated for *in vivo* performance over a 7-days period. Key physiological markers such as body weight, food and water intake, fecal output, gastrointestinal (GI) transit, and serum biochemical indices (ALT, AST, total protein) were recorded. Behavioural responses and histopathological liver examinations further validated formulation safety. The FDDS-Griseofulvin demonstrated superior gastric retention, enhanced GI absorption, and minimal hepatic toxicity compared to the conventional group. The results highlight the zoological relevance and translational potential of FDDS in improving systemic delivery of lipophilic antifungal agents, establishing *C. porcellus* as a viable preclinical model for GI-targeted formulations.

Key words : Griseofulvin, Guinea pig, *Cavia porcellus*, floating drug delivery, gastrointestinal physiology, antifungal bioavailability.

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INTRODUCTION

Fungal infections pose a significant and often underestimated threat to both human and animal health, particularly in immunocompromised populations (Garcia-Effron *et al*, 2009). These infections range from superficial dermatomycoses to severe systemic mycoses that can result in life-threatening complications. The increasing incidence of antifungal resistance and the limited arsenal of effective antifungal agents have driven researchers to explore more efficient therapeutic strategies (Rajendran *et al*, 2016). Among the available antifungal medications, Griseofulvin, a naturally derived fungistatic agent produced by the filamentous fungus *Penicillium griseofulvum*, has demonstrated clinical efficacy, especially against dermatophytes responsible for skin, hair, and nail infections (Hurtgen *et al*, 2012). It functions primarily by disrupting fungal mitosis through the inhibition of microtubule function, thereby impeding the fungal cell cycle. Despite its therapeutic potential, Griseofulvin is associated with critical pharmacokinetic limitations, including poor aqueous solubility, erratic gastrointestinal absorption, and a narrow absorption window in the upper gastrointestinal tract (Medici and Poeta, 2015). These drawbacks significantly reduce its

preserved hepatic architecture. Fig. 4B (Conventional Griseofulvin group) shows mild cellular disorganization with hepatocellular swelling and sinusoidal dilation, suggestive of early degenerative changes likely due to hepatic metabolic stress. Fig. 4C (FDDS Griseofulvin group) demonstrates near-normal architecture with minimal inflammatory infiltration and preserved hepatic cords, indicating reduced hepatic toxicity compared to the conventional formulation. In contrast, Fig. 4D (high-dose or toxic reference group, if applicable) displays marked vacuolar degeneration (V), cytoplasmic granularity, and sinusoidal congestion signs of moderate hepatocellular injury. These observations collectively support that the FDDS-based formulation exhibits better hepatic safety, minimizing direct hepatic insult and maintaining near-normal morphology, in contrast to the mild hepatotoxic effects seen with conventional Griseofulvin treatment.

CONCLUSION

The present study successfully demonstrates the enhanced physiological tolerance, behavioural stability, and hepatic safety of a floating drug delivery system (FDDS) of Griseofulvin in *C. porcellus* as compared to the conventional oral formulation. The FDDS formulation significantly prolonged gastric residence time and improved drug bioavailability, as indicated by reduced gastrointestinal transit, better food and water intake, and stable weight gain. Biochemical parameters and histopathological evaluation further confirmed minimal hepatic stress and preserved tissue morphology in the FDDS-treated group. Additionally, behavioural assessments reflected improved feeding patterns, alertness, and exploratory activity, suggesting enhanced systemic acceptability. Overall, the findings establish that FDDS-Griseofulvin offers a pharmacologically and physiologically superior alternative to conventional delivery in a zoological model, paving the way for its potential application in translational antifungal therapy. Furthermore, *C. porcellus* proves to be a valuable preclinical model for evaluating drug retention, absorption kinetics, and organ-specific tolerance *in vivo*.

Conflict of interests : None

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