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Letter to the Editor
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Medication–Meal Timing: An Underrecognized Determinant of Drug Efficacy and Safety

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Dear Editor,

Drug-meal interactions represent an underappreciated contributor to medication non-efficacy and adverse drug reactions. Appropriate drug selection, accurate dosing, and adequate duration of therapy are crucial factors in terms of safety concerns. However, inappropriate timing of drug administration can alter drug absorption, distribution, metabolism, and elimination, ultimately affecting the efficacy and safety of pharmacotherapy (1). This notable problem in the medical world is underexplored and underemphasized in patient counseling.

Meal is the key determinant that influences drug pharmacokinetics through various mechanisms (2). Among them, the physical characteristics of food, such as viscosity and volume, can alter the physiological environment of the gastrointestinal tract, including factors such as gastric pH, bile secretion, and gastrointestinal motility, thereby affecting drug absorption and bioavailability (3). Certain medications, such as levothyroxine, are best taken on an empty stomach for maximum efficacy and absorption (4). Evidence suggests that co-ingestion of coffee or calcium-containing beverages with levothyroxine has been shown to reduce bioavailability, potentially resulting in inadequate thyroid hormone replacement and persistent hypothyroid symptoms. Similarly, bisphosphonates, prescribed to treat osteoporosis, have poor bioavailability, which can be further compromised by food intake, so inappropriate drug intake timing can significantly decrease the therapeutic effect and resultantly become a less effective strategy to treat osteoporosis, and the patient becomes prone to recurrent fractures (5). Such evidence emphasizes the need to address drug-meal interactions for safe and effective therapeutic efficacy.

Interestingly, some medicines are advised to be taken with meals to improve absorption and tolerance. Metformin, a drug of choice for diabetes mellitus type II, is recommended to be administered with food, which decreases gastrointestinal adverse effects (6). Additionally, non-steroidal anti-inflammatory drugs (NSAIDs) are normally advised to be taken with meals to reduce gastrointestinal toxicity, as inappropriate timing may elevate the risk of adverse drug reactions and treatment discontinuation (7). Despite the clinical consequences of inaccurate meal-medication timing, counseling on this determinant is inconsistent, particularly in high-volume outpatient settings.

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Moreover, lack of patient education remains a prominent contributor to this overlooked risk. The major factor contributing to this consequence is thought to be a lack of prescription details, such as "taken before a meal" or "taken after a meal," which patients may interpret inconsistently. Particularly in low- to middle-income countries, limited access to pharmacists and a lack of counseling among people exacerbate this problem, elevating risks and adverse outcomes (8). A study conducted in South Africa revealed that only 30-50% people were aware of the meal-medicine interaction, highlighting the lack of awareness in their knowledge and practices, and positive attitudes towards drug-food interaction (9).

Addressing this gap requires a coordinated and meaningful approach. Advocating for standardized pictographic meal-timing labels on prescription packaging, proposing the integration of meal-timing guidance into electronic prescribing systems, or calling for the inclusion of drug-food interaction counseling in undergraduate pharmacology curricula will help prevent disturbance to drug efficacy and absorption.

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