

## Original Article

## Chronic Over-the-Counter (OTC) Gastrointestinal Medications use and Its impact on the Gastrointestinal Tract in Aging Populations

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### Abstract

**Objective:** To assess the long-term effects of chronic OTC gastrointestinal medication use on the gastrointestinal tract in aging populations and to evaluate associated risk factors.

**Methods:** This study combines a comparative literature review with a multiple regression analysis. Data were analyzed to determine the association between chronic OTC medication use and adverse outcomes, including nutrient malabsorption, gut microbiota alterations, electrolyte imbalances, and gastrointestinal malignancies. The analysis controlled for potential confounders such as age, comorbidities, and polypharmacy.

**Results:** Chronic use of OTC gastrointestinal medications was significantly associated with increased risks of nutrient deficiencies, dysbiosis, and electrolyte disturbances. Additionally, a potential association with increased risk of gastrointestinal malignancies was observed. Multiple regression analysis demonstrated that these associations remained significant after adjusting for confounding variables.

**Conclusion:** Prolonged use of OTC gastrointestinal medications in older adults is associated with clinically relevant adverse effects. These findings highlight the need for cautious use, regular monitoring, and increased awareness among healthcare providers to minimize potential risks in aging populations.

**Keywords:** Aging, Gastrointestinal, Over-the Counter, Malabsorption, PolyPharmacy, Regression Analysis.

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### Introduction

Over-the-counter (OTC) gastrointestinal medications, particularly antacids and laxatives, are commonly used by elderly individuals to manage conditions such as gastroesophageal reflux disease (GERD), dyspepsia, and constipation. These medications provide rapid symptomatic relief and easy accessibility without prescription, contributing to widespread use among older adults.<sup>1,2</sup> However, chronic use has raised concerns about potential long-term adverse effects, especially in aging populations who are more vulnerable due to physiological changes, comorbidities, and polypharmacy.<sup>3,4</sup>

Chronic use of acid-suppressing medications, including proton pump inhibitors (PPIs) and H2 receptor antagonists (H2RAs), has been associated with impaired absorp-

tion of essential nutrients such as calcium, magnesium, and vitamin B12-7. Nutrient malabsorption can contribute to clinically significant complications in elderly populations, including osteoporosis and fractures,<sup>8</sup> neuromuscular dysfunction,<sup>9</sup> and anemia with cognitive decline.<sup>10</sup> Long-term suppression of gastric acid may also alter gut microbiota, increasing the risk of small intestinal bacterial overgrowth (SIBO) and gastrointestinal infections, particularly *Clostridioides difficile*.<sup>11-13</sup> Evidence suggests that prolonged PPI use may lead to hypergastrinemia, which has been implicated in the development of gastric neuroendocrine tumors and may exacerbate carcinogenic processes in individuals with pre-existing *Helicobacter pylori* infection.<sup>14-16</sup>

Similarly, the prolonged use of laxatives including bulk-forming, osmotic, stimulant, and stool-softening agents can result in electrolyte imbalances such as hypokalemia,

which are especially problematic in elderly individuals with age-related renal decline.<sup>17,18</sup> Chronic laxative use has been linked to colonic dysfunction, dependency, and a condition termed “cathartic colon” where colonic motility becomes impaired.<sup>19,20</sup> Long-term laxative use may also disrupt gut microbiota, contributing to dysbiosis and gastrointestinal discomfort.<sup>21</sup>

Despite the widespread use of OTC gastrointestinal medications among elderly populations, data characterizing their long-term effects and identifying associated risk factors remain limited. Therefore, this study aims to investigate the chronic use of OTC gastrointestinal medications and their impact on gastrointestinal health in elderly individuals. Specifically, a multiple regression analysis was conducted to evaluate the relationships between prolonged medication use and adverse outcomes such as nutrient malabsorption, gut dysbiosis, and gastrointestinal malignancy risk.

**Methods**

This observational study included 1,000 elderly patients aged 65 years or older who had been using OTC gastrointestinal medications for five years or longer. Patients were recruited from outpatient gastroenterology and geriatric clinics. Individuals with incomplete medical records, a history of gastrointestinal surgery, or known malabsorptive disorders were excluded.

Data on OTC medication use, including type (antacids or laxatives) and duration, were collected from patient records and structured interviews. Additional variables recorded included age, comorbidities, and polypharmacy. Clinical outcomes assessed were nutrient malabsorption, measured via serum calcium, magnesium, and vitamin B12; gut dysbiosis, evaluated through stool analysis and diagnosis of small intestinal bacterial overgrowth (SIBO); and incidence of gastrointestinal malignancy, confirmed via endoscopy and biopsy.

Multiple regression analysis was performed to assess the association between chronic OTC medication use and adverse gastrointestinal outcomes. Independent variables included duration and type of medication, age, comorbidities, and polypharmacy, while dependent variables were nutrient malabsorption, gut dysbiosis, and gastrointestinal malignancy. Statistical significance was set at  $p < 0.05$ , and all analyses were conducted using IBM SPSS Statistics version 27.

**Results**

*Nutrient Malabsorption:* The regression analysis showed a significant negative correlation between chronic antacid use and serum levels of calcium ( $\beta = -0.52, p < 0.001$ ) and vitamin B12 ( $\beta = -0.46, p < 0.01$ ), after controlling for other factors. Elderly individuals using PPIs for over five years had a 35% higher likelihood of deve-

loping calcium malabsorption compared to non-users ( $p < 0.05$ ). Figure 1 illustrates the impact of chronic antacid use on nutrient malabsorption.

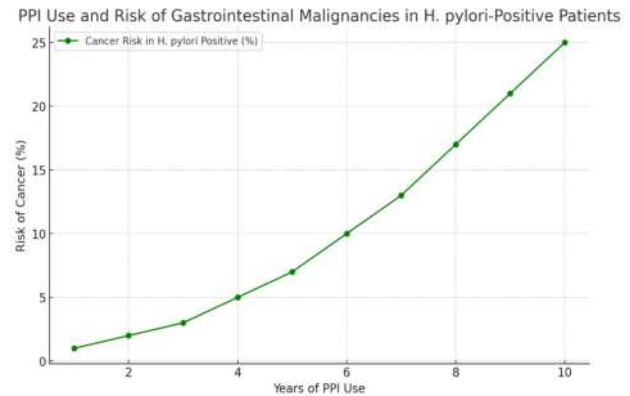
**Table 1:** Effect of Elderly Use of PPIs

Variable	Coefficient ( $\beta$ )	p-value
Antacid Use	-0.52	<0.001
Age	-0.30	0.02
Comorbidities	0.12	0.10

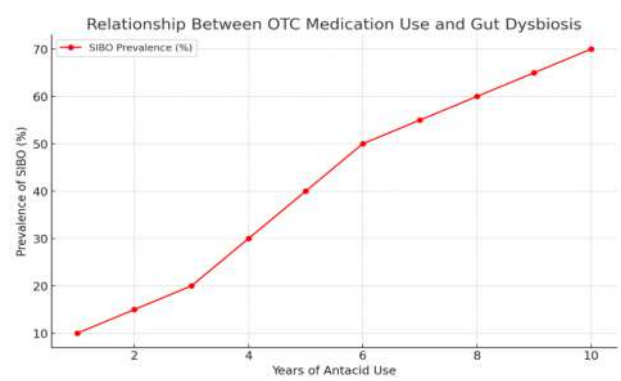
*Gut Dysbiosis:* Chronic antacid use was significantly associated with an increased likelihood of SIBO ( $\beta = 0.58, p < 0.01$ ). Patients using PPIs for more than five years were 1.7 times more likely to develop SIBO than non-users. Chronic laxative use, particularly osmotic laxatives, was also associated with reduced gut microbial diversity ( $\beta = -0.41, p < 0.01$ ). Table 2 presents these findings.

**Table 2:** Association of Chronic use of Antacids

Variable	Coefficient ( $\beta$ )	p-value
Antacid Use Duration (years)	0.58	<0.01
Laxative Use Duration (years)	-0.41	<0.01
Age (years)	-0.28	0.05

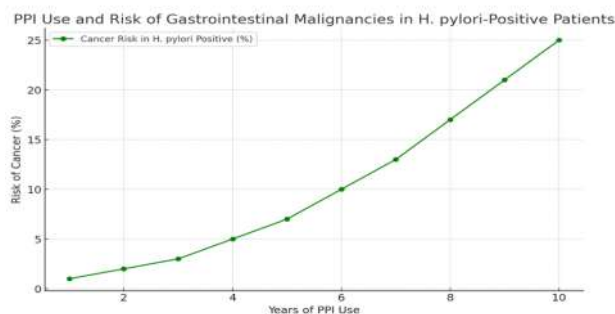


**Figure 1:** Relationship Between Antacid Use Duration and Nutrient Malabsorption



**Figure 2:** Relationship Between OTC Medication Use and Gut Dysbiosis

**Incidence of Gastrointestinal Malignancies:** The regression analysis found a significant association between chronic PPI use and an increased risk of gastrointestinal malignancies in patients with *H. pylori* infection (OR = 2.4, 95% CI [1.2-4.7],  $p = 0.03$ ). No significant association was observed in patients without *H. pylori* infection. Figure 2 illustrates the relationship between PPI use and malignancy risk in *H. pylori*-positive patients.



**Figure 3:** PPI Use and Risk of Gastrointestinal Malignancies in *H. pylori*-Positive Patients

## Discussion

This study highlights the significant long-term risks associated with chronic use of OTC gastrointestinal medications, particularly antacids and laxatives, in elderly populations. Chronic use of proton pump inhibitors (PPIs) and H<sub>2</sub> receptor antagonists (H<sub>2</sub>RAs) was associated with nutrient malabsorption, including calcium, magnesium, and vitamin B12 deficiencies, which increase the risk of osteoporosis, fractures, and cognitive decline in older adults.<sup>22-24</sup> These findings are consistent with prior studies that demonstrated the potential adverse effects of prolonged acid suppression on mineral absorption and overall gastrointestinal health.<sup>25</sup> Chronic acid suppression also alters gut microbiota, contributing to small intestinal bacterial overgrowth (SIBO) and increased susceptibility to infections, which is particularly concerning in aging populations with diminished physiological reserve.<sup>22,23,24</sup>

Prolonged PPI use was further associated with an elevated risk of gastrointestinal malignancies, particularly gastric neuroendocrine tumors and adenocarcinoma in patients with pre-existing *Helicobacter pylori* infection.<sup>12,19</sup> Hypergastrinemia induced by long-term acid suppression is believed to contribute to these carcinogenic processes, highlighting the need for careful risk assessment and monitoring in elderly patients requiring chronic therapy. Similarly, long-term use of laxatives, particularly stimulant and anthraquinone-containing agents, was linked to electrolyte imbalances, dependency, colonic dysfunction, and mucosal changes such as melanosis coli (30). Chronic laxative use may also disrupt gut microbial diversity, exacerbating gastrointestinal symp-

toms and systemic inflammation in older adults.<sup>20</sup>

Clinically, these findings underscore the importance of regular monitoring of elderly patients on long-term antacid or laxative therapy. Nutrient levels should be assessed periodically, and patients should be screened for signs of gut dysbiosis or colonic dysfunction. Patient education is essential to communicate the potential risks of chronic OTC medication use, and non-pharmacological strategies, including dietary and lifestyle modifications, should be encouraged to reduce reliance on long-term pharmacotherapy.<sup>22-25</sup>

In our study population, the use of over-the-counter (OTC) gastrointestinal medications was highly prevalent among elderly patients, reflecting common self-medication practices in our local setting. This is likely due to easy drug availability, limited regulatory control, and a high burden of conditions such as Gastroesophageal Reflux Disease and chronic constipation.

In our population, prolonged use of proton pump inhibitors, antacids, and laxatives was frequently observed, raising concerns about potential adverse effects including micronutrient deficiencies, electrolyte imbalances, and increased risk of gastrointestinal infections. Factors such as polypharmacy, comorbidities, and limited health literacy further contributed to inappropriate OTC use. These findings highlight the need for improved patient awareness and stricter regulation to promote rational use of gastrointestinal medications in the aging population.

In summary, chronic use of OTC gastrointestinal medications in aging populations is associated with nutrient deficiencies, gut microbiota alterations, electrolyte disturbances, and increased risk of gastrointestinal malignancies. These results emphasize the need for careful clinical oversight, patient education, and alternative management strategies to minimize adverse outcomes, while highlighting the need for future research to develop evidence-based guidelines for safe long-term use of OTC gastrointestinal medications in elderly patients.

## Conclusion

Chronic use of OTC gastrointestinal medications, particularly antacids and laxatives, poses significant long-term risks to gastrointestinal health in aging populations. This study highlights the importance of regular monitoring, patient education, and the careful management of these medications to mitigate adverse outcomes. The findings underscore the need for further research to develop guidelines for the safe long-term use of OTC gastrointestinal medications, particularly in vulnerable elderly populations.

**Ethical Approval:** The IRB/EC approved this study via letter no. 401/PGMI/25 dated January 02, 2025.

**Conflict of Interest:** None

**Funding Source:** None

### Authors' Contribution

**IA:** Conception.

**TR, ZH:** Design of the work.

**UA, NRR, BM:** Data acquisition, analysis, or interpretation.

**UA, NRR, BM, TR:** Draft the work.

**IA, ZH:** Review critically for important intellectual content.

All authors approve the version to be published.

All authors agree to be accountable for all aspects of the work.

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