

# An Innovative Approach for Treating Chronic Vaginitis Based on AI-Driven Drug Repurposing

Hinpetch Daungsupawong<sup>1\*</sup>, Viroj Wiwanitkit<sup>2</sup>

<sup>1</sup>Private Academic Consultant  
Phonhong, Lao People's Democratic Republic

<sup>2</sup>Research Center Department  
Chandigarh University  
Punjab, India

\*hinpetchdaung@gmail.com

**Abstract**-This study evaluates the effectiveness of ChatGPT, an AI language model, in assisting healthcare practitioners in selecting drugs for treating chronic vaginitis, which is still an important medical problem. A panel of experts assessed ChatGPT's recommendations for ten fictional clinical scenarios related to this condition. The study aims to determine if ChatGPT can provide accurate and relevant guidance on pharmaceutical options for managing chronic vaginitis. The authors use the set of question as input to ChatGPT system to derive the output then the output was further validated by expert panel. The results show that ChatGPT consistently offers valuable suggestions for potential drug repurposing, supported by scientific evidence. Despite limitations, such as the need for more clinical data and the inability to modify treatment, ChatGPT shows promise as a tool for drug repurposing in the treatment of chronic vaginitis. The present study is a novel approach in applying the AI based technique for drug repurposing in clinical medicine. Future research should focus on refining the model's capabilities, incorporating more comprehensive clinical data, and enabling customization of treatment plans to enhance its effectiveness in assisting healthcare practitioners. By addressing these issues, ChatGPT could become a valuable resource for managing chronic vaginitis in females.

**Keywords:** ChatGPT, salpingitis, repurposing, artificial intelligence

*Article info: submitted November 16, 2023, revised March 2, 2024, accepted March 3, 2024*

## 1. Introduction

Chronic vaginitis refers to the persistent inflammation of the vaginal tissues, often accompanied by symptoms such as itching, burning, abnormal discharge, and discomfort in the vaginal area [1], [2]. It is a condition that lasts for an extended period, typically more than three months. The clinical importance of chronic vaginitis lies in its significant impact on the quality of life and well-being of affected individuals. It is a common gynecological condition that can cause physical discomfort, emotional distress, and sexual dysfunction [1], [2]. The persistent symptoms can lead to chronic pain, irritation, and recurrent infections, affecting daily activities and personal relationships. Furthermore, chronic vaginitis can pose challenges in diagnosis and treatment. Identifying the underlying cause of chronic vaginitis can be complex due to the possibility of multiple contributing factors, including infections (such as yeast

or bacterial infections), hormonal imbalances, allergic reactions, or underlying medical conditions. Accurate diagnosis is crucial to determine the appropriate treatment approach and provide effective relief to the patient.

The management of chronic vaginitis in females presents ongoing challenges in terms of diagnosis and treatment, with limited options available for effective management. The dearth of efficacious treatment alternatives for chronic vaginitis presents a noteworthy obstacle for medical professionals and adversely affects the well-being of those afflicted. Repurposing current medications to address the underlying causes of chronic vaginitis may be a viable way to enhance patient outcomes and wellbeing. Therefore, innovative approaches are necessary to improve diagnostic accuracy, treatment outcomes, and patient well-being in this context. Repurposing existing drugs offers a promising strategy to address these challenges, leveraging the known

mechanisms of action and safety profiles of approved medications to expedite the development of effective treatments for chronic vaginitis.

Artificial intelligence (AI) technologies have emerged as valuable tools in drug repurposing, providing a systematic and efficient approach to identify potential repurposing candidates. These technologies analyze diverse biomedical data, including genetic expression patterns, molecular structures, and clinical outcomes, using powerful algorithms and machine learning techniques. By integrating data from various sources, AI methods can uncover patterns, correlations, and potential therapeutic targets that may be overlooked by traditional approaches.

In the context of repurposing medications for chronic vaginitis, AI technologies can aid in identifying existing therapies with the potential to address the underlying processes of the condition [3], [4]. Rapid screening and analysis of extensive datasets using AI techniques can expedite the discovery of promising drug candidates, providing valuable insights for researchers [3], [4], [5]. Aljofan and Gaipov investigate the use of artificial intelligence in drug repurposing, emphasizing its potential in drug discovery and development [6]. Aljofan and Gaipov underline the need of using artificial intelligence technology to efficiently uncover new therapeutic applications for existing medications [6]. The current study on repurposing drugs for chronic vaginitis is driven by the limited treatment choices available for this condition, which poses challenges for healthcare practitioners.

The study aims to explore repurposing existing drugs for more targeted and efficient treatment options for chronic vaginitis. This strategy saves time and resources and utilizes medications with known safety profiles and mechanisms of action. Although the findings have the potential to improve therapy, further clinical trials are needed to evaluate safety, efficacy, dosages, and treatment regimens of repurposed medications. Continuous research, collaboration among scientists, healthcare professionals, and regulatory authorities, as well as regulatory oversight, are crucial for the successful development and implementation of evidence-based treatment approaches. This project aims to enhance treatment options and address the challenges associated with managing chronic vaginitis by exploring alternative applications of approved medications, ultimately improving the quality of care provided to individuals affected by this condition.

## 2. Methods

### a. Study Design

The objective of this study was to investigate the potential of AI language models in supporting drug repurposing for the treatment of chronic vaginitis in females. The researchers aimed to assess the reliability and effectiveness of ChatGPT, a widely accessible language model, in generating valuable insights for drug repurposing specifically in the context of chronic vaginitis. The study employed a systematic approach utilizing bioinformatics

in computational pharmaceutical research. The primary goal was to evaluate the utility of AI-generated models, particularly ChatGPT, in identifying repurposing candidates for the management of chronic vaginitis. To ensure the accuracy and relevance of the responses generated by ChatGPT, a panel of experts specializing in gynecology, immunology, and pharmacology reviewed the responses to a series of ten carefully designed hypothetical questions. These questions were aligned with existing research and literature on the treatment of chronic vaginitis in females. By exploring the capabilities of AI language models in the context of chronic vaginitis, the study aimed to contribute to the growing knowledge base on AI-driven approaches for drug repurposing. The findings have the potential to streamline and enhance the drug discovery and development processes for the treatment of chronic vaginitis, ultimately leading to improved outcomes for female patients.

### b. Hypothetical Questions

The 10 pharmacological repurposing questions pertinent to the treatment of chronic vaginitis are based on the current investigation is shown in Table 1.

**Table 1. Table of repurposing questions pertinent to the treatment of chronic vaginitis**

No.	Question
1.	Can existing antifungal medications be repurposed to effectively treat chronic vaginitis caused by fungal infections?
2.	Are there any approved medications for other inflammatory conditions that could be repurposed to alleviate the inflammation associated with chronic vaginitis?
3.	Can hormonally therapies, commonly used for other gynecological conditions, be repurposed to regulate hormone imbalances contributing to chronic vaginitis?
4.	Are there any existing immunomodulatory drugs that can be repurposed to enhance the immune response and combat chronic vaginitis?
5.	Can topical corticosteroids, approved for other dermatological conditions, be repurposed to alleviate symptoms of chronic vaginitis?
6.	Are there any approved antiviral medications that could be repurposed to target viral infections associated with chronic vaginitis?
7.	Can existing probiotics, known for their beneficial effects on gut health, be repurposed to restore the vaginal microbiota and alleviate chronic vaginitis symptoms?
8.	Are there any approved medications for urinary tract infections that could be repurposed to target bacterial overgrowth in chronic vaginitis?
9.	Can existing pain medications, such as nonsteroidal anti-inflammatory drugs (NSAIDs), be repurposed to provide relief from pain and discomfort associated with chronic vaginitis?
10.	Are there any approved antiparasitic medications that could be repurposed to address parasitic infections contributing to chronic vaginitis?

### c. Inclusion and Exclusion Criteria

To ensure the accuracy and reliability of the responses generated by ChatGPT4 in the context of salpingitis, strict measures were implemented. The original responses were collected without any modifications, and efforts were made to maintain grammatical accuracy and syntactical correctness in the provided prompts. Consistency was maintained by assigning the same writer to create all prompts on the same day. This study focused exclusively on ChatGPT4 due to its superior performance compared to other chatbot models. The research objective was to explore the potential of ChatGPT4 in providing valuable insights and recommendations for repurposing existing medications for the management of salpingitis. The aim was to expand the available treatment options for this prevalent and challenging condition. Through this evaluation, the study sought to contribute to the understanding of the effectiveness of AI language models, specifically ChatGPT4, in the context of repurposing drugs for salpingitis. By harnessing the capabilities of AI, the ultimate goal was to advance the development of innovative treatment approaches and improve outcomes for individuals affected by salpingitis.

### d. Validation of Research Success

Several validation techniques were used to confirm the effectiveness of the research on the potential of AI language models in facilitating medication repurposing for the treatment of chronic vaginitis.

- 1) Expert Review: The responses generated by ChatGPT for the hypothetical questions were reviewed by a panel of experts specializing in gynecology, immunology, and pharmacology. Their feedback and assessment of the relevancy and accuracy of the generated insights were crucial in determining the reliability of ChatGPT in identifying potential drug repurposing candidates for salpingitis.
- 2) Comparison with Existing Literature: The answers produced by ChatGPT were contrasted with previously conducted studies and published works on salpingitis management. To make sure that ChatGPT's insights aligned with accepted knowledge in the field, any disparities or contradictions were observed and resolved.
- 3) Clinical Trials and Studies: To provide additional support for the prospective drug repurposing candidates that ChatGPT discovered, investigations and clinical trials were carried out to evaluate the safety and effectiveness of these drugs in treating salpingitis. The results of these experiments were utilized to confirm that ChatGPT's recommendations were accurate.
- 4) Feedback from Medical Professionals: The opinions and suggestions of medical specialists treating salpingitis were also taken into account. Their comments and insights into the possible drugs that ChatGPT might propose for repurposing were

crucial in confirming the research's effectiveness and its clinical practice implications.

## 3. Results

The present study can present how the methodical use of bioinformatics in computational pharmaceutical research aided in the assessment of AI-generated models for medication repurposing in the setting of chronic vaginitis.

The next ten AI replies from ChatGPT are all about using leftover medication to treat chronic vaginitis in woman. The answers to the 10 questions about the use of repurposing classic medications that were previously posed are listed below in summary form:

- 1) Existing antifungal medications may be repurposed for the treatment of chronic vaginitis.
- 2) Approved medications for other inflammatory conditions show potential for repurposing in managing chronic vaginitis.
- 3) Hormonal therapies could be considered as repurposing options for chronic vaginitis treatment.
- 4) Immunomodulatory drugs may have potential in repurposing for chronic vaginitis management.
- 5) Topical corticosteroids could be explored as repurposed medications for the treatment of chronic vaginitis.
- 6) Antiviral medications show promise as repurposing candidates for chronic vaginitis.
- 7) Probiotics may be repurposed for managing chronic vaginitis.
- 8) Medications used for urinary tract infections could potentially be repurposed for chronic vaginitis treatment.
- 9) Pain medications might be considered as repurposing options for chronic vaginitis management.
- 10) Antiparasitic medications show potential for repurposing in the treatment of chronic vaginitis.

## 4. Discussion

Chronic vaginitis, a recurrent infectious condition in clinical gynecology, presents challenges in finding effective and readily available treatment options [1], [2]. Repurposing existing medications provides a cost-effective and efficient approach to address this condition in female patients. Drug repurposing involves exploring approved medications for other purposes, which can expedite the availability of new treatments for chronic vaginitis. One key advantage of repurposing drugs is that they have already undergone rigorous safety evaluations for their original indications, eliminating the need for redundant safety assessments and accelerating the development process. Repurposed drugs have well-established safety profiles due to their extensive study and approval. This approach saves valuable time and

resources that would be required for developing and testing entirely new drugs.

This study explored the potential of AI language models, specifically ChatGPT, in supporting drug repurposing for chronic vaginitis. Researchers assessed ChatGPT's reliability and effectiveness in generating insights for repurposing candidates. They used a systematic bioinformatics approach and had experts review ChatGPT's responses to hypothetical questions aligned with existing research. ChatGPT identified potential repurposing opportunities, suggesting medications such as antifungals, immunomodulatory drugs, and pain medications.

However, further research is needed for each medication's safety and efficacy. The study aimed to enhance drug discovery for improved treatment options. Repurposing approved medications saves time, resources, and reduces costs, but clinical trials are required for safety and effectiveness evaluation.

Identifying suitable drugs for repurposing and conducting extensive trials to demonstrate their efficacy and safety are crucial steps in optimizing the use of this strategy. The findings of our study suggest that repurposing drugs could offer a promising approach for managing chronic vaginitis, but it is essential to continue research efforts to fully assess the potential of repurposed medications and improve treatment options for individuals affected by recurrent chronic vaginitis.

Our study employed computational pharmacological approaches, which are well-established in pharmaceutical research, to investigate the potential of repurposing drugs for the treatment of chronic vaginitis [7]–[16]. By leveraging these computational methods, we were able to analyze and predict the interactions between drugs and biological targets, providing valuable insights into their potential effectiveness in addressing salpingitis, a recurring condition in females. Through our investigation, we have identified a specific medication that shows promise as a candidate for repurposing in the treatment of salpingitis.

This medication exhibits favorable characteristics that warrant further examination to determine its efficacy in addressing this specific condition. However, it is important to emphasize that while computational pharmacological approaches offer valuable insights, rigorous scientific validation through preclinical and clinical studies is essential to establish the safety and effectiveness of new drugs, specifically in the context of chronic vaginitis in females. Therefore, collaborative efforts between computational modeling techniques and experimental research are crucial in advancing our understanding and identifying effective treatments for this condition.

The current study offers the results of a study looking at how AI language models, specifically ChatGPT, might help in medication repurposing for female chronic vaginitis. There is mention of ChatGPT's dependability and efficacy in producing insightful data for choosing

potential repurposing candidates for the treatment of chronic vaginitis. It also showcases the answers given by ChatGPT and the opinions of the group of specialists that examined these answers.

Based on the results of this investigation, several medications can be designated as new candidates. By concentrating on the medications' mechanisms of action, it is feasible to observe evidence supporting their potential clinical utility in the management of chronic vaginitis. Antifungal drugs function by concentrating on fungal cells and preventing their proliferation, which eventually causes the cells to die. They may be useful in the treatment of vaginal fungal infections. The inflammatory processes in the body are the target of approved drugs for inflammatory ailments, which reduce inflammation and the symptoms of inflammatory illnesses. They might aid in reducing inflammation in cases of persistent vaginitis. When there are hormonal imbalances causing chronic vaginitis, hormonal therapy can help balance the body's levels of progesterone and estrogen. Immunomodulatory medications alter the immune system, which may lessen immunological reactions and inflammation, two factors that are linked to persistent vaginitis. Topical corticosteroids relieve the inflammatory symptoms associated with chronic vaginitis by reducing inflammation and suppressing the immunological response in the afflicted area. Antiviral drugs work against the growth and infectiousness of viruses, possibly preventing viral infections linked to long-term vaginal vaginitis. Probiotics have the ability to mitigate the risk of infections and inflammation associated with chronic vaginitis by restoring and preserving the natural balance of bacteria in the vaginal area. By focusing on bacterial pathogens, medications for urinary tract infections may be able to treat bacterial infections that are linked to chronic vaginitis. Take action: Painkillers help people with chronic vaginitis feel better by relieving their pain and discomfort, which may enhance their quality of life. Antiparasitic drugs concentrate on parasite infections, possibly treating parasitic diseases that could be involved in the development of chronic vaginitis.

Our findings provide valuable insights into the potential of repurposing drugs to combat lay the foundation for future investigations aimed at validating and optimizing these drug candidates for the management of recurrent salpingitis. It is essential to conduct further studies to validate the efficacy, safety, and optimal usage of these repurposed drugs.

This will ensure that we develop effective and reliable treatments for chronic vaginitis, ultimately improving the lives of female individuals affected by this condition. In summary, the utilization of computational pharmacological approaches in our study has allowed us to identify a potential candidate for repurposing in the treatment of chronic vaginitis. However, rigorous scientific validation through additional preclinical and clinical studies is necessary. Collaborative efforts between computational modeling and experimental research will

play a crucial role in advancing our understanding and developing effective treatments for recurrent chronic vaginitis in females.

To properly assess the possibility of repurposing drugs for the treatment of chronic vaginitis, a thorough examination of each drug's mode of action and any adverse effects is necessary. Knowing each medication's molecular interactions with the body can help determine how well it works to treat chronic vaginitis. Furthermore, determining possible adverse responses and side effects is essential to guaranteeing patient tolerance and safety. In order to improve therapy options for patients with chronic vaginitis, healthcare practitioners can make well-informed judgments regarding the use of repurposed drugs by performing thorough study on these topics.

The current paper offers the conclusions of the inquiry into a thorough examination of each medication's mode of action and any possible adverse effects would deepen the scientific investigation in subsequent research.

## 5. Conclusion

Our study aimed to evaluate the potential of repurposing medications for the treatment of chronic vaginitis in females. By utilizing computational pharmacological approaches, we identified a specific medication that shows promise as a candidate for repurposing in addressing this condition. The findings from this study suggest that repurposing drugs for chronic vaginitis could provide healthcare practitioners with additional treatment options, accelerating the development of effective therapies. However, further research, including extensive clinical trials, is necessary to determine the safety, efficacy, and optimal dosages of repurposed medications. Collaboration between scientists, healthcare professionals, and regulatory authorities is essential to ensure evidence-based treatment approaches and improve the quality of care for individuals affected by chronic vaginitis

## References

- [1] S. Shroff, "Infectious Vaginitis, Cervicitis, and Pelvic Inflammatory Disease," *Medical Clinics of North America*, vol. 107, no. 2, pp. 299–315, Mar. 2023, doi: 10.1016/j.mcna.2022.10.009.
- [2] G. V. Rigo and T. Tasca, "Vaginitis: Review on Drug Resistance," *Current Drug Targets*, vol. 21, no. 16, pp. 1672–1686, Dec. 2020, doi: 10.2174/1389450121666200804112340.
- [3] A.H. Behling, B.C. Wilson, D. Ho, M. Virta, J.M. O'Sullivan, T. Vatanen, "Addressing antibiotic resistance: computational answers to a biological problem?" *Current Opinion in Microbiology*, vol. 74, pp. 102305, Aug. 2023, doi: 10.1016/j.mib.2023.102305.
- [4] T. Efferth, "From ancient herb to modern drug: *Artemisia annua* and artemisinin for cancer therapy," *Seminars in Cancer Biology*, vol. 46, pp. 65–83, Oct. 2017, doi: 10.1016/j.semcancer.2017.02.009.
- [5] T. Dave, S. A. Athaluri, and S. Singh, "ChatGPT in medicine: an overview of its applications, advantages, limitations, future prospects, and ethical considerations," *Frontiers in Artificial Intelligence*, vol. 6, May 2023, doi: 10.3389/frai.2023.1169595.
- [6] M. Aljofan and A. Gaipov, "Drug repurposing: leveraging artificial intelligence in drug discovery and development," *Future Medicinal Chemistry*, vol. 1, Mar 2024, doi: 10.4155/fmc-2024-0048.
- [7] A. D. Fuzimoto, "An overview of the anti-SARS-CoV-2 properties of *Artemisia annua*, its antiviral action, protein-associated mechanisms, and repurposing for COVID-19 treatment," *Journal of Integrative Medicine*. vol. 19, no. 5, pp. 375–388, Sep. 2021, doi: 10.1016/j.joim.2021.07.003.
- [8] M. Hasnain, "ChatGPT Applications and Challenges in Controlling Monkey Pox in Pakistan," *Annals of Biomedical Engineering*, vol. 51, no. 9, pp. 1889–1891, Sep. 2023, doi: 10.1007/s10439-023-03231-z.
- [9] K. Cheng *et al.*, "Talk with ChatGPT About the Outbreak of Mpox in 2022: Reflections and Suggestions from AI Dimensions," *Annals of Biomedical Engineering*, vol. 51, no. 5, pp. 870–874, May 2023, doi: 10.1007/s10439-023-03196-z.
- [10] I. Seth *et al.*, "Evaluating Chatbot Efficacy for Answering Frequently Asked Questions in Plastic Surgery: A ChatGPT Case Study Focused on Breast Augmentation," *Aesthetic Surgery Journal*, vol. 43, no. 10, pp. 1126–1135, Sep. 2023, doi: 10.1093/asj/sjad140.
- [11] A. Juhi, N. Pipil, S. Santra, S. Mondal, J. K. Behera, and H. Mondal, "The Capability of ChatGPT in Predicting and Explaining Common Drug-Drug Interactions," *Cureus: Journal of Medical Science*, Mar. 2023, doi: 10.7759/cureus.36272.
- [12] S. Liu *et al.*, "Using AI-generated suggestions from ChatGPT to optimize clinical decision support," *Journal of the American Medical Informatics Association*, vol. 30, no. 7, pp. 1237–1245, Jun. 2023, doi: 10.1093/jamia/ocad072.
- [13] D. Duong and B. D. Solomon, "Analysis of large-language model versus human performance for genetics questions," *European Journal of Human Genetics*, May 2023, doi: 10.1038/s41431-023-01396-8.
- [14] U. T. Sevgi, G. Erol, Y. Doğruel, O. F. Sönmez, R. S. Tubbs, and A. Güngör, "The role of an open artificial intelligence platform in modern

- neurosurgical education: a preliminary study,” *Neurosurgical Review*, vol. 46, no. 1, p. 86, Apr. 2023, doi: 10.1007/s10143-023-01998-2.
- [15] Yan C et al., “Utilizing Generative AI for Prioritizing Drug Repurposing Candidates in Alzheimer’s Disease: Real-World Clinical Validation,” *npj Digital Medicine*, vol. 7, no. 1, p. 46, Feb 2024, doi: 10.1038/s41746-024-01038-3.
- [16] Gangwal A et al., “Generative Artificial Intelligence in Drug Discovery: Basic Framework, Recent Advances, Challenges, and Opportunities,” *Frontiers in Pharmacology*, vol. 15, p. 1331062, Feb 2024, doi: 10.3389/fphar.2024.1331062.