



A Retrospective Study of Doxycycline-based Quadruple Therapy versus Tetracycline-based Quadruple Therapy for the First Line Treatment of Helicobacter Pylori

Ryan Meader DO, Adam Wichelmann DO, David Kruchko DO, Alan Shapiro MD, Eli Ehrenpreis MD
Internal Medicine Department, Division of Gastroenterology
Advocate Lutheran General Hospital



Introduction

- The global prevalence of antimicrobial resistance has resulted in challenges for eradicating *H. pylori*.
- Gastric acid suppression and antibiotic therapy are used to eradicate *H. pylori*. Cost and shortages inhibit use of tetracycline for first line treatment of *H. pylori*.
- Doxycycline represents a potential cost-effective alternative for treating *H. pylori*.
- We performed an analysis of doxycycline-based quadruple therapy in comparison to tetracycline-based quadruple for first line therapy in the eradication of *H. pylori*.

Methods

- A retrospective chart review was conducted using a multi-hospital community-based system consisting of sixteen hospitals and over 500 sites of care.
- All patients 18 and older with documented *H. pylori* infection treated with either a doxycycline-based regimen (DOX) or tetracycline-based first line regimen (TCN) from January 2012 to April 2022 were included.
- In total, 3,384 patients were identified. Patients who received prior first-line treatment with other regimens were excluded.
- All cases were reviewed for confirmation of infection (either by biopsy, breath test or stool antigen testing), the treatment regimen used, and confirmation of *H. Pylori* eradication (either by biopsy, breath test, or stool antigen).
- Patients without confirmation of eradication or with pending eradication test results were excluded.
- Patient demographics were summarized and eradication rates determined.
- The study was powered according to postiori non-inferiority calculation

Results

- Of the 3,384 reviewed cases, 628 cases met inclusion and exclusion criteria. Of these, 305 patients were treated with a DOX and 323 patients were treated with a TCN.
- The study was powered according to postiori non-inferiority calculation assuming 85% eradication rate for the TCN and 80% for DOX and 90% power suggested 100 patents were needed per group.
- The average age for DOX was 57 years and 193/305 (60%) were female.
- The average age for TCN was 58.5 and 210/323 (69%) were female.
- Eradication rates were 87.6% for Doxycycline and 88.2% for Tetracycline (see Table 1).

<u>Doxycycline Regimen</u>	<u># of Patients</u>	<u>% of Patients</u>
Successful Eradication	283	87.6%
Failed Eradication	40	12.4%
Total	323	
<u>Tetracycline Regimen</u>	<u># of Patients</u>	<u>% of Patients</u>
Successful Eradication	269	88.2%
Failed Eradication	36	11.8%
Total	305	

Table 1. The number of patients with tetracycline or doxycycline antibiotic regimens and the eradication rate

<u>Doxycycline Regimen Demographics</u>	
Average Age	57
Male	113
Female	210
<u>Tetracycline Regimen Demographics</u>	
Average Age	58.5
Male	130
Female	193

Table 2. Doxycycline and tetracycline regimen demographics

Discussion

- Tetracycline based quadruple therapy is a regimen recommended for first line treatment of *H. pylori*.
- Due to tetracycline shortages and cost it may be difficult to prescribe this medication in practice.
- Doxycycline has been routinely substituted for tetracycline in these regimens due to these tetracycline constraints.
- Several studies have been mixed on whether doxycycline substituted for tetracycline based quadruple therapy is an effective alternative.
- Doxycycline based quadruple therapy showed similar *H. pylori* eradication rates to tetracycline regimens.

Conclusions

- Doxycycline-based quadruple therapy regimen are effective and appear to be non-inferior to tetracycline-based quadruple therapy regimens for first line treatment of *H. pylori*.

References

1. Dunn BE, Cohen H, Blaser MJ. "Helicobacter pylori." Clin Microbiol Rev. 1997 Oct;10(4):720-41.
2. Fallone C, et al. "The Toronto Consensus for the Treatment of Helicobacter pylori Infection in Adults". Gastroenterology. 2016;151:51-69.
3. Gu L, Li S, He Y, et al. "Bismuth, rabepazole, amoxicillin, and doxycycline as first-line Helicobacter pylori therapy in clinical practice: A pilot study". Helicobacter. 2019 Aug;24(4):e12594.
4. Borody, T. J., George, L. L., Brandl, S., Andrews, P., Lenne, J., Moore-Jones, D., Devine, M., & Walton, M. (1992). Helicobacter pylori eradication with doxycycline-metronidazole-bismuth subcitrate triple therapy. *Scandinavian journal of gastroenterology*, 27(4), 281–284.
5. Nyssen, O. P., Perez-Aisa, A., Rodrigo, L., Castro, M., Mata Romero, P., Ortuño, J., Barrio, J., Huguet, J. M., Modollel, I., Alcaide, N., Lucendo, A., Calvet, X., Perona, M., Gomez, B., Gomez Rodriguez, B. J., Varela, P., Jimenez-Moreno, M., Dominguez-Cajal, M., Pozzati, L., Burgos, D., ... Gisbert, J. P. (2020). Bismuth quadruple regimen with tetracycline or doxycycline versus three-in-one single capsule as third-line rescue therapy for Helicobacter pylori infection: Spanish data of the European Helicobacter pylori Registry (Hp-EuReg). *Helicobacter*, 25(5), e12722. <https://doi.org/10.1111/hel.12722>
6. Howden, C.W. Emerging Regimens for *H. pylori* Infection Should Enhance Efficacy and Circumvent Resistance. *Dig Dis Sci* 64, 2691–2692 (2019). <https://doi.org/10.1007/s10620-019-05747-8>
7. Borody, T. J., George, L. L., Brandl, S., Andrews, P., Lenne, J., Moore-Jones, D., Devine, M., & Walton, M. (1992). Helicobacter pylori eradication with doxycycline-metronidazole-bismuth subcitrate triple therapy. *Scandinavian journal of gastroenterology*, 27(4), 281–284. <https://doi.org/10.3109/00365529209000075>
8. Wang, Z., & Wu, S. (2012). Doxycycline-based quadruple regimen versus routine quadruple regimen for rescue eradication of Helicobacter pylori: an open-label control study in Chinese patients. *Singapore medical journal*, 53(4), 273–276.
9. Sealed Envelope Ltd. 2012. Power calculator for binary outcome non-inferiority trial. [Online] Available from: <https://www.sealedenvelope.com/power/binary-noninferior/> [Accessed Wed Jun 15 2022].