

Systematic Review: In Adults With H.Pylori Infection, Does Quadruple Therapy Containing Bismuth Subsalicylate, Metronidazole, Doxycycline, and Omeprazole, Rather than Standard Triple Therapy Containing Clarithromycin, Amoxicillin or Metronidazole, and Omeprazole Result in More Effective Eradication of H.Pylori?

Abigail Assenza, M.S. in Physician Assistant Studies

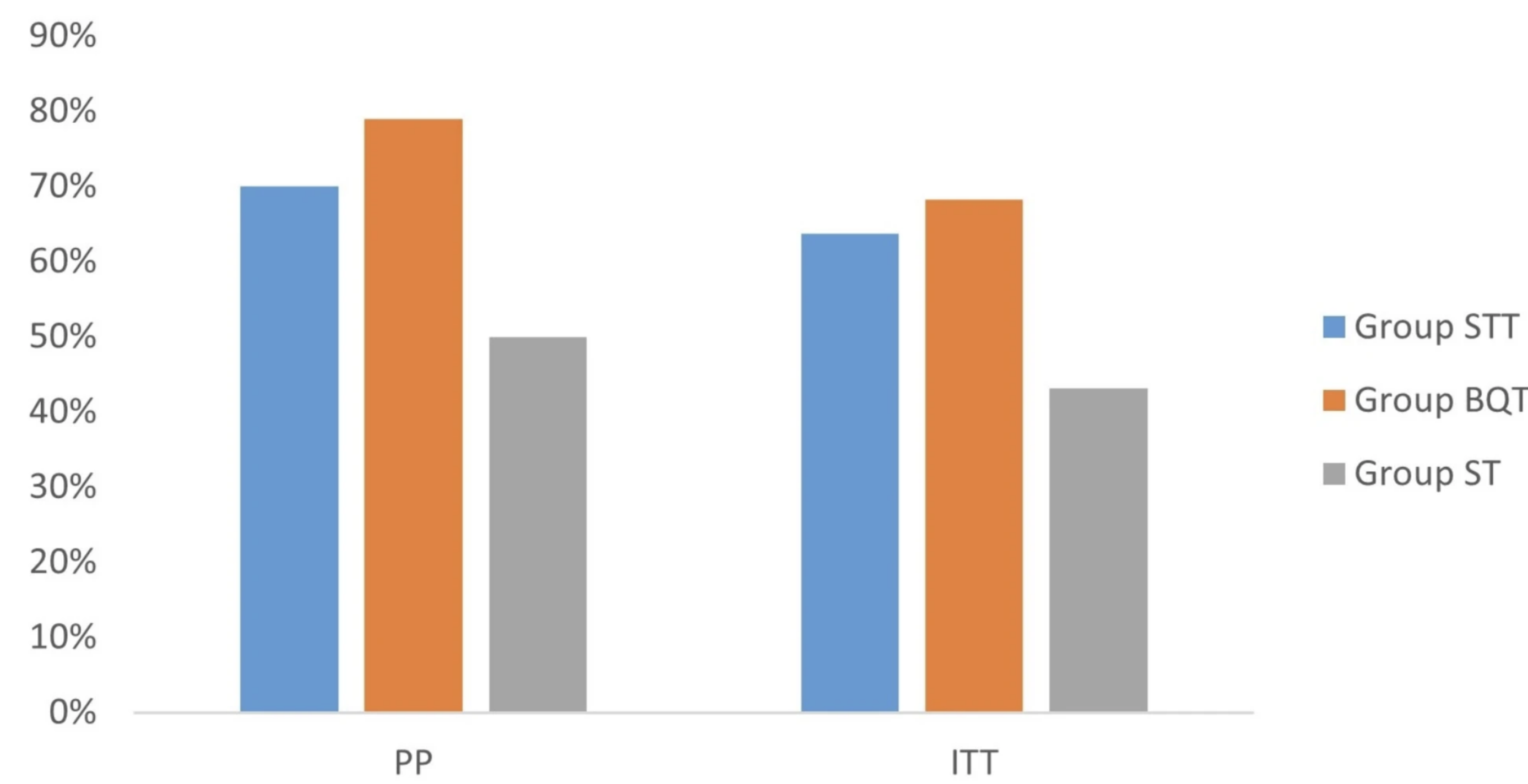
FACULTY MENTOR: Brian Baker MD, JD



Introduction

H. pylori (HP) is a leading cause of chronic infections in the world, including peptic ulcer disease and certain cancers. Since 1994, HP has been identified as a carcinogen. Common treatment regimens for HP include standard triple therapy (STT) and Bismuth Quadruple Therapy (BQT), but they have universally low compliance because of their side effects (Guerrero Garcia et al., 2023).

From: **A randomised controlled clinical study of standard triple therapy, bismuth-based quadruple therapy and sequential therapy for *Helicobacter pylori* infection in children**



The eradication rate of three group

STT: standard triple therapy; BQT: bismuth quadruple therapy; ST: sequential therapy; PP: per-protocol; ITT: intention-to-treat

Method

- A review of the literature was performed on adults with *Helicobacter pylori* (H. pylori) infection to determine if quadruple therapy containing Bismuth Subsalicylate, Metronidazole, Doxycycline, and Omeprazole, rather than triple therapy containing clarithromycin, amoxicillin, and omeprazole (or metronidazole) result in more effective eradication of H. pylori.
- The primary outcome evaluated was eradication rate, measured by 13C urea breath test, measured a few weeks after treatment (4-10 weeks). Other outcomes observed were side effects, diarrhea, compliance with medication, cancer incidence post H. pylori, and general symptoms.
- Data was collected through literature search using electronic databases available through the Yeshiva University School library, primarily PubMed. The following search terms were used: Quad treatment H.Pylori, triple treatment H.Pylori, H.Pylori+Bismuth, H.pylori treatment, H.pylori eradication, and Quad vs. triple treatment for H.pylori. Systematic Reviews, research articles, case control, and meta- analysis studies were included for review and analysis.
- Literature search was limited to 29 peer-reviewed journal articles published within the last 10 years (2014-2024) and 4 published before 2010. Selected studies were systematically screened for bias by a single author.

Results

- Most studies did not compare bqt and stt. Findings on treatment efficacy demonstrated that BQT is more effective in eradicating HP. A sampling of the studies appears below.
- A trial in 2024, showed a clear benefit to using BQT which yielded a 73% eradication rate in the ITT group versus 68% for the STT ITT group (Francois et al., 2024).
- Eadication rates are highest when patients are compliant and have a low side effect profile. Rates of eradication in Bakarat et al. (2025) reached 74.3%, and up to 82% in Luther et al. (2025). These rates of eradication are significant however the only downfall to be considered with Luther's trial is that it was limited to the geographic area of Bahrain, lowering its generalizability. These trials showed the superiority of BQT over STT (Barakat et al., 2025; Luther et al., 2025).
- It was found in 2023 that cure rates between STT and BQT were as high as 92% in the ITT groups and 97% in the PPA group. These numbers had never been seen prior to this study and showed that antibiotic resistance patterns seem to be less of an issue in UK populations (Laine et al., 2023).
- Another trial in 2024 showed eradication rates in children to be 70% with STT and 78% in BQT (Maio et al., 2024). Shown in left column.

H. pylori Treatment Regimens

Regimen	Drugs	Notes
STT (Standard Triple Therapy)	- PPI - Clarithromycin - Amoxicillin	Traditionally first-line in areas with low clarithromycin resistance.
BQT (Bismuth Quadruple Therapy)	- PPI - Bismuth (subsalicylate or subcitrate) - Tetracycline - Metronidazole	Preferred first-line in many areas (including U.S.). Good for high clarithromycin resistance or penicillin allergy.

Conclusions

- The literature supports the importance and superiority of BQT over other regimens in treating HP.
 - Current and future studies should compare treatment across global populations and use the best and strongest PPI selection with a longer treatment duraiton.
 - These small improvements will help to treat HP most efficiently and potentially help prevent stomach cancers and gastric conditions.
- Limitations:**
- Few limitations were seen across multiple trials that were reviewed.
 - Some trials did not have adequate blinding of treatment arms such as in Ibrahim and Barakat, leaving room for bias, and variable outcomes.
 - Other studies only compared mall geographic regions making it hard to apply the data to larger populations, such as in Barakat and Ching.
 - Despite these limitations most of the literature supports the importance and superiority of BQT over other regimens in the treatment of H.pylori.

Acknowledgements

Thank you to Dr. Brian Baker for encouraging me to continue my research and present here today,

References

