Prevalence of Methane Positive Small Intestinal Bacterial Overgrowth in IBS and IBD: A Systematic Review and Meta-Analysis

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INTRODUCTION

- Alterations in methane producing archaea has been implicated in the pathophysiology of irritable bowel disease (IBS) and in patients with inflammatory bowel disorders (IBD).

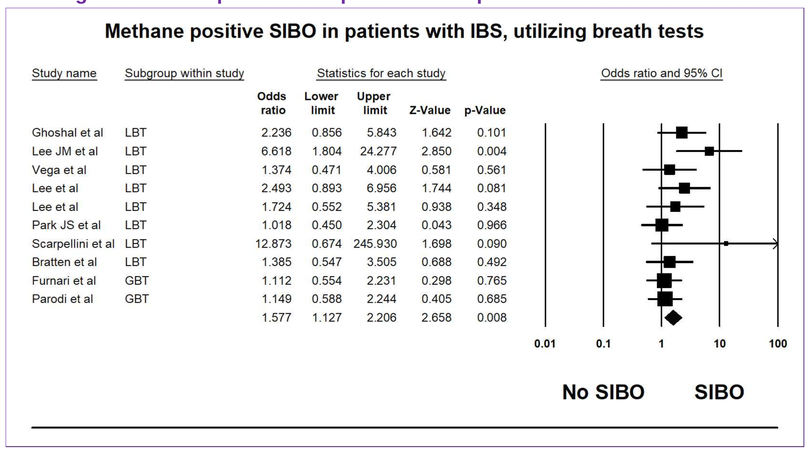
AIMS

- The aim of this study was to establish the prevalence of methane positive small intestinal bacterial overgrowth (SIBO) in patients with IBS and IBD.

METHODS

- Electronic databases were searched up to November 2019 for all studies reporting the prevalence of SIBO in patients with IBS and IBD.
- The prevalence rate of methane positive SIBO among IBS and IBD patients and the odds ratio (OR) and 95% CI of SIBO in these patients compared with healthy controls were calculated.

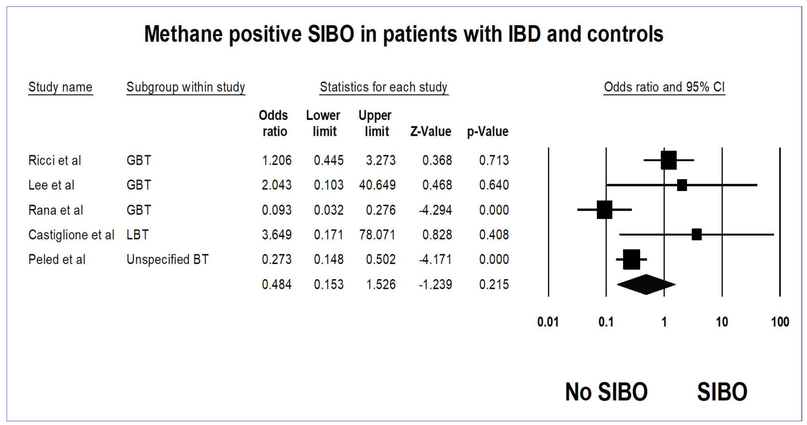
Figure 1: Forest plot of SIBO prevalence in patients with IBS and controls



RESULTS

- The final dataset included 21 studies assessing the prevalence of methane positive SIBO in 2,562 adult patients with IBS and 769 controls, and 6 studies assessing the prevalence of methane positive SIBO in 545 adult patients with IBD and 434 controls, all utilizing breath test for diagnosis of SIBO.
- Overall, the prevalence of methane positive SIBO in patients with IBS and IBD was 26.5% (95%CI 24.8-28.3) and 6.8% (95% CI 4.8-9.2), respectively.
- Prevalence of methane positive SIBO in IBS was significantly increased compared to controls (OR=1.58, 95% CI 1.13-2.21, p=0.008, Figure 1). This was significantly higher for studies utilizing lactulose breath test (LBT) (OR=1.89, 95% CI 1.23-2.89, p=0.003), as compared to those utilizing glucose breath test (GBT) (OR=1.13, 95% CI 0.70-1.83, p=0.62). There was minimal heterogeneity in these analysis (I^2= 17.73, p=0.280).
- Methane positive breath tests were significantly more prevalent in IBS-C as compared to IBS-D (OR 2.2, 95% CI 1.3-3.6, p=0.003).
- In 207 methane positive IBS patients, antibiotic treatment was associated with symptom improvement in 76.3% and normalization of positive breath test in 57.3% patients.
- On the other hand, methane positivity on breath test was inversely, but not significantly associated with SIBO in IBD patients (OR=0.48; 95% CI 0.15-1.53, p=0.215) compared to controls, (Figure 2), however there was high heterogeneity in the studies included in the analysis (I^2= 75.74, p=0.003).
- Methane positive SIBO was 3-fold higher in controls 25.8% (95% CI 21.8-30.2) compared to IBD patients 7.6% (95.CI 5.3-10.3).

Figure 2: Forest plot of SIBO prevalence in patients with IBD and controls



CONCLUSIONS

- This systematic review and meta-analysis suggests methane positivity on breath testing is positively associated with IBS, in particular IBS-C, but reveals an inverse association with IBD.
- Antimicrobial therapy appears to improve symptoms and reduce the rate of methane positive SIBO in IBS.
- Due to the substantial 'clinical heterogeneity' and lack of uniform selection criteria for cases and controls as well as limited sensitivity and specificity of the available diagnostic tests, the overall quality of evidence is low.