

The effect of oral iron supplementation on hydrogen and methane breath testing (HMBT) and gastrointestinal symptoms in healthy volunteers.

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INTRODUCTION

- Oral iron supplementation is associated with gastrointestinal side effects e.g. constipation and bloating
- Iron is an important energy source of gut microbiota methanogenesis and increased breath methane is associated with constipation and bloating (1).
- Therefore, we hypothesised that healthy volunteers taking oral iron for 28 days would see an increase in methane gas compared to baseline.

METHODS

- 48 healthy volunteers completed the study.
- They attended for 2 study visits, one at baseline and then 28 days after taking 400mg ferrous sulphate daily.
- At each study visit a 3hr lactulose HMBT was performed. Participants also completed the irritable bowel syndrome severity scoring system (IBS-SSS) at baseline and day 28 along with a daily study diary to assess changes to bowel movements, stool consistency and symptoms.

RESULTS

- 15 participants (28%) were methane producers, with ≥ 10 ppm at baseline.
- There was an increase in total methane production (over the 3hr lactulose HMBT) within the methane positive population from 386ppm at Day 1 vs 474ppm at Day 28, but this was not significant ($p=0.125$).
- Total hydrogen production was significantly lower over the lactulose HMBT between Day 1 and Day 28 after oral iron supplementation ($p=0.005$), **Table 1**.
- There was a significant increase in IBS-SSS from Day 1 to Day 28 ($p=0.030$), however values were still in the sub-clinical range (2).
- The study diary did not reveal any significant difference in any parameter measured.

Table 1: Comparison of hydrogen production via the breath test. Values are presented as mean \pm standard deviation. Samples taken every 15 minutes from lactulose ingestion.

Total hydrogen production between time points (minutes)	Day 1 (mean \pm SD, ppm)	Day 28 (mean \pm SD, ppm)	p
0-45	30.9 \pm 46.5	32.8 \pm 99.1	0.246
0-60	49.2 \pm 56.8	33.4 \pm 46.5	0.021
0-90	113.8 \pm 93.4	79.5 \pm 79.5	0.011
60-90	82.7 \pm 69.3	57.2 \pm 53.8	0.007
90-180	307.3 \pm 190.1	237.2 \pm 155.4	0.009
0-180	385.2 \pm 239.3	291.4 \pm 196.7	0.005

Table 2: Analysis of IBS-SSS score when completed on Day 1 vs Day 28. P-value determined via Wilcoxon signed ranks test. (2).

	Day 1 mean score	Day 28 mean score	p
Q1 (abdominal pain severity)	2.64	7.74	0.004
Q2 (abdominal pain day /10)	3.21	8.68	0.023
Q3 (bloating severity)	7.36	10.8	0.124
Q4 (bowel functioning)	21.3	19.8	0.824
Q5 (symptoms interfere with daily life)	4.34	10.6	<0.001
Total	38.9	58.7	0.030

CONCLUSION

- Oral iron supplementation is well tolerated in healthy volunteers, only causing mild increases in gut symptoms which may be indicative of changes to gut microbiota composition and function.
- Changes to methane post-iron were not significant in healthy volunteers, but may be more pronounced in a clinical population where iron is taken over longer periods and colonic dysbiosis is more prevalent.
- Significant decreases in hydrogen production need further investigation, but indicate microbiota changes in response to oral iron.

REFERENCES

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