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The Impact of Gluten and Inulin on Sensory Attributes, Breath Hydrogen, Gastrointestinal Symptoms, and Satiety in Healthy Adults

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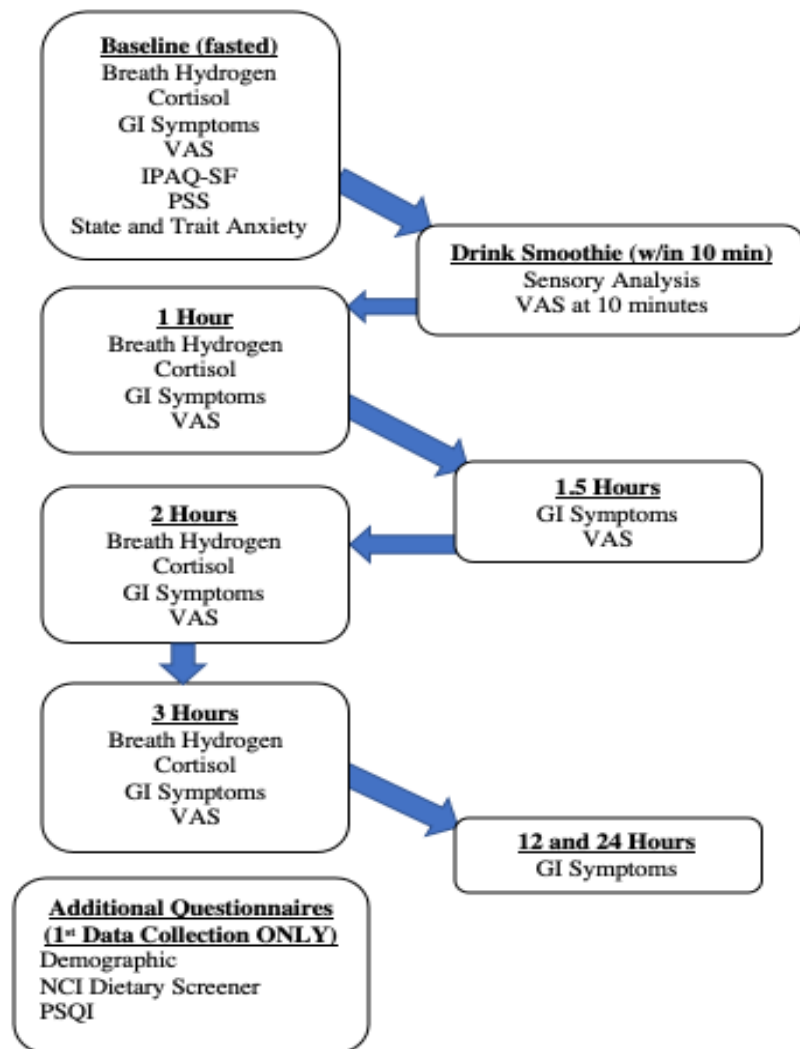
Introduction

- Gluten and inulin type fibers have been shown to impact satiety, breath hydrogen, GI symptoms, and properties of different food products.

Objective

- To investigate the effects of gluten and inulin on sensory attributes, breath hydrogen, GI symptoms, and satiety in healthy individuals.

Methods



- Breath hydrogen, GI symptoms, and VAS scales were assessed by area under the curve using the trapezoidal rule.
- Repeated Measures ANOVA was used to evaluate differences between treatments with significance set at $p < 0.05$.

Table 1. Summary of AUC Satiety Ratings, GI Symptoms, and Breath Test Differences Based on Treatment

	CONTROL (n = 24)	GLUTEN (n = 24)	INULIN (n = 24)			
	M ± SD	M ± SD	M ± SD	F	p	η ²
VAS						
HUNGER	119.90±40.82	123.77±49.14	141.52±47.0	3.428	0.041*	0.130
SATISFACTION	140.18±45.63	139.90±60.94	128.70±51.00	1.371	0.264	0.056
FULLNESS	139.30±51.21	142.05±58.95	118.45±49.83	4.623	0.015*	0.167
VOLUME	147.30±40.75	133.49±52.38	155.27±49.73	2.442	0.098	0.096
GI SYMPTOMS						
BLOATING	8.18±14.42	4.45±8.90	9.27±14.65	2.202	0.122	0.087
NAUSEA	1.73±5.79	1.45±6.41	2.19±8.70	0.100	0.765	0.004
GAS	7.45±12.28	3.75±6.06	8.35±13.92	1.948	0.154	0.078
CONSTIPATION	5.44±12.90	2.14±6.15	4.44±9.68	0.820	0.391	0.034
RUMBLING	7.68±10.95	7.58±22.56	8.29±13.28	0.053	0.912	0.002
CRAMPING	1.41±2.87	1.94±6.40	3.15±9.31	0.686	0.434	0.029
DIARRHEA	3.32±6.84	1.64±3.82	1.76±6.74	0.851	0.434	0.036
TOTAL SYMPTOMS	35.91±37.38	20.00±30.31	37.45±47.62	3.388	0.042*	0.128
BREATH TEST						
BREATH HYDROGEN	3.96±19.45	12.31±32.57	11.81±26.67	1.273	0.290	0.052
METHANE	-0.18±4.71	0.65±6.22	2.30±8.91	1.146	0.324	0.047

Figure 1. Subjective Hunger Ratings over Time

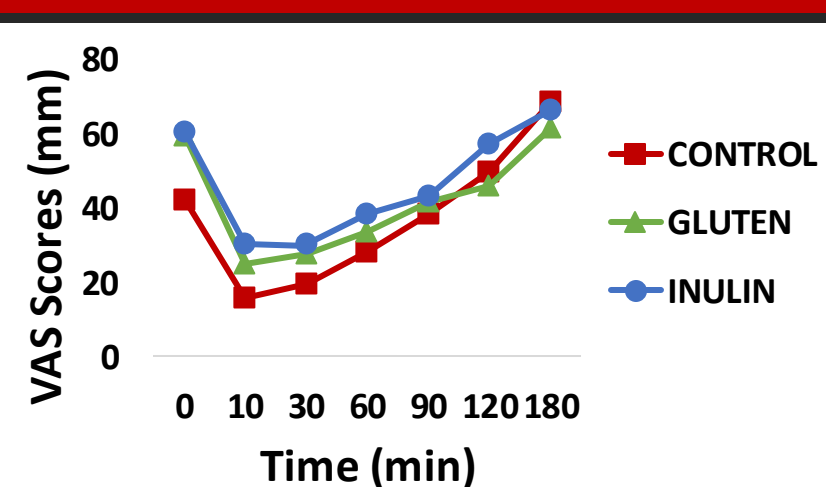


Figure 2. Subjective Fullness Ratings over Time

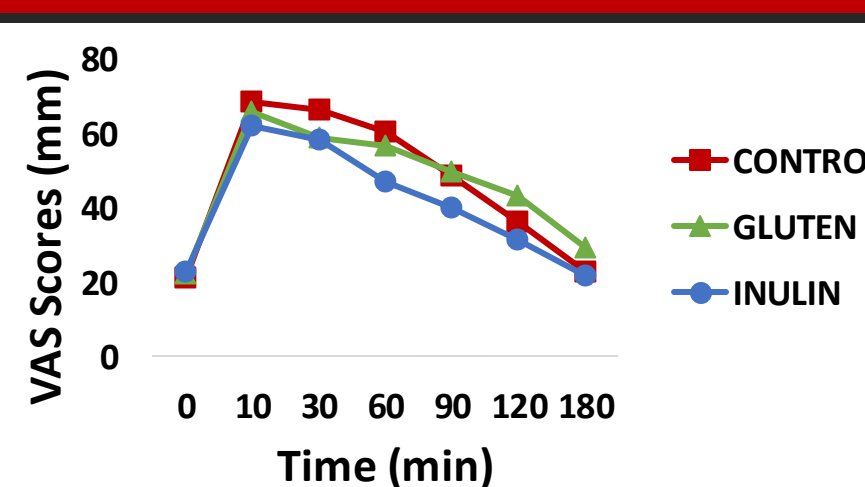


Table 2. Differences in Sensory Attribute Ratings of Smoothies Based on Treatments

SENSORY ATTRIBUTE	CONTROL (n=24)	GLUTEN (n=24)	INULIN (n=24)	F	p
APPEARANCE	6.35±0.33	5.87±0.94	5.91±1.63	1.67	0.20
COLOR	6.22±1.36	5.91±0.81	5.96±1.59	0.50	0.61
CONSISTENCY	4.00±2.09	4.39±2.07	3.48±2.17	2.29	0.11
BERRY FLAVOR	5.57±0.62	5.26±1.29	5.17±0.97	1.01	0.37
SWEETNESS	5.17±1.15	5.04±0.95	5.13±1.39	0.09	0.92
MOUTHFEEL	3.87±1.94	3.78±1.91	3.43±1.89	0.64	0.53
OVERALL FLAVOR	5.17±0.97	5.13±0.94	5.09±1.45	0.04	0.96

Results

- No significant differences ($p > 0.05$) in breath hydrogen between treatments at any time point or total AUC.
- GI total symptoms between the low FODMAP control and gluten treatment were significantly different, with gluten producing less total GI symptoms (MD=2.84; $p=0.015$).
- No differences between treatments for any sensory attributes or overall liking.
- There was a significant difference in AUC for hunger between control and inulin treatments (MD=-6.18; $p=0.024$).
- There were significant differences in AUC for fullness between control vs inulin (MD=5.96; $p=0.026$) and gluten vs inulin treatments (MD=6.74; $p=0.016$).
- There were no differences between treatments for satisfaction and volume of food to eat ($p > 0.05$).



Conclusion

- Gluten and inulin at levels of 5 grams had no impact on sensory attributes.
- Consumption of inulin resulted in a decrease in hunger and an increase in fullness.
- These results support not limiting gluten or inulin consumption in healthy individuals, as they did not lead to increased breath hydrogen or GI symptoms.