

Bitter Taste Sensitivity and Post-Operative Nausea and Vomiting (PONV) in Females Diagnosed with Breast Cancer

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Introduction

Background

- Post-operative nausea and vomiting (PONV) occurs in up to 30% of the general population and increases to up to 70% in high-risk patients.
- High-risk individuals include women, nonsmokers, people with history of motion sickness, and young patients.
- For many, discomfort of PONV is even worse than their post-surgical pain, and it can hinder recovery.
- Most breast cancer patients are female, so they already possess one risk factor for PONV.
- It is crucial to identify other risk factors to provide necessary management options to prevent PONV.
- A possible additional risk factor is bitter taste sensitivity.
- Bitter taste is predominantly mediated by the Taste 2 Receptor Member 38 (TAS2R38) gene.
- Studies have found TAS2 receptors (e.g. TAS2R38) in the gastrointestinal tract, providing a possible link between bitter taste and nausea and vomiting.

Study Goal and Hypothesis

- This study aimed to investigate whether bitter taste sensitivity would predict if females undergoing reconstructive breast surgery following a diagnosis of breast cancer would experience PONV.
- We hypothesized that increased bitter taste sensitivity would result in an increased incidence of PONV.

Methods

- We recruited 42 adult female patients with a breast cancer diagnosis from the Center for Restorative Breast Surgery in New Orleans, Louisiana.
- During their preoperative visits, participants were given a brief survey, with questions about demographics, liking of foods, and other factors that may impact taste sensitivities.
- Participants were then given a series of bitter taste strips and asked whether they detected a taste, and if so, to report its strength.
- Fungiform density was calculated by placing blue food dye on the tip of the tongue and counting in a small paper circle.
- On the day of surgery, participants were asked to report history of motion sickness and PONV and nursing staff recorded incidence of PONV.
- We divided patients using a median split analysis based on average bitter food scores into bitter likers and bitter dislikers.

Participant Characteristics

Age (years)		53.5 ± 8.7	
		<i>n</i>	%
Race	White	38	90.5
	Black	3	7.1
	Other	1	2.4
Hispanic	Yes	1	2.4
	No	41	97.6
Reproductive status	Pre-menopausal	3	7.1
	Peri-menopausal	9	21.4
	Post-menopausal	30	71.4
Smoking status	Currently	2	4.8
	Never	38	90.4
	Previously	2	4.8
Chemotherapy	Yes	20	47.6
	No	22	52.4
Antibiotic use	Yes	3	7.1
	No	39	92.9
Allergy medicine use	Yes	14	33.3
	No	28	66.7
Dry mouth	Yes	5	11.9
	No	37	88.1

Food Liking Composite Scores

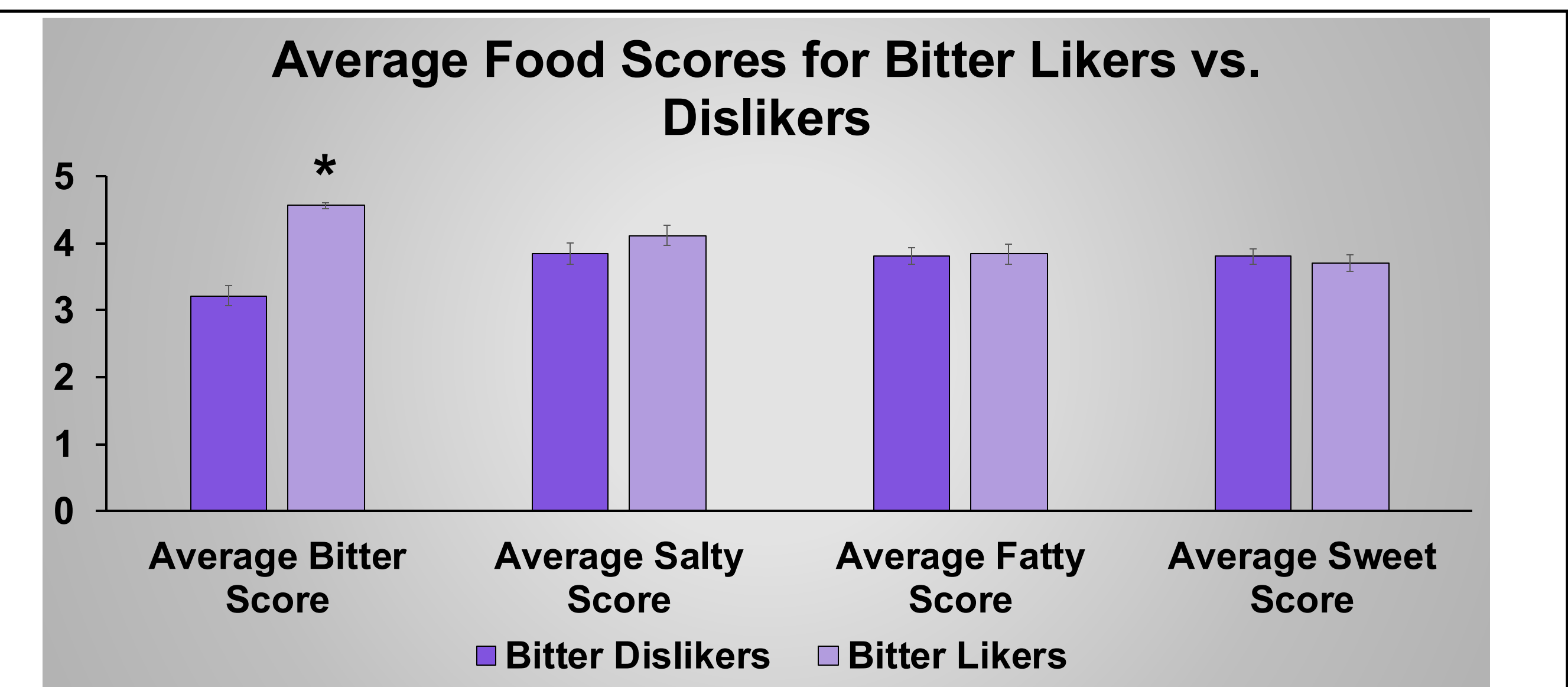


Figure 1. Average food scores reported by bitter likers and dislikers for bitter, salty, fatty, and sweet categories. The only category with a notable difference was bitter ($p < 0.0001$). However, bitter dislikers also reported lower scores for shish-kabobs in the fatty category ($p = 0.008$) and for pistachios ($p = 0.01$) and feta cheese ($p = 0.003$) in the salty category.

Phenylthiocarbamide (PTC) Strips

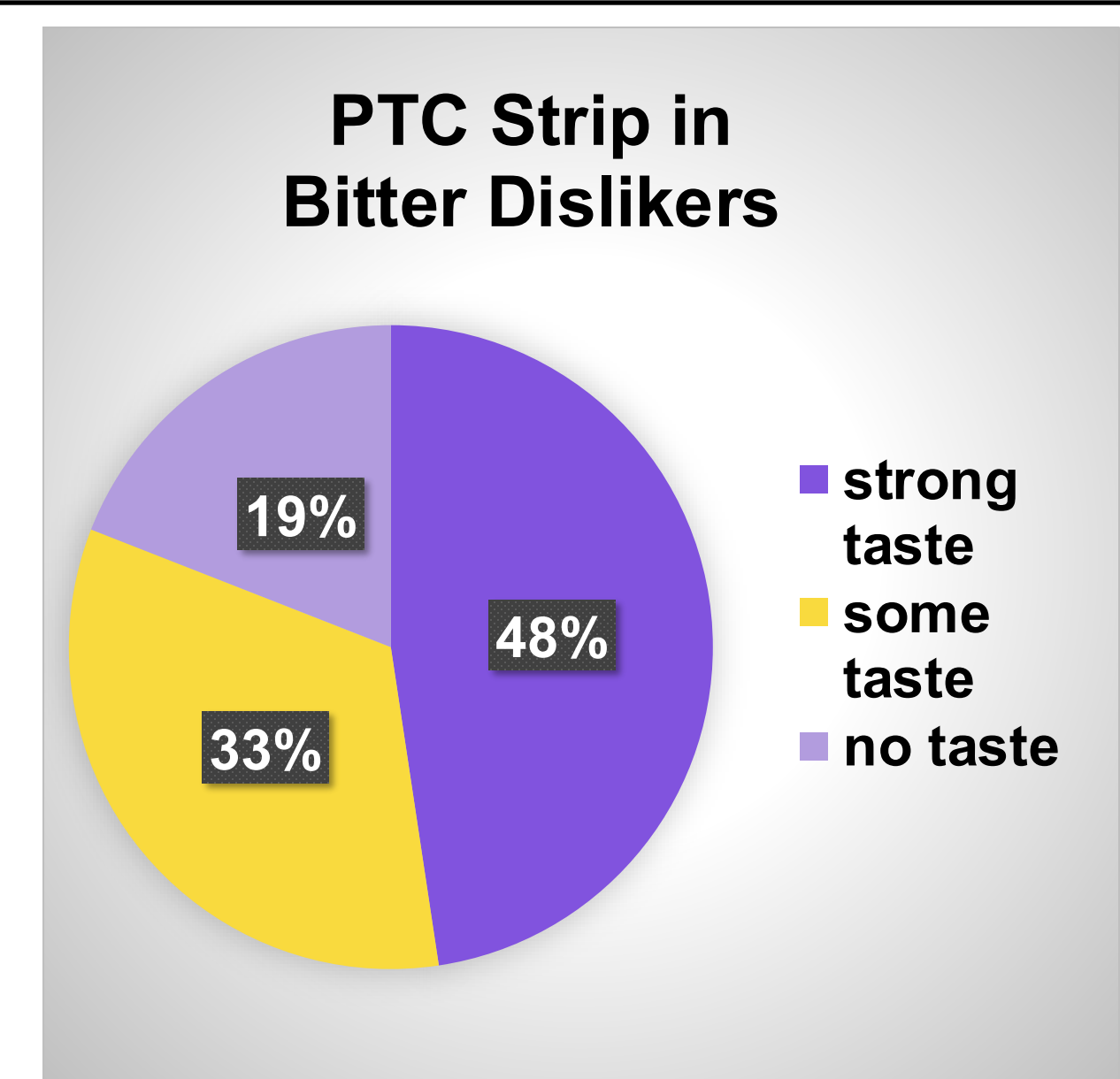


Figure 2. Strength of PTC strips reported in bitter dislikers.

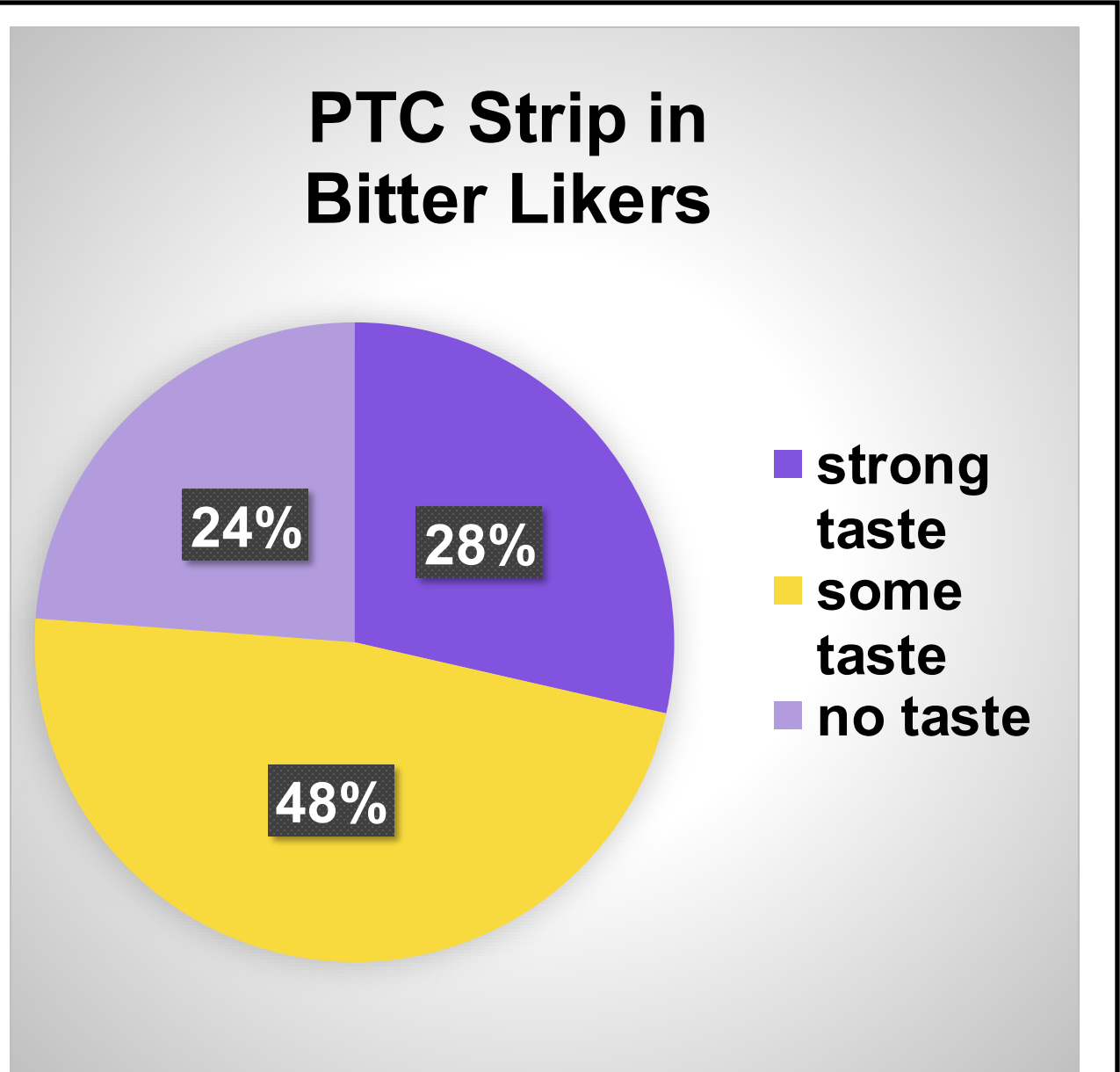


Figure 3. Strength of PTC strips reported in bitter likers.

Bitter Likers vs. Bitter Dislikers

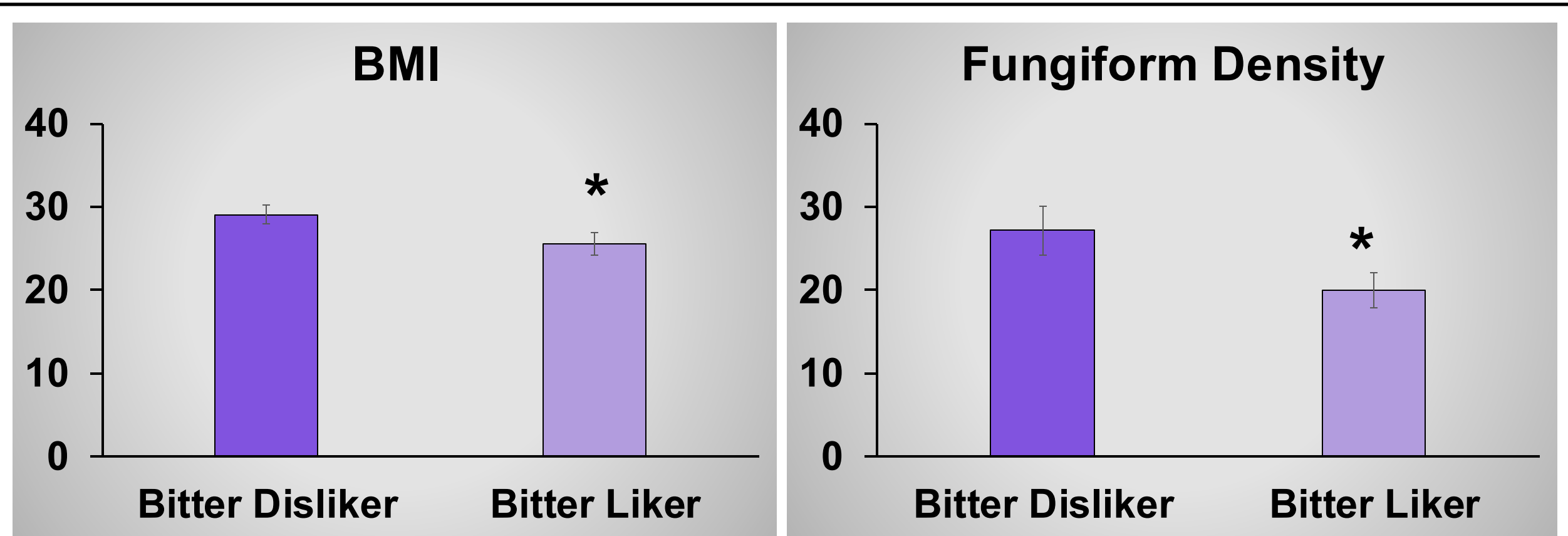


Figure 4. Average BMI for bitter likers and dislikers. Dislikers had a significantly higher BMI ($p = 0.05$).

Figure 5. Average fungiform density (FD) for bitter likers and dislikers. FD was significantly higher for dislikers ($p = 0.05$).

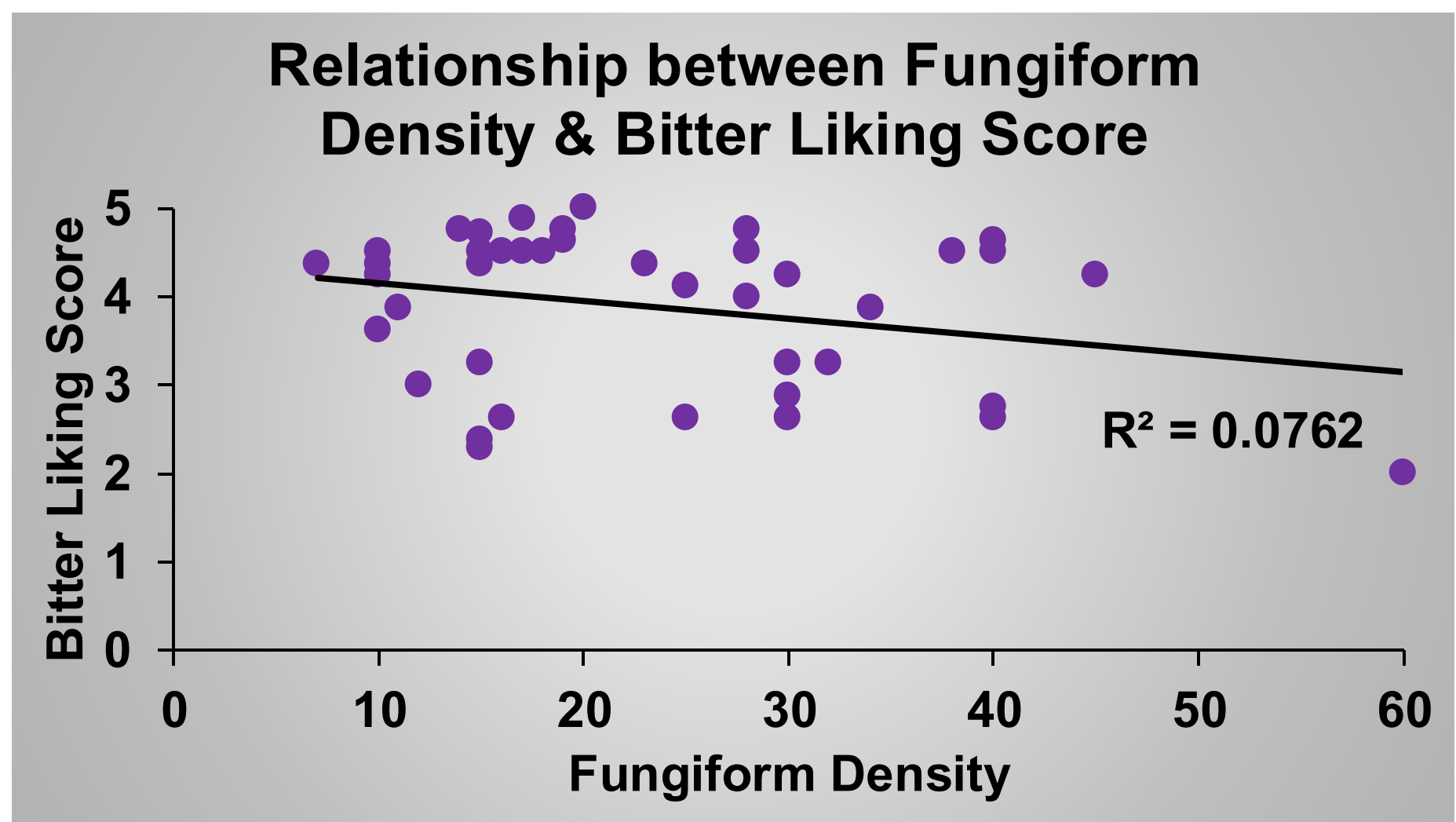


Figure 6. Correlation between fungiform density and bitter liking scores. As fungiform density increases, bitter scores decrease, though insignificantly ($p = 0.08$).

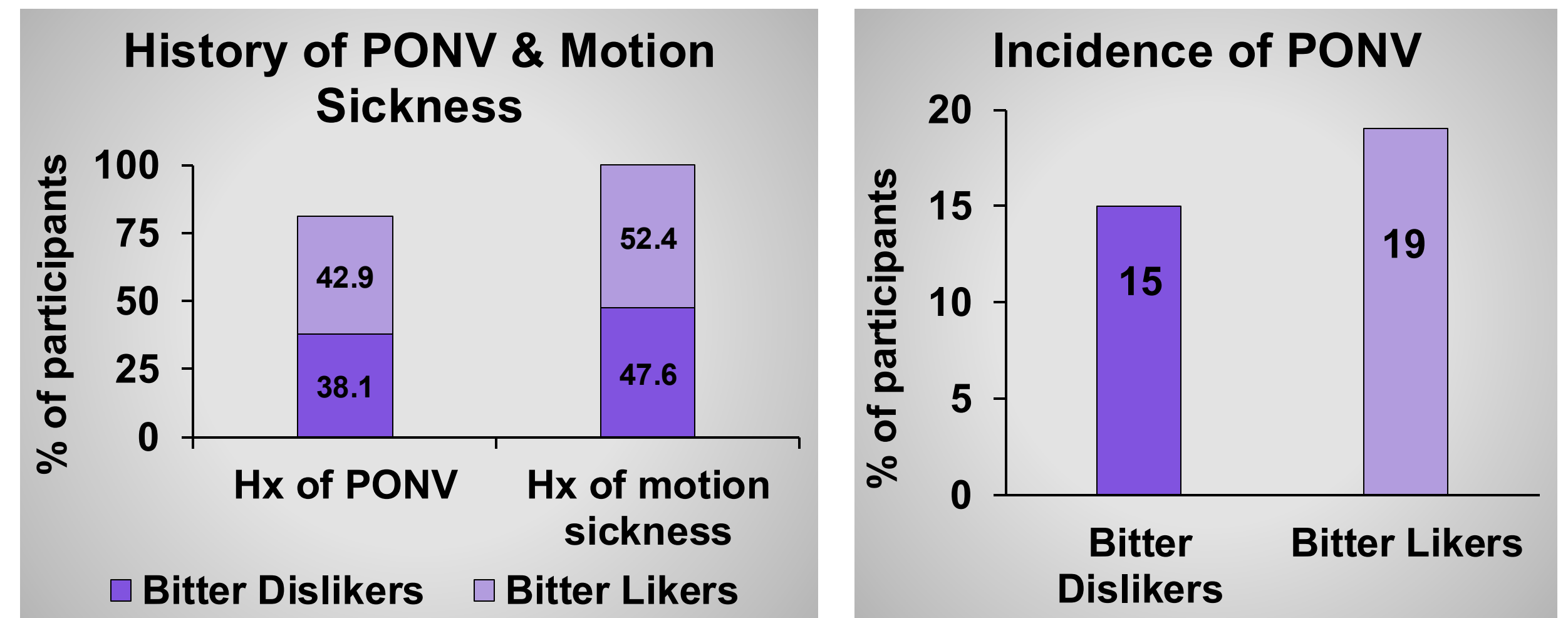


Figure 7. Percentage of bitter likers and dislikers who had a history of PONV¹ and motion sickness¹. No significant differences were observed between groups (¹ $p = 0.857$, ² $p = 0.883$).

Figure 8. Percentage of bitter likers and dislikers who experienced PONV after breast surgery. No significant differences were observed between groups ($p = 0.738$).

Conclusion

- In the current study, enhanced bitter taste sensitivity was associated with lower BMI and higher density of fungiform papillae, though not the incidence of PONV.
- Most participants (97.6%) were given preoperative and intraoperative antiemetics, which likely contributed to the incidence of PONV (17.1%).
- Interestingly, Bitter Dislikers were more likely to be administered the antiemetic, Aponvie (35% vs. 5.8%), which acts on the Substance P/Neurokinin 1 receptor system. This neurotransmitter system has been shown to modulate taste sensitivity.
- Future studies will include a more diverse patient population, an assessment of surgical history and further explore the role of and response to Aponvie.