DOES DIET COMPOSITION IMPACT REFLUX AND EATING-RELATED SYMPTOMS IN METABOLIC SURGERY PATIENTS? A NATURAL LANGUAGE PROCESSING POWERED ANALYSIS OF FREE-TEXT DIETARY RECALL

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Background

- Patient Reported Outcomes (PROMS) are validated clinically relevant endpoints such GERD HRQL (reflux symptoms) and BODY-Q (eating related symptoms)
- Rule-based Natural Language Processing (NLP) uses deep learning techniques to analyze and categorize text based on set definitions
- NLP can be applied to food recall free-text responses from patients undergoing metabolic and bariatric surgery (MBS) to estimate the average food intake composition (e.g., protein, carbohydrates, fat, fiber)
- The association between food intake composition and PROMs including GERD HRQL and BODYQ scores is poorly described
- We hypothesize that lower carb content intake is associated with improved reflux (GERD HRQL) and improved eating-related symptoms, distress, and behavior (BODY-Q) in both pre-operative and post-operative MBS patients

Methods

- This is a prospective cohort study
- All patients at a major academic institution undergoing bariatric surgery evaluation were given a 24 hour free text diet recall, GERD HRQL and Body-Q electronic questionnaires at their preoperative evaluation and at each postoperative follow-up
- GERD-HRQL, a validated 15-question survey, was scored from 0 to 75, with higher scores reflecting more severe symptoms.
- Body-Q (Table1) evaluated three domains: Eating related eating behavior (ER Behavior), distress (ER Distress), and symptoms (ER Symptoms); with scores ranging from 0 (poor health) to 100 (optimal health).
- Employing NLP, diet recall free-text was parsed and matched with nutritional data from a comprehensive food database, allowing the calculation of daily macronutrient totals converted into percentages of daily calorie intake.
- A carbohydrate intake exceeding 50% of daily calories was categorized as a high-carbohydrate diet
- A comparative analysis of high and low carbohydrate diet's with GERD HRQL and BODY Q scores was performed

BODY-Q™ - EATING BEHAVIOR

HOW ARE YOUR EATING HABITS?

Think about the FOOD you ate in the past week. How often did you:

	Never	Sometimes	Often	Always
1. Feel satisfied after eating?	1	2	3	4
2. Eat healthy food that your body needs?	1	2	3	4
3. Show self-control when you ate?	1	2	3	4
4. Feel in control of what you ate?	1	2	3	4
5. Chew food thoroughly before swallowing?	1	2	3	4
6. Eat the right amount of food?	1	2	3	4
7. Eat at the right speed (not too fast)?	1	2	3	4
8. Avoid unhealthy snack foods?	1	2	3	4
9. Stop eating before you felt full?	1	2	3	4

Table 1

Demographic	Preoperative	Postoperative	p-value
Age	44.61 (11.89)	44.31 (10.66)	0.297
Gender (M, n%)	25.60%	23.50%	0.434
BMI	46.2 (7.40)	41.0 (7.55)	<0.001

Table 2

Pre-operative patients	High carb diet	Low carb diet	P-value
GERD HRQL	7.45	4.48	0.008
BODY-Q ERS	76	79.84	0.057
BODY-Q ERD	58.16	58.83	.755
BODY-Q ERB	83.07	81.68	0.62

Table 3

Post-operative patients	High carb diet	Low carb diet	P-value
GERD HRQL	6.6	6.72	0.95
BODY-Q ERS	73.35	73.29	.98
BODY-Q ERD	62.1	62.24	0.29
BODY-Q ERB	84.55	86.44	0.67

Table 4

Results

- 305 dietary recall questionnaires were completed:
  - 224 pre-operatively and 81 post-operatively.
  - Survey compliance was 82%.
- The baseline demographics of pre-operative and post-operative groups did not differ significantly in age or gender, but the post-operative group had significantly lower BMI (41 vs. 46, p <0.001). (Table 2)
- Patients adhering to a "Low Carbohydrate" diet before surgery showed significantly worse GERD-HRQL, BODYQ ER Symptoms, and ER Behavior scores postoperatively (Table 3).
- Conversely, the "High Carbohydrate" group demonstrated no significant differences in preoperative and postoperative scores (Table 4).

Conclusions

- Patients adhering to a preoperative low-carbohydrate diet experienced worsening of GERD and eating-related symptoms following bariatric surgery, despite improvements in eating-related distress and behaviors.
- In contrast, individuals following a high-carbohydrate diet showed no significant changes in their preoperative and postoperative measures.
- These findings suggest that while a low-carbohydrate diet may enhance GERD-related quality of life measures before surgery, these benefits appear to diminish following bariatric surgery.
- Longitudinal analysis of these patient groups needs to be performed to further validate these findings
- Leveraging NLP to analyze food recall may be a useful tool to assist in counseling patient's undergoing MBS

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