Dietary Interventions for Gastroparesis in Pediatric and Adult Populations: A Systematic Review Protocol

Debra Okafor (deb.okafor@bcm.edu)
Baylor College of Medicine Department of Pediatrics https://orcid.org/0000-0002-7432-8442
Tanya Su
Baylor College of Medicine Department of Pediatrics
Keya Lee
Texas Medical Center Library
Bruno Chumpitazi
Baylor College of Medicine Department of Pediatrics
Robert J Shulman
Baylor College of Medicine Department of Pediatrics
Ruben Hernaez
Baylor College of Medicine

Protocol

Keywords: gastroparesis, diet, dietary intervention, gastric emptying

Posted Date: November 4th, 2020

DOI: https://doi.org/10.21203/rs.3.rs-100214/v1

Abstract

Background: Dietary interventions are the first-line treatment for patients with gastroparesis. It is unclear which diets are the most efficacious as well as clear guidance as to which diets should be recommended to adult versus pediatric patients. We plan to conduct this systematic review to assess the literature on the efficacy and effectiveness of dietary interventions on clinical outcomes in adult and pediatric patients with gastroparesis.

Methods: We will search PubMed and EMBASE databases, evaluating randomized control trials and cohort studies that reported dietary interventions in gastroparesis. Our primary outcomes are to evaluate changes in symptom-specific patient-reported outcomes, changes in perception of quality of life, and changes in gastric emptying time. Data collected from the studies will be analyzed using meta-analysis**.** Depending on the outcome, we will use quantitative summary estimates (e.g., standardized mean difference with 95% Confidence Intervals, 95%CI) or dichotomous outcomes (e.g., odds ratio and 95%CI).

Discussion: This review will explore the use of dietary interventions in the treatment of both adult and pediatric patients with gastroparesis, which has yet to be published in the literature. By assessing what has been investigated by researchers as effective non-pharmacologic treatments in patients, and providing a comprehensive overview of treatment options, healthcare providers will be able to better guide patient care. Furthermore, this review will act as a means to provide direction for future research.

Systematic Review Registration: PROSPERO registration ID: CRD42020210536.

Article Summary

Strengths and Limitations of this Study:

- Each potential study will be evaluated by two independent reviewers to ensure all possible studies will be included
- There may not be many studies available to include in the systematic review
- The studies included may not have a lot of power due to small subject cohorts involved
- The studies included may not assess each of the specifics listed in the primary and secondary outcomes

Background

Gastroparesis (**GP**) is a delay in gastric emptying of fluids or solids in the absence of a mechanical obstruction[1]. Both adult and pediatric patients with GP typically develop symptoms such as early satiety, anorexia, bloating, abdominal pain, nausea, and vomiting, among others[1]. Depending on the severity of symptoms, patients may develop significant weight loss and nutritional deficiencies. These symptoms have led to significant burdens on patients from a financial and mental health perspective. In adult

patients with GP, it has been shown that when patients reflect on their quality of life using a validated questionnaire, that their scores were comparable to patients with chronic mental health disorders and depression[2]. By the disease negatively affecting their quality of life, patients have more difficulty managing on a daily basis and are more likely to reach out for medical care or become hospitalized. When evaluating personal financial burden, patients reported that GP reduced their annual income by 28.5% and 11% of patients with GP had to apply for disability[2]. GP-related hospitalizations accounted for millions of dollars and over 900,000 hospital days[3]. In pediatric patients with GP, several studies have indicated that the number of hospitalizations due to pediatric GP has continued to increase, with the rate increasing by 130 hospitalizations per year between 2004 and 2013[4]. These findings represent the significant burden GP has on patients and the healthcare system, and the need for more research done to better outcomes.

There are multiple potential treatment options for GP that include prokinetic agents, botulinum toxin injections into the pylorus, and gastric neurostimulation; however, none of these treatments are uniformly effective and may have significant side effects[4]. As a result, the first-line treatment for GP for pediatric and adult patients is dietary intervention. A publication that organizes the data into clear and concise guidelines is lacking. Dietary management research studies for patients with GP are primarily from the adult literature, thus, in pediatrics, the need is even greater. Hence, we aim to conduct a systematic review of the literature assessing the effect of dietary interventions carried out in adults and pediatric patients with GP to attempt to identify recommendations using an evidence-based medicine framework.

RESEARCH OBJECTIVES:

To assess the efficacy and effectiveness of dietary interventions on clinical outcomes in patients with GP. Clinical outcomes in GP will be a) Reduction in gastroparesis-specific patient-reported scores/outcomes (e.g., Gastroparesis Cardinal Symptom Index, PAGI-SYM), b) General scoring symptoms and quality-of-life measurements (e.g., SF-36, PedsQL), c) Re-admissions, hospitalization length-of-stay, d) Improved emptying time on gastric scintigraphy

Methods And Analysis

This protocol conforms to the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) checklist which is completed and included in this manuscript.

Eligibility criteria:

Study characteristics:

This systematic review and meta-analysis will include randomized control trials, retrospective cohort studies and prospective cohort studies where various dietary interventions are the independent variable.

Animal studies will not be considered.

Types of participants

The studies included will assess participants that have been diagnosed with GP as defined by delayed gastric emptying (greater than 60% gastric retention at the 2-hr mark or greater than 10% retention at the 4-hr mark) on gastric scintigraphy[5].

Setting and time frame:

All studies published will be included regardless of the settings, this includes hospitals, clinics, and nursing facilities. The time frame of the study will include articles published between March 2008 and the present time. This time frame was chosen because this was when the consensus definition of gastroparesis was published in the literature.

Report Characteristics:

The study will only include articles that are in English. We will not include abstracts presented at scientific meetings due to a lack of complete and detailed information.

Information sources and Search Strategy:

A Texas Medical Center medical reference librarian with expertise in systematic reviews will perform a search through academic databases such as PubMed, EMBASE, and MEDLINE, as well as other appropriate databases. The initial search strategy will be refined until useful data results, then the search strategy will be applied to other databases to expand results. Reference lists from relevant articles will be searched as well and included if useful. The following terms will be used, adapted to each database: gastroparesis, diet or dietary intervention, randomized control trial, cohort, cohort study.

Study Records

Selection Process:

Two reviewers will independently review the references collected by the librarian. The reference list will be stored using COVIDENCE. The title and abstract of each article will be reviewed and categorized as eligible, maybe eligible, or not eligible. All articles categorized as not eligible will be excluded. The full text of the articles considered eligible will be reviewed and a list of approved articles will be made. The articles that are considered maybe eligible will be reviewed by a third independent reviewer. The inclusion criteria are as follows:

1. Human subjects diagnosed with any subtype of GP
2. Studies on dietary interventions in patients with GP evaluating:

    a. Symptoms

b. Quality of life

c. Hospitalization metrics

d. Rate of gastric emptying

Data management:

Data will be extracted using the COVIDENCE database based on the final list of articles collected. The items from each article that will be collected will include: author, publication year, journal title, study design, study setting, demographics (age, sex, etc), type of GP studied, sample size, type of dietary intervention, outcomes measured, method outcomes are being measured. Technical appendix, statistical code, and dataset available upon request.

Patient and Public Involvement:

Patients and the public were not involved in the study design, conduct, assessment, reporting, and dissemination plan of the research. At the conclusion of the study, with the information we are able to collect, we plan to disseminate this information to healthcare providers to assist in their management and education for patients with gastroparesis.

Quality Assessment:

Full texts will be appraised by two researchers separately. Randomized control trials and cohort studies will be assessed by the representativeness of their cohort, comparability of cohorts, and time to survey. The cohort studies will be assessed for risk of bias by the Newcastle-Ottawa scale (supplemental index 1)[6]. Randomized controlled trials will be graded using the GRADE approach using GRADE Pro GDT as high, moderate, low, and very low based on their certainty and a 1–9 importance scale based on the certainty of evidence and the importance, respectively. Based on the GRADE Handbook, the scale of importance for the evaluated articles will be based on whether the data is critical, important, but not critical, or of limited importance (Table 1). Grades of 1 are considered the least important and grades of 9 are considered critical[7].

DATA SYNTHESIS

We intend to perform a quantitative summary of the data with a meta-analysis, if possible. Depending on the outcome, we will use quantitative summary estimates (e.g., standardized mean difference with 95% Confidence Intervals, 95%CI) or dichotomous outcomes (e.g., odds ratio and 95%CI). We plan to use the random-effects model but if there is no evidence of heterogeneity, we will use the fixed-effects meta-analysis approach to assess the different dietary interventions being analyzed. We will assess statistical heterogeneity by quantifying the variation using I^2. If statistical heterogeneity is found, we plan, *a priori*, to conduct the following sensitivity analysis based on the following clinical variables:

a. By underlying etiology of GP: diabetes, surgically induced, idiopathic
b. Use of medication and when the medication was started
c. Methods used to show improvement: surveys vs gastric scintigraphy studies
d. Country of origin
e. Referral center- vs. community-based

We plan on performing meta-regression to understand the influence of such variables on the overall estimates. Publication bias will be addressed using a funnel plot. Once completed, the manuscript will be completed following the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines.

Ethics and Dissemination

Ethical approval will not be needed because this study will not involve individual patient data or identifying information; it will only be performed on published pieces of literature. Once the research is finalized, the manuscript will be submitted to a peer-reviewed journal and presented at a conference relevant to the topic.

Discussion

A systematic review evaluating the efficacy of dietary interventions in gastroparesis has yet to be performed and as the first-line treatment for GP, a thorough and comprehensive systematic review assessing the outcomes of dietary intervention is needed. This information will be helpful for patients with GP and healthcare providers looking for non-pharmacologic options to manage GP and to predict what outcomes would be expected in patients based on the studies presented. Because we plan on evaluating both adult and pediatric GP studies, we anticipate our study also will bring to light deficits in the current literature on this topic and encourage further research on the topic.

Abbreviations

GP, gastroparesis; PAGI-SYM, The Patient Assessment of Upper Gastrointestinal Symptom Severity Index; SF-36, 36-Item Short Form Survey; PedsQL, Pediatric Quality of Life Inventory

Declarations

Ethics Approval and consent to participate:

Not applicable.

Consent for publication:

Not applicable.

Availability of data and materials:

The studies included in this study will be available upon request.

Competing Interests:

The authors report no competing interests.

Funding Statement:

This study was supported by U01 DK112194 from the National Institutes of Health (RJS), the Daffy's Foundation, the USDA/ARS under Cooperative Agreement No. 6250-51000-043, and P30 DK56338 which funds the Texas Medical Center Digestive Disease Center. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health. This work is a publication of the USDA/ARS Children's Nutrition Research Center, Department of Pediatrics, Baylor College of Medicine and Texas Children's Hospital. The contents do not necessarily reflect the views or policies of the USDA, nor does mention of trade names, commercial products, or organizations imply endorsement by the US Government.

Author Contributions:

The study was designed by DO, BPC, and RJS. The protocol was written by DO and revised by RH and RJS. The search strategy was initially developed by DO, RJS, and RH, and modified by KL. KL will perform the search process, while DO and TS will perform the screening process, data extraction and quality assessment. RJS and RH will assist in determining eligible studies. RH will perform the meta-analysis. The manuscript for the protocol was written by DO, RJS, and RH. All authors approved the final version of this protocol.

Acknowledgements:

Not applicable.

References

1. Islam, Saleem. "Gastroparesis in Children." *Current Opinion in Pediatrics*, vol. 27, no. 3, 2015, pp. 377–382., doi:10.1097/mop.0000000000000216.
2. Lacy, Brian E., et al. "Gastroparesis: Quality of Life and Health Care Utilization." *Journal of Clinical Gastroenterology*, vol. 52, no. 1, 2018, pp. 20–24., doi:10.1097/mcg.0000000000000728.
3. Wang, Yize, et al. "Gastroparesis-Related Hospitalizations in the United States Trends, Characteristics, and Outcomes, 1995–2004." *The American Journal of Gastroenterology*, vol. 102, no. 2, Feb. 2008, pp. 313–322.

4. Febo-Rodriguez, Liz, et al. “Childhood Gastroparesis Is a Unique Entity in Need of Further Investigation.” *Neurogastroenterology & Motility*, vol. 32, no. 3, 2019, doi:10.1111/nmo.13699.
5. Abell, T. L., et al. “Consensus Recommendations for Gastric Emptying Scintigraphy: A Joint Report of the American Neurogastroenterology and Motility Society and the Society of Nuclear Medicine.” *Journal of Nuclear Medicine Technology*, vol. 36, no. 1, 2008, pp. 44–54., doi:10.2967/jnmt.107.048116.
6. Wells, GA, et al. “The Newcastle-Ottawa Scale (NOS) for Assessing the Quality of Nonrandomised Studies in Meta-Analyses.” *Our Research*, The Ottawa Hospital, www.ohri.ca/programs/clinical_epidemiology/oxford.asp.
7. Schünemann, Holger, et al. *GRADE Handbook*, Oct. 2013, gdt.gradepro.org/app/handbook/handbook.html#h.pq7g5y80zfhj.

Table

Table 1: Representation of importance scale to be used for the articles, from the GRADE Handbook[3].

rating scale:								
1	2	3	4	5	6	7	8	9
of **least** importance								of **most** importance
of limited importance for making a decision (not included in evidence profile)			important, but not critical for making a decision (included in evidence profile)			Critical for making a decision (included in evidence profile)		

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- NewcastleOttawascale.pdf
- PRISMAPchecklist.DOkafor.docx