

Impact of the Maternal and/or Infant Elimination Diet on Infants with Gastroesophageal Reflux Disease

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Abstract

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BACKGROUND: Infantile gastroesophageal reflux disease (GERD) and cow milk protein allergy (CMPA) are common conditions. There is a potential link between these two disorders.

AIM: To outline the possible impact of the maternal and/or infant elimination diet on improving GERD manifestations in infants.

MATERIALS AND METHODS: This was a retrospective cohort study that was conducted in the General Pediatric outpatient clinics at Aswan University investigating the possible positive effect of the maternal and/or infant elimination diet on outcomes of GERD in infants.

RESULTS: Forty -five infants were enrolled in our study. A significant difference (P value =0.001) regards the frequencies of spitting at presentation and the fourth week of follow-up was noticed (Median (IQR)= 5 (3), 4 (3) respectively). A significant decline in aspirations was detected (P value =0.001). The overall prevalence of CMPA in infants with GERD in our study was 33%.

CONCLUSION: It seems that the maternal and/or infant elimination diet could be a potential therapeutic modality for infants with GERD.

Introduction

The exact ways in which cow's milk and other food allergens cause gastrointestinal motility disorders are not known. Besides immune reactions, the effects of food components on gut motility and the gut microbiota may also play a role in the development of these disorders. In cases where conventional medical treatment has not been successful, infants may be recommended to try a diet that eliminates certain antigens from the mother's or the infant's diet [1], [2].

Breastfeeding is the best way to provide nutrition for babies, but it can be difficult to handle breastfeeding infants who show signs of food allergies [3]. It is believed that human milk contains enough antigenic food proteins to cause clinical reactions in infants who are already sensitized. These reactions can include food allergies that are not mediated by IgE such as GERD [4].

Gastroesophageal reflux (GER) is when stomach contents flow back into the esophagus, either with or without regurgitation or vomiting. It is a common physiological condition. However, GER disease (GERD) occurs when the reflux of stomach contents leads to symptoms that negatively impact the quality of life or result in complications such as poor weight gain, difficulties with feeding or sleeping, chronic respiratory issues, inflammation of the esophagus, vomiting blood, episodes of stopped breathing, and potentially life-threatening events. The symptoms of cow's milk protein allergy and GERD can be similar, and both conditions can occur together in 42-58% of infants. If cow's milk protein is eliminated from the diet, symptoms typically improve within 2-4 weeks. Most infants with uncomplicated reflux do not require any intervention [5], [6]. Our aim of the study was primarily to outline the possible impact of a maternal and/or elimination diet on improving GERD symptomatology in infants.

Materials and methods

This study included 45 infants who were followed at the General Pediatric outpatient clinic in Aswan University Hospital in the period from the First of January 2021 to the end of December 2022. Infants with GERD were treated with different therapeutic modalities. We traced only those who were treated via the maternal and /or infant elimination diet during the study duration. Those infants with associated conditions such as neurodevelopmental disorders, esophageal atresia, anatomical malformations, and those who were receiving any other therapies for GERD were excluded. Full-term and breast-fed infants of both sexes with GERD that didn't respond to conventional therapies were included. All infants were treated via maternal and/or infant elimination diet.

Case definition

GERD

The diagnosis of GERD was based on clinical symptoms, medical history, frequencies of spitting, and associated frequent aspirations [7].

Cow Milk Protein Allergy (CMPA)

Screening for CMPA was done using The Cow's Milk-Related Symptom Score (CoMiSS) with a predictive cut-off of more than 12 [8], [9].

Improvement of GERD

The improvement of GERD was outlined by the change in frequencies of spitting and aspirations on the follow-up at the fourth week of starting the elimination diet.

Elimination diet

A 6-food elimination diet (SFED) eliminates the most common food antigens: dairy, wheat or gluten, eggs, legumes, nuts, and seafood from the maternal diet and/or infant diet older than 6 months old for 4 [10].

Sample size technique

All infants who were treated for GERD with maternal and/or infant elimination were enrolled in the study by using a consecutive, non-probability sampling technique. Assessment of the power of the study was examined using SPSS version 27 which yielded a power analysis of nearly 99% with a level of significance at 0.05 based on the primary outcome which was the effect of the elimination diet on the frequencies of spitting of infants with GERD in our study.

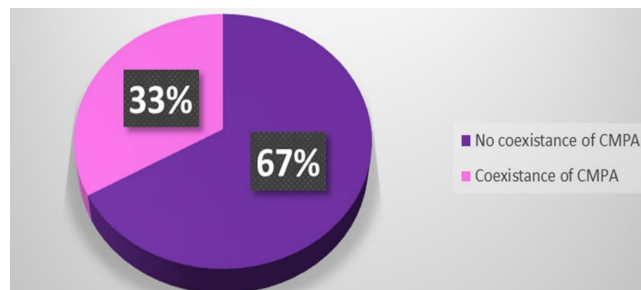


Figure 1: Pie chart showing the distribution of CMPA in our study

Ethical approval

The study was revised and approved by the scientific ethical research committee of the Faculty of Medicine, Aswan University, IRB number is 24356. The study was done by the laws for human research. Informed consent was obtained from the parents or caregivers of the enrolled infants. This study followed the principles of the Declaration of Helsinki.

Statistical analysis

Statistical calculations were conducted using SPSS (Statistical Package for the Social Science; SPSS Inc., Chicago, IL, USA) version 27. Categorical variables were described as frequencies and percentages, while numerical variables were designated as mean and standard deviation or median and range, as appropriate based on the normality distribution using Kolmogorov-Smirnov test and Shapiro-Wilk tests. Related sample Wilcoxon sign rank test and Paired sample t-test were used to compare the outcomes before and after introducing the elimination diet. McNemar test was applied to detect the difference regards the presence or absence of aspirations at the start and the fourth week [11], [12].

Results

Firstly, we studied the normal distribution of the data to choose the suitable statistical presentations and tests as shown in Table 1. Nearly all numerical data weren't normally distributed except the number of spitting-on presentations and the difference in CoMiss scores between presentation and follow-up.

Table 1: Normality test of the numerical variables of interest

Numerical variable	P value of Kolmogorov-Smirnov test and Shapiro-Wilk tests
Difference of spitting	0.01*
Number of spitting at presentation	0.018*
Number of spitting at FU	0.145
Weight Z scores at presentation	0.001*
Weight Z scores at FU	0.007*
Difference in weight Z scores	0.001*
Difference of CoMiss between presentation and Follow up	0.846
Age	0.02*

*P value is significant <0.05.

Our study enrolled 45 breastfed infants with GERD. The median age of the enrolled participants was 4 months with close distribution between males and females (Table 2).

Table 2: Sociodemographic criteria

Age in months	
Median (IQR)	4 (3.9)
Min-Max	1-11
Gender: Total 45	
Males: n (%)	22 (48.8%)
Females: n (%)	23 (51.1%)

Our aim of the study was to disclose the impact of the elimination diet on outcomes of infants with GERD. The primary outcome measure was the difference in frequencies of spitting between the presentation and at follow-up after 1 month. The secondary outcome measure was the difference between the weight Z scores between presentation and follow-up time to detect if this method of elimination could have any impact on the infants' weight. Table 3 illustrates these outcome measures. There was a significant difference in the frequencies of spitting between the presentation and follow-up, P value = 0.001. However, no significant difference was found between weight Z scores, P value = 0.839.

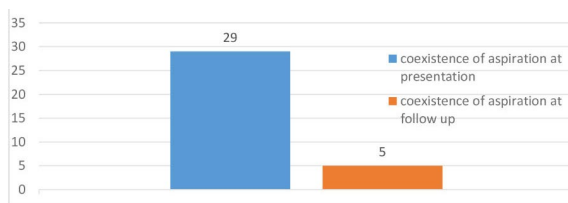


Figure 2: Cluster Column chart showing the frequency and percentage of aspirations of the enrolled infant at presentation and follow-up (FU)

Notably, infants who had a coexistence of cow milk protein allergy represented a considerable number of the study participants (n= 15, 33%), as shown in Figure 1. Further analysis was carried out to outline if the elimination diet helped improve the allergy score in those infants with CMPA and yielded a significant difference, a P value of 0.039 (Table 3).

Table 3: Difference of spitting, weight scores, CoMiss scores and aspirations between the first visit and a follow-up visit in the fourth week

Difference in frequencies of spitting: Total 45 (100%)			
	Numbers of spitting at presentation	Numbers of spitting at FU	P value
Median (IQR)	5(3)	4(3)	0.001 ⁽¹⁾
Min: Max	3:9	0:8	
Difference of weight scores: Total 45 (100%)			
Median (IQR)	0.8(0.9)	0.9(1)	0.832 ⁽¹⁾
Min: Max	-1:2.9	0:2.9	
Difference of CoMiss scores in infants with CMPA: Total 15			
Mean Difference (between presentation and FU scores (SD))		7.8 (2.6)	0.039 ⁽²⁾
Comparison between the Coexistence of aspiration between presentation and FU			
	No aspiration at FU	Co-existence of aspiration at FU	P value
No aspirations at the presentation	16	0	0.001 ⁽³⁾
Co-existence of aspiration at presentation	24	5	
Total Number	40	5	

(1) Related sample Wilcoxon sign rank test; (2) Paired sample t-test; (3) McNemar test; *P value is significant < 0.05; SD: Standard deviation.

Additionally, the coexistence of aspirations was examined at presentation and follow-up. Figure 2 illustrates the difference between the presence of aspirations at the presentation and follow showing a marked improvement with a significant difference, P value = 0.001 as shown in Table 3.

Discussion

The current research demonstrates that removing cow's milk products from infants diagnosed with refractory GERD effectively resolved their issues. It appears that cow's milk products can worsen GERD symptoms by affecting the movement of the gastrointestinal tract, or they may be the reason why GERD does not respond to medication [13]. Cow milk protein allergy co-existed in 33% of the study participants in our study. Former studies found close results that CMPA was in 41.8% and 33.3% of infants with GERD [14], [15].

Given the hypothesis that CMA can affect all parts of the gastrointestinal tract, such as the esophagus, stomach, small intestine, colon, and rectum [16], [17], it could be suggested that a trial of elimination diet could be of value for resistant GERD. This was noticed in our study as there was a significant decrease in the frequencies of spitting in infants of our study after the maternal and /or infant elimination diet, in parallel with a significant improvement in the CoMiss score. A similar finding was reported [15].

Notably, our study has addressed the absence of the negative impact of the short-term elimination diet on infants which was previously reported, moreover, there was a non-significant change in weight Z scores of infants who had undergone maternal and /or infant elimination diet.

Our report recommends screening for CMPA in infants with GERD and considering a 4-week maternal and/or infant elimination diet for them. Further studies outlining the grounds for the link between GERD and CMPA are required.

Conclusion

This study evaluated the pros and cons of applying the maternal and /or infant elimination diet as an alternative therapy for infants with GERD. No cons were detected. Instead, a significant decline in frequencies of spitting and aspirations was observed without any significant weight change.

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