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editorial-office@sciformat.ca

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DIETARY THERAPY IN THE TREATMENT OF EOSINOPHILIC ESOPHAGITIS: A COMPREHENSIVE REVIEW OF CLINICAL EVIDENCE

Maria Wieczorek *(Corresponding Author, Email: wieczorekmarialucja@gmail.com)*
Orłowski Independent Public Clinical Hospital, Centre of Postgraduate Medical Education, Warsaw, Poland
ORCID ID: 0009-0000-9951-7509

Jan Kownacki
The Infant Jesus Teaching Hospital, Warsaw, Poland
ORCID ID: 0009-0004-6276-6383

Paweł Drzymała
Central Clinical Hospital of UCC MUW, Warsaw, Poland
ORCID ID: 0009-0006-6288-6232

Kacper T. Majczak
Praga Hospital of Transfiguration of Our Lord Ltd., Warsaw, Poland
ORCID ID: 0009-0000-4115-0513

Marta Śliwińska
Praga Hospital of Transfiguration of Our Lord Ltd., Warsaw, Poland
ORCID ID: 0009-0003-0710-4021

Magdalena G. Gehrke
National Medical Institute of the Ministry of the Interior and Administration in Warsaw, Warsaw, Poland
ORCID ID: 0009-0004-8141-4236

Aleksandra Schmidt
John Paul II Western Hospital in Grodzisk Mazowiecki, Grodzisk Mazowiecki, Poland
ORCID ID: 0009-0005-3725-739X

Julian Uchacz
John Paul II Western Hospital in Grodzisk Mazowiecki, Grodzisk Mazowiecki, Poland
ORCID ID: 0009-0005-4431-6343

Oliwia Z. Śmiechowicz
District Health Center in Otwock, Otwock, Poland
ORCID ID: 0009-0008-5803-7232

Natalia A. Skwarek
The Infant Jesus Teaching Hospital, Warsaw, Poland
ORCID ID: 0009-0001-2061-6158

ABSTRACT

Eosinophilic esophagitis (EoE) is a chronic, immune-mediated inflammatory disorder of the esophagus characterized clinically by symptoms of esophageal dysfunction and by eosinophilic infiltration. EoE has emerged as a major cause of dysphagia and food impaction in both pediatric and adult populations. Accumulating evidence indicates that is primarily driven by antigen exposure, particularly food allergens, leading to a T helper type 2 (Th2)-mediated inflammatory cascade. Dietary therapy has become one of the three major therapeutic pillars of EoE management, alongside proton pump inhibitors and topical corticosteroids. This review synthesizes current evidence regarding dietary interventions in EoE and demonstrates that dietary therapy induces histologic remission in a substantial proportion of patients, with response rates exceeding 90% for elemental diets and approximately 70% for six-food elimination diets. However, dietary treatment carries risks of nutritional deficiencies, psychosocial burden, and the need for repeated endoscopic monitoring.

KEYWORDS

Eosinophilic Esophagitis, Diet, EoE, Six-Food Elimination Diet, Four-Food Elimination Diet

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Introduction

Eosinophilic esophagitis (EoE) is a chronic, antigen-driven inflammatory disease of the esophagus defined by symptoms of esophageal dysfunction and 15 eosinophils or more per high-power field (eos/hpf) on esophageal biopsy after exclusion of secondary causes of esophageal eosinophilia [1]. Since its first formal characterization in the 1990s, the incidence and prevalence have increased substantially in Western countries [2]. A systematic review estimated the pooled prevalence of this disease at approximately 34 cases per 100000 persons, with higher rates reported in North America and Europe [2]. EoE affects both children and adults, with a male predominance of approximately 3:1 [3]. Clinical presentation differs by age; feeding intolerance, vomiting, and failure to thrive are common in children, whereas dysphagia and food impaction predominate in adults [4]. If left untreated, chronic inflammation can lead to fibrostenotic remodeling of the esophagus, resulting in strictures and persistent dysphagia [5].

Diagnosis

Endoscopic evaluation is central, both for establishing the diagnosis and for assessing treatment response and long-term disease activity. Common endoscopic features include mucosal edema with reduced vascular markings, fixed esophageal rings, white plaques/exudates, longitudinal furrows, strictures, luminal narrowing, and mucosal fragility (“crepe-paper” mucosa). In patients with fibrosis, the mucosa may feel unusually firm during biopsy acquisition, producing a characteristic “tug” or “pull” sign [19-20]. Although these findings are not pathognomonic and are not part of the formal diagnostic criteria, when they are specifically sought, they are present in most patients and strongly increase suspicion for EoE. ACG Clinical Guideline recommend obtaining at least 6 esophageal biopsies from at least 2 esophageal levels (e.g., proximal/midand distal), targeting endoscopic findings, to assess for histologic features consistent with EoE.

Pathogenesis

The pathogenesis is strongly associated with atopy. Between 60% and 80% of patients have concomitant allergic diseases such as asthma, allergic rhinitis, or atopic dermatitis [3]. Mechanistically, EoE is driven by a Th2-predominant immune response, with interleukin (IL)-5 and IL-13 playing central roles in eosinophil recruitment and activation [8]. IL-13 induces expression of eotaxin-3 (CCL26) in esophageal epithelial cells, which is highly upregulated and contributes to selective eosinophil trafficking [8]. Food antigens are major drivers of this inflammatory cascade, so dietary elimination strategies have been developed as therapeutic interventions. The antigen dependent nature of EoE was first convincingly demonstrated using elemental diets in pediatric patients [9]. Since then, dietary therapy has evolved into a structured, evidence-based approach forming a cornerstone of management guidelines [1].

Methodology

To identify literature relevant to the topic, the PubMed database was searched using predefined keywords: “eosinophilic esophagitis” and “diet”. The search was limited to systematic reviews and meta-analyses published between 2000 and 2026. In addition, 5 publications were identified through manual searching. Abstracts were screened to select studies aligned with the aims of the present review, after which each eligible publication underwent an in-depth full-text assessment. Inclusion criteria comprised English-language articles with full text available for analysis. Pediatric and adult populations were both considered, as dietary response rates may vary by age group. Studies based on animal models were excluded. Ultimately, 24 publications were included and cited in this review.

Results

There are various diets that can have positive therapeutic effects in the treatment of EoE. Among the best known and most described are: six-food elimination diet (SFED), four-food elimination diet (FFED), one-food elimination diet (OFED), a targeted elimination diet (TED) and elemental diet.

Six-Food Elimination Diet (SFED)

The six-food elimination diet empirically removes the six most common food allergens: milk, wheat, egg, soy, nuts, and seafood.

The clinical trial by Gonsalves et al. demonstrated that elimination diet leads to marked symptom relief and decreases both endoscopic and histologic signs of EoE in adults. When foods are reintroduced, EoE findings frequently recur, supporting the contribution of food allergens to the disease’s underlying pathogenesis. [13]. Pediatric studies have shown similar efficacy [10]. Retrospective observational study by Kagalwalla et al. compared short-term clinical and histologic outcomes in children with eosinophilic esophagitis managed during two different periods, one using a SFED and the other using an exclusive elemental diet (ELED). Sixty children met inclusion criteria and adhered to the dietary protocol. Follow-up esophageal biopsies were performed after at least six weeks of dietary therapy. Histologic remission or marked improvement (≤10 eos/hpf)) was achieved in 74% of the SFED group and 88% of the ELED group, with significant reductions in peak eosinophil counts in both cohorts. The authors concluded that it is an effective option and may be preferable as an initial approach because it tends to be more acceptable, less costly, and easier to maintain than an elemental diet. A systematic review and meta-analysis by Arias et al. confirmed that SFED was effective for 72.1% patients. (95% CI) [11]. In the 2024 update, the results were 63.9% (95% CI) [22]. Remission rates after dietary interventions did not differ significantly between adults and children (67.2% vs 63.3%) [9]. In the meta-analysis by Cotton et al., initial histological and symptomatic response rates were similar for topical corticosteroids and the six-food elimination diet, but the heterogeneity of the study designs precludes direct comparison of the methods [21]. SFED requires sequential reintroduction of eliminated foods with repeat endoscopic biopsies to identify individual triggers, which increases healthcare utilization and patient burden [1]. Balance between efficacy and feasibility has established SFED as a widely adopted first-line dietary strategy.

Four-Food Elimination Diet (FFED)

To reduce dietary restriction, Molina-Infante et al. evaluated a four-food elimination diet excluding milk, wheat, egg, and legumes [14]. In a prospective multicenter study, FFED induced histologic remission in 54% of adult patients [14]. When non-responders escalated to SFED, overall remission increased to approximately 72%, supporting a step-up strategy [14]. The study by Arias et al. [22] also confirmed the effectiveness of this diet in both adults and children. The overall rate of histologic remission was 54.7% (95% CI). This demonstrates the superiority of the SFED without disputing the usefulness of the FFED. This stepwise approach reduces unnecessary food restrictions and minimizes nutritional risk while preserving overall efficacy [14]. Milk remained the most common single trigger.

One-food elimination diet (OFED)

Cow's milk protein has emerged as the single most frequent trigger in both children and adults. In pediatric cohorts, elimination of milk alone has achieved remission in up to 65% of patients [15]. A prospective pediatric study by Kagalwalla et al. showed that milk elimination alone induced histologic remission in a substantial proportion of children with EoE [15]. However, this finding should be interpreted with caution given the small number of children included (n = 12). Furthermore, the systematic review by Mukkada et al. found an improvement in health-related quality of life (HRQoL)[23].

Given its simplicity and relatively low nutritional risk when properly supplemented, milk-only elimination is increasingly considered as an initial strategy, particularly in pediatric populations [1].

Targeted elimination diet (TED)

In the cohort study by Spergel et al. (n = 319), milk, egg, wheat, and soy emerged as the predominant dietary triggers of EoE, while IgE-mediated symptoms (e.g., urticaria and anaphylaxis) occurred in 15% of cases [16]. Combined skin prick tests (SPT) and atopy patch tests (APT) testing showed an average negative predictive value of 92%, but only 44% for milk and a positive predictive value of 44%. Histologic response was 53% with either empiric six-food elimination or test-directed avoidance, increasing to 77% when milk was empirically eliminated in addition to SPT/APT identified foods [16].

Elemental diet

The elemental diet consists exclusively of amino acid based formulas devoid of intact proteins, thereby eliminating all potential antigenic stimulation. The first major demonstration of its efficacy was reported by Kelly et al., who showed clinical and histologic remission in children treated with an elemental diet [9]. In a subsequent prospective pediatric study by Kagalwalla et al., histologic remission was achieved in 96% of children receiving elemental formula therapy [10]. A meta-analysis by Arias et al. reported pooled histologic remission rates exceeding 90% for elemental diets, making it the most effective dietary intervention in EoE [11]. The mechanism underlying this high efficacy is presumed to be complete removal of food antigens that trigger the Th2 inflammatory cascade [8].

Despite its effectiveness, elemental therapy has significant limitations. It is costly, poorly palatable, and often requires nasogastric tube supplementation in children [12]. Long term adherence is difficult, particularly in adults, and psychosocial impact can be substantial [12]. Therefore, while highly effective, elemental diets are typically reserved for refractory cases or young pediatric patients.

Nutritional and Quality-of-Life Outcomes

Dietary therapy carries potential nutritional risks, particularly with prolonged multi-food elimination. Reed et al. highlighted risks of calcium and vitamin D deficiency when milk is excluded [17]. Growth impairment in children with EoE has also been reported, particularly in those undergoing restrictive diets without dietetic supervision [18].

Quality-of-life studies demonstrate that dietary therapy, particularly elemental diets, significantly impacts social functioning and eating-related anxiety [19]. Nonetheless, many patients prefer dietary therapy over chronic corticosteroid exposure [19].

Discussion

Dietary therapy in EoE represents a mechanistically rational approach targeting the antigen-driven nature of the disease. Elemental diets achieve the highest remission rates but are limited by feasibility and tolerability [11]. Empiric elimination strategies, particularly SFED, offer a favorable balance between efficacy and practicality, with remission rates around 70% [13].

The evolution toward step-up strategies reflects efforts to minimize dietary restriction while maintaining overall response rates [14]. Emerging evidence supporting milk-only elimination suggests that simplified strategies may be effective in selected populations [15].

However, dietary therapy requires repeated endoscopy to confirm histologic remission, as symptom improvement does not reliably correlate with histologic resolution [18]. Additionally, long-term adherence can be challenging, and nutritional monitoring is essential [17].

When compared with pharmacologic therapy, such as swallowed topical corticosteroids, dietary therapy avoids drug-related adverse effects but may impose greater lifestyle burden [1]. Shared decision-making is therefore central to selecting optimal treatment strategies.

Conclusions

Dietary therapy is a highly effective treatment modality for eosinophilic esophagitis. Elemental diets achieve remission in more than 90% of patients but are limited by practicality. Empiric elimination diets, particularly the six-food elimination diet, induce remission in approximately 70% of cases and represent a widely adopted first-line strategy. Step-up approaches and milk only elimination offer simplified alternatives with moderate efficacy. Allergy test directed elimination is less effective and not routinely recommended. Successful implementation of dietary therapy requires multidisciplinary care, nutritional monitoring, and individualized treatment planning.

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