

Improving standards in the management of wheat-dependent exercise-induced anaphylaxis



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Wheat-dependent exercise-induced anaphylaxis is a severe food allergy with few guidelines regarding management of this condition. An audit has been carried out to establish best practice for managing a severe wheat allergy, which covers the role of diet, prescriptions and dieticians.

Background

Wheat-dependent exercise-induced anaphylaxis (WDEIA) is a severe food allergy occurring when wheat ingestion is preceded or followed by exercise.¹ This is a subcategory of food-dependent exercise-induced anaphylaxis, characterised by an IgE-mediated hypersensitivity reaction to the protein omega-5 gliadin, which is found in roughly 3–6% of wheat gluten.² The time delay between exercise and onset of symptoms can range from 15 to 60 minutes and the degree of exertion during exercise can also range massively,³ which adds to the complexity of diagnosing this condition (see Figure 1).

Despite a wealth of literature proposing management of the condition, there are no existing guidelines for clinicians to refer to. Adding to this uncertainty, there has been debate surrounding the terminology used to describe this condition. There is contention surrounding its name, since many patients never experience anaphylaxis. Wong *et al.* proposed that an alternative name, such as ‘activity-dependent wheat allergy’, may be more appropriate.⁴

This contention also relates to the broad spectrum of symptoms, with some patients experiencing only mild allergic symptoms and others experiencing full anaphylactic reactions. Despite this ambiguity, the key principles underpinning its management remain clear; complete elimination of wheat from the diet is the most reliable prophylaxis and, as a precautionary measure, adrenaline and antihistamines should be prescribed.

Aims and objectives

This audit process aimed to establish the most important principles for managing WDEIA, drawing on the recommendations within published literature. These principles will form the standards for care against which the performance of departments will be compared. These standards will relate to the pharmacological and dietary management of WDEIA.

This audit also aimed to assess the proportion of omega-5 gliadin specific IgE (sIgE) tests that ultimately resulted in WDEIA diagnosis, to evaluate the frequency of a positive sIgE to omega-5 gliadin. Finally, this audit aimed to compare the correlation

Table 1: Performance of departments against standards extracted from the literature.

Standard	Audit value (n=43)	Re-audit value (n=17)
Pharmacological treatment		
Prescribed adrenaline (with positive sIgE result)	74% (n=32)	71% (n=12)
Prescribed adrenaline (with confirmed WDEIA diagnosis)	84% (n=36)	100% (n=12)
Discussed allergy management plan	100% (n=43)	100% (n=12)
Dietary management		
Given dietary advice by clinician	100% (n=43)	100% (n=12)
Given co-factors advice by clinician	77% (n=33)	100% (n=12)
Offered dietician appointment	77% (n=33)	92% (n=12)
Attended dietician appointment	49% (n=21)	82% (n=11)
Given dietary advice leaflet	–	100% (n=12)
Abbreviations: sIgE: specific IgE; WDEIA: wheat-dependent exercise-induced anaphylaxis.		

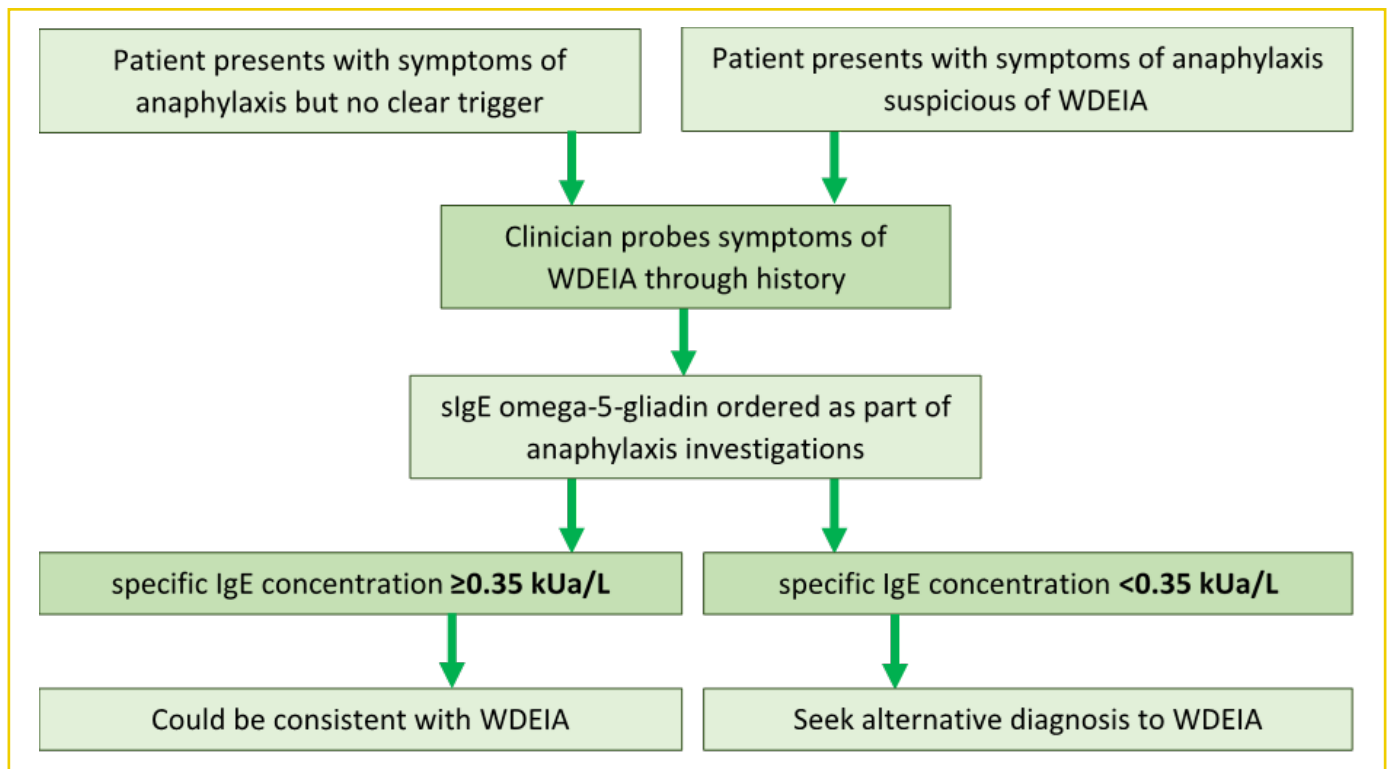


Figure 1: Flow chart of WDEIA diagnosis.

Abbreviations: sIgE: specific IgE; WDEIA: wheat-dependent exercise-induced anaphylaxis.

between sIgE (kUa/L) levels and the probability of a clinical diagnosis of WDEIA.

The first round of this audit identified two key areas for improvement. First, the role of co-factors in triggering anaphylaxis in WDEIA was only discussed with 77% of patients, despite these factors having an important role in developing anaphylaxis. Second, less than half of patients attended their appointment with the dietician, despite the evidence confirming that dietary education and advice are paramount in managing WDEIA (i.e. adhering to a strict wheat-free diet).⁵ The re-audit process aimed to improve these issues.

Standards

Standards were found by cross-referencing the literature to find common themes, which can be split into two categories: pharmacological and dietary management. Pharmacological management included prescription of adrenaline autoinjectors and education about their administration in acute anaphylaxis. This information was contained within the Allergy Management Plan, a protocol for patients to follow during an acute allergic reaction.^{1,2}

Dietary management of the condition is most effective when wheat is completely eliminated from the diet.⁵ The avoidance of co-factors,⁶ such as non-steroidal anti-inflammatory drugs (NSAIDs), concurrent infections and alcohol, can also help to reduce anaphylaxis rates. The literature suggests that patients should receive dietary and co-factor advice from their clinician.

Reference ranges for IgE values were taken from an allergy diagnosis reference guide produced in

East Kent University Hospitals,⁷ and were used to assess whether a higher sIgE concentration correlates to a greater likelihood of WDEIA diagnosis, a common finding in the literature.

Method

Patients were identified retrospectively by accessing sIgE omega-5 gliadin tests performed at the Clinical Immunology and Allergy Department, Royal Victoria Infirmary (RVI), Newcastle-upon-Tyne. Patients were included if they had a positive sIgE result (concentration ≥ 0.35 kUa/L). The initial audit ran from 1 January 2017 to 28 February 2019 and the re-audit ran between 1 March 2019 and 31 August 2020. Information about diagnosis and management was obtained from clinical notes. The care of these patients was assessed against the following standards in the initial audit:

- pharmacological management:
 - was the patient prescribed adrenaline autoinjectors?
 - was the patient given an allergy management plan?
- dietary management:
 - was the patient given dietary advice by their clinician?
 - was the patient given co-factor advice by their treating clinician?
 - was the patient offered an appointment with a dietician, and did they attend this?

Following the results of the first audit, a patient information leaflet was produced as a quality improvement project. This leaflet provided useful information (about diet and co-factors) and acted as an adjunct to the dietician appointment.

Table 2: Proportion of patients in each sIgE category with confirmed WDEIA diagnosis.

Specific IgE concentration kUa/L	Specific IgE category	Initial audit		Re-audit	
		No. of patients in audit (n=187)	No. of confirmed WDEIA diagnoses (n=29)	No. of patients in reaudit (n=123)	No. of confirmed WDEIA diagnoses (n=12)
>100	6 – Strong positive	0	0	0	0
52.5–100	5 – Strong positive	1	1 (100%)	0	0
17.5–52.5	4 – Strong positive	9	8 (89%)	3	2 (67%)
3.5–17.5	3 – Positive	23	16 (70%)	8	6 (75%)
0.70–3.5	2 – Positive	6	4 (67%)	4	2 (50%)
0.35–0.70	1 – Low, weak positive	4	0 (0%)	2	2 (100%)
<0.35	0 – Negative	144	–	106	–

Abbreviations: sIgE: specific IgE; WDEIA: wheat-dependent exercise-induced anaphylaxis.

Therefore, the following standard was introduced for the re-audit:

- dietary management:
 - was the patient sent the patient advice leaflet?

Patients were also stratified into groups according to their sIgE concentration. The ranges used were >100, 52.5–100, 17.5–52.5, 3.5–17.5, 0.70–3.5, 0.35–0.70 and <0.35 kUa/L (Table 2).

Results

Descriptive statistics

During the initial audit period, 43 patients were identified (13 females and 30 males) with a positive sIgE omega-5 gliadin test. The age range of this cohort was from 3 to 78 years, with a mean average age of 42 years at time of diagnosis. During the re-audit period, 12 patients were identified (four females and eight males) with a positive sIgE omega-5 gliadin test, with an age range from 29 to 68 years and mean average age of 48 years at the time of diagnosis.

How did the department perform?

The department performed consistently well in discussing allergy management plans with patients in both the initial audit and re-audit (Table 1). Patients with a diagnosis of WDEIA who were not prescribed adrenaline were deemed to have only mild symptoms and therefore did not need this treatment.

Eight patients in the initial audit and five patients in the re-audit had a positive sIgE to omega-5 gliadin, but were not diagnosed with WDEIA – they were deemed to have allergic symptoms of unclear aetiology, potentially associated with a gluten allergy.

How successful were the quality improvement measures?

The initial audit identified two areas for improvement: discussing dietician referral and provision

of advice about co-factor avoidance. A common reason cited in the notes of patients not referred to the dietician was that they were already competently eliminating wheat from their diet. Despite this, these patients may still benefit from seeing a dietician to ensure they are not avoiding other foods unnecessarily.

The proportion of patients offered dietician appointments increased over the re-audit period (77% vs 92%) and the proportion of patients attending their appointment with the dietician also increased (49% vs 82%). This demonstrated a positive trend towards increasing dietician attendance. A possible explanation is that during the pandemic, appointments were held remotely over the phone, making appointments easier to attend. The patient information leaflet was created as an adjunct to dietician appointments, but would also be especially useful for those who did not have a dietician review. 100% of patients with diagnosed WDEIA received the leaflet, which provides clear information on the role of diet and co-factors in managing the condition.

Did sIgE concentration correlate with likelihood of WDEIA diagnosis?

This audit found that the higher the concentration of sIgE to omega-5 gliadin, the greater the proportion of patients with a final diagnosis of WDEIA (Table 2). This is in concordance with the literature,⁸ and reaffirms the utility of sIgE testing in diagnosing this condition. The re-audit did not observe the same trend, which may be owing to the reduced sample size in the re-audit.

What proportion of all sIgE tests resulted in WDEIA diagnosis?

The RVI immunology laboratory tested a total of 187 samples for sIgE omega-5 gliadin during the initial audit and 123 samples in the re-audit. There were 43 confirmed diagnoses of WDEIA (23% positive results) in the initial audit, and 12 confirmed diagnoses of WDEIA (9.8% positive results) in the

re-audit. Both of these results are a relatively high detection rate given the prevalence of the condition. The lower detection rate in the re-audit could be owing to increased testing rates associated with greater awareness of the condition.

Conclusion and recommendations

Our findings suggest that the current management of WDEIA patients within the department compares well with internationally published standards.^{2,5} An information leaflet has been developed and distributed to patients to improve co-factor and dietary advice provided to patients during the consultation. Additionally, a greater proportion of patients attended dietician appointments during the re-audit period, which may be explained by the switch to tele-consultations in 2020, making virtual attendance much easier. Both the dietary advice leaflet and increased attendance at dietician appointments helped improve patient understanding of the role of diet and co-factors in their condition, which is important as this is the primary modality of prophylaxis against allergic reactions. We recommend continuing to distribute WDEIA dietary advice leaflets to patients, and maintaining the option of tele-health dietician appointments to maintain a high attendance rate.

Action plan

1. Distribute WDEIA patient information leaflet to all patients with a confirmed diagnosis.
2. Continue to offer virtual dietician appointments to maintain high attendance rates.
3. Re-audit department performance in 24 months.

Recognition

The authors of this article thank Dr Gavin Spickett at the Clinical Immunology and Allergy Department, Royal Victoria Infirmary, Newcastle-Upon-Tyne, for his contribution to the content.

References available on our website.

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