

CASE REPORT

# Rhinitis and Sinusitis Improvement after Nutraceuticals and a Milk-Free Diet

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## **ABSTRACT**

### **OBJECTIVE**

To describe a patient with recurrent upper respiratory tract infection successfully prevented by nutraceuticals and a milk-free diet.

### **CASE DESCRIPTION**

A 26-years-old female patient with a past medical history of allergic rhinitis, with several episodes of sinusitis (more than 4 per year) and chronic fatigue for at least 4 years. She received antibiotics and antihistamine drugs, without improvement. Her white blood count was low in 2,560/mm<sup>3</sup> (low neutrophils 512/mm<sup>3</sup> lymphocytes 1526/mm<sup>3</sup>), 25-OH-vitamin d 29, cortisol 13.1 mcg/dL; the other laboratory tests were normal. A supplement formula was prescribed and included methylcobalamin, vitamin C, zinc, vitamin D, and Rhodiola rosea. We also suggested a milk-free diet that she followed. After 1 month, she returned asymptomatic, without new rhinitis or sinusitis episodes, feeling better, and white blood cell increased to 3,300/mm<sup>3</sup> and normalization of vitamin D, improvement of vitamin B12 and cortisol. Currently, two years after, the patient is asymptomatic, without fatigue; she had no new episode of rhinitis or sinusitis.

### **CONCLUSION**

This case illustrates an interesting case of a patient with rhinitis and sinusitis successfully treated with a milk-free diet and supplement use. It may be an alternative therapeutic option for these patients.

### **KEYWORDS**

Rhinitis; Sinusitis; Respiratory tract infection; Immunity; Immunodeficiency; Vitamin D; Supplements; Nutraceuticals

## **INTRODUCTION**

Rhinitis and sinusitis are prevalent upper respiratory tract disorders and reach 20% to 40% of the adult population. It is not considered life-threatening, but it has a significant impact on quality of life, work performance, poor cognitive performance, and rising healthcare costs. Symptoms of rhinitis and sinusitis include sneezing, rhinorrhoea, nasal congestion, and nasal pruritus [1,2].

The most popular food allergens guilty of allergic diseases along with infants and young children are milk proteins. The incidence of diagnosed milk allergy goes between 2% and 7% in western societies. It can be solved by introducing formulas constructed on extensively hydrolyzed proteins and soy products [2,3]. Milk allergy is identified established on generally accepted standards: The occurrence of allergy symptoms, high serum-specific immunoglobulin E, positive skin-prick test, and positive results of open oral milk challenge test [1-3].

However, the conservative treatment involves using anti-histaminic drugs and antibiotics with a high recurrence rate [1]. Furthermore, side effects are common following these therapeutics which have a propensity to be palliative. Health supplements may be used to supplement the person's diet; they include vitamins and probiotics.

Vitamin D deficiency is standard worldwide and maybe an essential conservation risk factor in developing allergic disease. In addition, studies have found an association between low serum vitamin D levels and the incidence of allergic disorders [1].

The finding that many cells express vitamin D receptors shows that this insufficiency can potentially regulate the function of the innate and adaptive immune systems [1,2]. Appropriate nutrition is vital for acquiring peak bone mass in childhood and adolescence when growth is intensive. Sufficient calcium and vitamin D intake is essential for children, especially those with deficiencies attributable to milk allergy [1-3].

New modalities of treatment are therefore desired. In this line, low-risk treatments such as a non-milk diet have shown efficacy in the clinical practice for rhinitis/sinusitis patients. In addition, the inclusion of several supplements in the diary routine of these subjects suffering these disorders is wished. In this line, a recent systematic review of the health supplements was performed and reviewed many of these complementary substances in rhinitis [1,2].

Many studies have been developed analysing the effect of honey on health, especially on respiratory symptoms. The beneficial effects of honey on human health have long been recognized. The nutritional composition is affected by several factors such as floral source, geographical location, and season. Although, there is no significant improvement of this supplement to reduce the incidence of rhinitis and sinusitis. There is only contradictory evidence regarding its use for the treatment of allergic rhinitis [4].

Today, some evidence from basic science studies indicates that vitamin E may reduce allergic immune responses. Therefore, vitamin E supplementation is generally used in clinical practice to prevent and treat different conditions. But only a few clinical studies of the effect of vitamin E on allergic conditions [1,4,5].

On the other hand, Zinc supplementation has a logical supplement in patients with respiratory symptoms. For example, patients with upper respiratory tract infections can expect a shorter duration of symptoms by taking high doses of vitamin C (2 gram) associated with zinc supplements [6,7].

Regarding vitamin C, epidemiological studies have shown that increased intake of vitamin C is associated with fewer rhinitis symptoms in children. In addition, it demonstrated that high doses of intravenous vitamin C had positive clinical benefits for patients with both acute and chronic allergic rhinitis [6].

The purpose of this article is to report the case of a patient with rhinitis and sinusitis and was successfully treated with supplements and a non-milk diet. As a result, no more episodes of these respiratory tract disorders were observed.

### **CASE REPORT**

A 26-years-old female patient with a past medical history of allergic rhinitis, with several episodes of sinusitis (more than 4 per year) and chronic fatigue for at least 4 years. She received antibiotics and antihistamine drugs, without improvement. She denied any other disease.

Her physical examination was unmarked, white blood count was low in  $2,560/\text{mm}^3$  (low neutrophils  $512/\text{mm}^3$  lymphocytes  $1526/\text{mm}^3$ ), negative HIV 1 and 2 and syphilis serologies, IgG1 9801 mg/L [normal range (nr): 4,050 mg/L - 10,110 mg/L], IgG2 2650 mg/L (1,690 mg/L - 7860mg/L), IgG3 413mg/L (nr: 110 mg/L - 850mg/L) and IgG4 1820 mg/L (nr: 30 mg/L - 2010mg/L), IgM 217 mg/dL (nr: 40 mg/L - 230mg/dL) , IgA 285 mg/dL (nr: 70 mg/L - 400 mg/dL), IgE 143 mg/dL (nr <100 mg/dL), CD4  $684/\text{mm}^3$  (nr:  $456/\text{mm}^3$  -  $1492/\text{mm}^3$ ) and CD8  $319/\text{mm}^3$  (nr:  $272/\text{mm}^3$  -  $1144/\text{mm}^3$ ), CH50- 172 U, C3 113 mg/dL and C4 22mg/dL, 25-OH-vitamin d 29, cortisol 13.1 mcg/dL, vitamin B12 461 pg/mL, C-reactive protein <0.03 mg/L; antinuclear antibodies, rheumatoid factor, IgA and IgG anti-gliadin, anti-endomysium and anti-tissue transglutaminase were all negative.

A supplement formula was prescribed and included methylcobalamin 1000 mcg, vitamin C 500 mg, zinc 40 mg, vitamin D 10,000IU and Rhodiola rosea 400 mg (due to fatigue) per day. We also suggested a milk-free diet that she followed. After 1 month, she returned asymptomatic, without new episodes of rhinitis or sinusitis, and feeling better, and white blood cell increased to  $3,300/\text{mm}^3$  (neutrophils  $1,152/\text{mm}^3$ , lymphocytes  $1,494/\text{mm}^3$ ), cortisol augmented to 17.76, vitamin B12 to 601 pg/mL, and 25OHD to 49.4 ng/mL.

Currently, two years later, the patient is asymptomatic, without fatigue, cycling 3 times per week; she had no new episode of rhinitis or sinusitis, using the same supplements (methylcobalamin 200 mcg/day). She said that it is the best time for her health ever.

### **DISCUSSION**

This is a report of a patient who suffered rhinitis and episodes of sinusitis and was successfully treated with a combination of some nutraceuticals and a milk-free diet.

A blend of strategies was used in our patient. Indeed, we supplemented the patient with vitamin d and vitamin C since her serum levels of vitamin D were low, and there is evidence in the literature about these deficiencies. Furthermore, the use of vitamin D in rhinitis was already studied. Its efficacy was supported by studies like

Jerzyńska et al. [2] performed a randomized clinical trial of a 5 months vitamin D supplementation in children with grass pollen-related allergic rhinitis [1].

Jerzyńska et al. [2] observed that allergy sufferers tend to produce an assortment of reactive oxygen species (ROS) from the cells lining the airways, resulting in a weakened antioxidant defence mechanism and inflammatory changes of the nasal mucosa it includes increased vascular permeability. In addition, studies have shown that increased intake of vitamin C is linked with fewer symptoms in children.

Reactive oxygen species (ROS) perform an essential role in biological function. Initially, the production of ROS was viewed as uncritical and random and their targets as primary factors of disease [3]. Finally, though, research demonstrated that the ROS generation is a physiologic process. Moreover, when in the correct amounts, these ROS are highly beneficial for the organism and are critical for cell homeostasis [2,3].

The authors observed a significant improvement in symptoms and a reduction of the need for ‘rescue’ medication, as well as an immune-modulating effect. Moreover, another study using a high dose of vitamin D given orally has been demonstrated to enhance symptomatic relief in asthma and allergic rhinitis patients undergoing pollen-specific immunotherapy [3]. Furthermore, the RCT by Malik et al. [4] showed that allergic rhinitis sufferers deficient in vitamin D receive supplementation has a significant improvement in nasal symptoms.

Regarding vitamin C, epidemiological studies have shown that increased intake of vitamin C is associated with fewer rhinitis symptoms in children [5]. In addition, Vollbracht et al. [6] demonstrated that high doses of intravenous vitamin C had positive clinical benefits for patients with both acute and chronic allergic rhinitis.

Zinc supplementation has a logical supplement in rhinitis patients. Patients with upper respiratory tract infections can expect a shorter duration of symptoms by taking high doses of vitamin C (2 gram) associated with zinc supplements [7]. In addition, a review article stated that zinc supplementation taken every 2 hours while awake within 24 hours to 48 hours of the onset of symptoms might reduce the severity and duration of the cold disease [8,9].

Podoshin et al. [10] demonstrated that two-weeks use of nasal applications of ascorbic acid reduces nasal edema, mucous secretions, and nasal obstruction. However, Vollbracht et al. [11] showed that high doses of intravenous vitamin C had positive clinical results advances for patients with acute and chronic allergic rhinitis.

Related to *Rhodiola rosea* use for fatigue as used by our patient, a study evaluated 200 mg twice a day for 8 weeks; the patients noted an improvement immediately after 1 week of onset of this phytotherapeutic agent fatigue symptoms continued to decline further significantly [12]. Furthermore, *Rhodiola rosea* is also an immunostimulating action evidenced by several experimental and in vitro studies, including immune enhancement improvement in the cancer field [13-15].

Vitamin D deficiency is common worldwide and maybe an essential conservation risk factor in developing allergic disease. Studies have found an association between low serum vitamin D levels and the incidence of allergic disorders [16]. Vitamin D exists in two primary forms: ergocalciferol (vitamin D2) and cholecalciferol (vitamin D3). It employs its immunomodulatory effects over vitamin D receptors which are observed on various immune

cells such as B and T cells, dendrites, and macrophages, thereby influencing the allergy-related inflammatory response [16].

Sadeghi et al. [17] have shown that vitamin D inhibits the manifestation of TLR (Toll-like receptor) on monocytes, inhibits pro-inflammatory cytokine creation, and induces antimicrobial peptide synthesis. It also impacts the adaptive immune system, particularly altering T-cell stimulation and antigen-presenting cell's function. It has been associated with reducing Th1 cytokine excretion and inhibition of T cells production [18,19]. The association of vitamin D and Th2 cells is less clear and contradictory, with a report of both increased and decreased expression of the Th-2 cytokines IL-4, IL-5, and IL-10 in adult peripheral blood cell cultures [17-19].

Immunoglobulin E (IgE) has a central role in type I hypersensitivity, which clinically manifests in an assortment of allergic diseases such as atopic dermatitis, asthma, allergic rhinitis, allergic conjunctivitis, food allergies, and specific types of urticaria [20,21].

Zinc (Zn) is an essential and essential element that performs roles in the immune system, from providing to the skin barrier to gene regulation in lymphocytes [20]. However, Zn deficiency affects about 2.2 billion people around the world. Zn deficiency is clinically manifested as alopecia, acrodermatitis enteropathica, diarrhea, emotional disorders, weight loss, dysfunction of cell-mediated immunity, and neurological disorders [20,21].

There have been a few reports about the benefits of Zn supplements in managing allergic diseases. These articles showed that Zn supplementation for 8 weeks resulted in a significant increase in Zn levels in hair, and significant reductions in eczema area severity index, transepidermal water loss when compared to healthy control subjects [20-23], but the exact role of Zn in allergic diseases remains unclear [20].

Within the chaotic study of food allergies, the allergy to cow's milk is widely studied because it presents variable symptoms and a significant incidence. However, its study is hampered because, in clinical practice, researchers are often divided into unbelievers, who underestimate symptoms, or those who overestimate, which can lead children to use unnecessary diets and deprivations, with serious nutritional and psychological consequences.

The first antigens children have contact with are cow milk allergens, and the symptoms may be associated with the respiratory tract, gastrointestinal tract, and skin [24]. The prevalence of food allergies (FAs) and especially cow's milk allergy (CMA) has increased in recent decades, and CMA is classified as a reproducible adverse reaction to milk protein, normally casein or serum  $\beta$ -lactoglobulin. IgE-mediated reactions are the most common. On the other hand, non-IgE mediated reactions can arise from other cellular processes involving eosinophils or T-cells. The primary milk allergens are soluble proteins, named whey proteins, which represent approximately 20% of total proteins [24].

Non-milk diet is an additional tool to be used in rhinitis commonly used in clinical practice. Studies show that children with persistent milk allergy frequently develop eczema, asthma, and rhinitis [24]. The growth of cow's milk allergy possibly involves genetic factors and environmental exposure. Maturity develops with age and is manifested by antigen processing ability [24,25]. In 1995, Host et al. [25] indicated that the difference between the date of the first exposure to cow's milk and the onset of symptoms, in most cases, is less than a week.

Host et al. [25] and Lovegroove et al. [26] are unanimous in affirming the critical role of breast milk in preventing atopic diseases and, in particular, cow's milk allergy. Esteban, in 1992, reported groups of children with an allergy to cow's milk, which, introduced before the first month of life, caused the development of the symptomatology of this allergy [24].

Despite the type I immunological reaction already described, they are not often related to respiratory symptoms in the literature; in the study by Carvalho (2001), 17 children with respiratory tract involvement, exposed to ingestion of cow's milk after 6 weeks of deprivation of this food, were retrospectively evaluated. The children who underwent re-exposure had the most respiratory condition, especially in the first hour after provocation in a hospital environment [24].

Upper or lower respiratory symptoms have been defeated as a result of various food challenges. In minutes or up to two hours, food allergens are appropriate to induce a diverse range of symptoms, from typical allergic rhinoconjunctivitis, wheezing to spirometric changes with a drop in forced vital capacity and forced expiratory volume during placebo-controlled double-blind challenge [24,25].

In one year of evaluation, James et al. (1994) [27] described 320 patients with atopic dermatitis, 2/3 with food allergies. Half had asthma or rhinitis as symptomatology, and 59% developed symptoms during closed and double-blind provocation [26]. These symptoms included nasal congestion, rhinorrhea, nasal itching, and nasal obstruction, in addition to coughing and dysphonia. Involvement of the lower airways determined the appearance of dyspnea, dry cough, and wheezing in 17% of the children [27].

In our patient, a rapid improvement of leucopenia was observed in one month after vitamin B12 supplementation. It is classical pernicious anemia. However, our patient's levels of vitamin B12 were more significant than 300 pg/mL, and no macrocytosis was seen. An alternative explanation may be that the other supplements might play a role in increase leucocytes.

In another case, evidence from basic science studies indicates that vitamin E may reduce allergic immune responses. Therefore, vitamin E supplementation is generally used in clinical practice to prevent and treat different conditions. However, only a few clinical studies of the effect of vitamin E on allergic conditions have been performed in patients with atopic dermatitis and asthma, and we did not find any performed in patients with allergic rhinitis [28].

Shahar et al. [28] analyzed in a double-blind, placebo-controlled, 112 patients with documented hay fever received either vitamin E (800 mg/d) or placebo in addition to their regular antiallergic treatment during the pollen season. They made patients recorded their daily nasal and eye symptoms and their daily need for other medications to control allergic symptoms. Even Though no effect was observed on ocular symptoms, nasal symptom scores were lower in patients who received vitamin E supplementation during the hay fever season. However, there was no reduction in the percentage of days with severe symptoms, or those medications were used to control allergic symptoms during the pollen season [28].

The beneficial effects of honey on human health have long been recognized. It has been used as a medicine since ancient times and remains a popular food worldwide, and many of those positive effects have been studied to

elucidate its mode of action [28,29]. The nutritional composition is affected by several factors such as floral source, geographical location, and season; however, its main constituents include sugars, vitamins, minerals, amino acids, proteins, enzymes, organic acids, volatile substances, and polyphenols. Honey's many health properties include antioxidant, anti-inflammatory, and immune-modulating effects [29]; however, there is contradictory evidence regarding its use for treating allergic rhinitis [29].

Many studies have been developed analyzing the effect of honey on health, especially on respiratory symptoms. For example, Rajan et al. indifferent that consuming a tablespoon of any unpasteurized or daily pasteurized honey was not beneficial in reducing nasal symptoms [30,31]. In contrast, more recently, Asha'ari et al. demonstrated that honey further improves symptoms of allergic rhinitis when used as an adjunct to loratadine instead of antihistamine alone [32]. Furthermore, Saarinen et al.'s allergy that consumed honey containing birch pollen before the pollen season had positive changes, namely a significant improvement of symptoms and reduction in the use of antihistamines [33].

Not Long Ago, nutritional involvements with probiotics have been investigated for their beneficial effects on allergic disorders [34]. Commercially available probiotics are sold worldwide and usually contain more beneficial bacterial genera, such as Lactobacillus or Bifidobacteria [34]. The WHO defines probiotics as 'living micro-organisms that confer a health benefit to the host when administered in adequate amounts. Various types of probiotics have been studied as a treatment for allergic rhinitis and will be considered according to bacterial genus [34].

## **CONCLUSION**

Health supplements are commonly available in health shops and pharmacies and are typically brought to market without studies. Although dietary supplements are generally considered safe, they have potential risks when misused because they can exert a physiological and pharmacological effect. As a result, there is a growing tendency to self-medicate with these products, occasionally seeking advice from someone qualified.

Future randomized and controlled studies using vitamin D, vitamin c, zinc, and *Rhodiola rosea*, and other potential agents are desired to confirm the efficacy and quick response observed in the patient.

The decision to use health supplements in allergic rhinitis should involve a process between the health provider and patient due to a rarity of good quality trials and recommendations. In addition, this decision has to involve efficacy, safety, and cost.

In conclusion, the present case used some nutraceuticals and changed her diet suppressing milk to those patients who suffer from chronic rhinitis and sinusitis.

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### ***Author Contributions***

JFC: Conception, analysis, writing, interpretation, revision, submission

### **ETHICAL STATEMENT**

The author declares that he followed the World Medical Association Declaration of Helsinki in this study. Informed consent was obtained from the patient for publication of her case. No image of her is used.

### ***Data and Material Availability***

All data from this manuscript is available at requesting.

### ***Conflict of Interest***

None

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