LATEST FINDINGS IN PRIMARY PREVENTION OF ATOPIC DERMATITIS IN CHILDREN

ULTIMELE NOUTĂȚI ÎN PREVENȚIA PRIMARĂ A DERMATITEI ATOPICE LA COPII

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Abstract

Keywords:

atopic dermatitis,
trigger factors,
prophylactic measures

Atopic dermatitis is the most common inflammatory skin disease in children with an increased prevalence and a significant burden on the healthcare system.
Lately, attention has been directed towards prevention methods and ways of reducing the severity of atopic dermatitis . An increased benefit was observed controlling the factors that can influence the evolution of AD and among them the most important are: diversity of the microbiota, increased fish intake, use of emollients and proactive long-term continuous topical anti-inflammatory therapy.
This article is a review of the most recent findings from the literature on factors that are thought to affect the course of atopic dermatitis.

Rezumat

Cuvinte-cheie:

dermatită atopică,
factori declanşatori,
măsuri de profilaxie

Dermatita atopică este una dintre cele mai comune boli cutanate la copii, având o incidență crescută şi reprezentând o povară asupra sistemului de sănătate.
În ultimul timp, atenția s-a îndreptat tot mai mult asupra mijloacelor de prevenire şi reducere a severității bolii. S-a observat un beneficiu crescut prin controlarea unor factori ce pot influența evoluția bolii, iar printre aceştia se pot enumera: flora intestinală microbiană, consumul crescut de peşte, folosirea emolientelor cutanate şi a terapiei antiinflamatorii proactive pe termen lung.
Acest articol este o punere la punct a celor mai recente descoperiri din literatură privind factorii care se crede că ar afecta debutul sau evoluția dermatitei atopice.

Cite this article:
Laura Daniela Vasile, Mihaela Zait, Roxana Silvia Bumbacea. Latest findings in primary prevention of atopic dermatitis in children. RoJCED 2015; 1(1):28-31

Atopic dermatitis is the most common inflammatory skin disease in children. Patients' quality of life is significantly impaired both through its symptoms and through complications, like infections. Because its increasing prevalence and the significant burden it poses on the healthcare system there is a clear need for methods of disease prevention [1]. As the understanding of the complexity of the disease has grown, attention has been focused on ways of reducing the incidence or severity of atopic dermatitis [2]. In this short review we present some of the latest findings in literature on factors that are thought to somehow affect the course of atopic dermatitis.

MATERNAL AND INFANT NUTRITION

Nutrition is one of the many factors affecting atopic dermatitis development. In this context it has been proposed that maternal diet during pregnancy can affect the immune response of the fetus making it more predisposed to childhood allergy. A German prospective birth cohort study (LISA) showed a positive association between high maternal intake of margarine and vegetable oil during pregnancy and childhood eczema [3]. However a recent Cochrane review concluded that a strict maternal diet of antigen avoidance was no better than a standard diet in the prevention of childhood eczema [4].

Although the World Health Organization has recommended exclusive breastfeeding for at least 6 months [5], there is little, if no evidence that breastfeeding for more than 3 or 4 months has an effect on atopic dermatitis development [5-7].

Recent studies showed that delayed introduction of solid foods in the infants alimentation was associated with a higher risk of developing atopic dermatitis [6,8-10].Even more food allergies seem to be associated with a delayed introduction of allergenic foods in the diet [11]. The German Infant Nutritional Intervention Study showed that children who have been fed with extensively hydrolyzed casein formulas or with partially hydrolyzed whey formulas had an important risk reduction of developing atopic dermatitis up to age 10 [12,13].

DIETARY SUPPLEMENTS

A number of studies showed that a high fish intake during pregnancy or infancy lowers the risk of the offspring developing atopic dermatitis [14,15]. This effects have been attributed to the anti-inflammatory n-3 polyunsaturated acids (n-3 PUFA). Case studies showed that people who suffer from atopic dermatitis have a increased level of linoleic acid in their blood and lower levels of n-3 PUFA [16]. Accordingly to this discoveries fish oil supplementation has been tried, but it did not show a protective effect on atopic dermatitis development (although it increased the levels of n-3 PUFA in the serum) [16, 17].

A number of recent reports suggested that vitamin D plays an important role in the pathogenesis of several diseases, including atopic dermatitis. It appears to enhance the expression of antibacterial peptides, thus preventing skin infections [18]. Unfortunately there is insufficient evidence to demonstrate that vitamin D supplementation can reduce the risk of developing atopic dermatitis [19-22]. The same thing can be said about a number of other supplements, including vitamin E, vitamin C, pyridoxine, zinc and selenium [21].

MICROBIOTA, PRE AND PROBIOTICS

The microbiota (or microflora) of the gut is another subject that has been extensively investigated in relation with the development of atopic dermatitis. An association between the low diversity of the microbiota and development of atopic dermatitis has been shown, especially in high risk children [23]. Furthermore, children who develop atopic dermatitis have an increased staphylococcus aureus and coliforms, and less lactobacilli and bifidobacteria in their early gut microflora [24-26].

Probiotics are supplements or food products that contain microorganisms in a number that can alter the microflora of the patient in order to obtain a beneficial health effect. Prebiotics are a nondigestible food ingredient that benefits the host by selectively stimulating the favorable growth and/or activity of one or more indigenous bacteria [27].

A big number of probiotics (especially strains of lacto - and bifidobacteria) have been studied, used together, or individually during pregnancy and early life and have shown a relative risk reduction for atopic dermatitis development [28], but this findings are difficult to replicate due to the heterogeneity in methodology. The same risk reduction was demonstrated by a recent Cochrane review and meta-analysis of four studies using prebiotics in the postnatal period [29].

Further research is needed before validating the use of pre- and probiotics as an effective means in the prevention of atopic dermatitis [30].

PHYSICAL FACTORS

Environment plays an important part in the etiology of atopic eczema and the exposure to hard water may increase the risk of eczema [31]. In a cross-sectional study about the effect of water hardness on 358 children aged 5-6 years, practicing swimming was linearly associated to the prevalence of eczema whereas the relationship of eczema with infant swimming was not linear [32]. According to studies carried out among elementary-school children in Japan, as well as in the United Kingdom and Spain, water hardness may be involved in increasing the risk of atopic dermatitis. Softened Water Eczema Trial (SWET), could not recommend the water softener as a routine use because there was no significant benefit in addition to normal AD treatment after 12 weeks of study. However these cannot exclude the fact that water hardness might play a role in the initiation of eczematous skin inflammation in early life [33].

SKIN BARRIER DYSFUNCTION

Filaggrin is an important component of the granular cell layer of the epidermis, leading to formation of the stratum corneum and it is known that FLG mutation carriers had more than four times higher risk of developing eczema by 3 months of age compared with children without FLG mutations. However, it is currently unclear whether skin barrier impairment and the increase of transepidermal water loss (TEWL) precedes eczema in FLG mutation carriers, or whether it is an epiphenomenon of disease activity [34].

On this basis a Barrier Enhancement for Eczema Prevention (BEEP) pilot study tries to demonstrate the usefulness in primary prevention by using emollients and avoiding alkaline soaps, bubble baths and shampoos from an early age in children with signs of skin barrier impairment. If this is true, enhancing the skin barrier function in babies born from parents with allergic disease by limiting the assault of skin cleansers coupled with liberal use of emollients could prevent the development of atopic dermatitis [35].

Latest research findings support the concept that identifying a combination of general disease features together with specific trigger factors in the individual patients might be helpful for preventing and treating the disease. To improve the skin barrier function it is working on new enhancing topical and systemic preparations to upregulate FLG expression in the epidermis [36].

ROLE OF MICROORGANISM AND ALLERGIC SENSITIZATION

There is a close connection between AD severity and allergic sensitization like food and respiratory allergies but IgE sensitization provided no predictive value when used as part of the diagnostic criteria for AD [37].

A majority of AD patiens develops bacterial colonization predominantly with Staphylococcus aureus witch secretes toxins with superantigenic properties leading to inflammation of the skin and causing secondary infection in atopic eczema, but it is unclear if antimicrobial products are useful outside of the context of clinical infection or if they promote bacterial resistance [38]. According to a study made on mice, parasitic infection inhibits AD-like skin lesions and the number of NK cells in the skin increased after malarial infection in a mouse model of AD but it is still unclear whether parasitic infections can suppress AD, and if so, it is important to investigate the actual mechanism. This understanding of the 'hygiene hypothesis' will open a new era of AD research [39].

Considering the important role of inflammation in the skin barrier breakdown, a more efficient control of the disease might help to prevent AD chronicity and severity and even prevent the development of the atopic march [40,41]. Proactive long-term continuous topical anti-inflammatory therapy, twice weekly application of topical cortisone or calcineurin inhibitors, has been indicated to prevent AD flares [42].

HOUSE DUST MITE INFLUENCE

Although eczematous lesions are the consequence of skin inflammation which is produced by lymphocytes and not by an immediate IgE mediated response, an increased percentage of patients with AD shows sensitivity to mites and exposure to them may exacerbate atopic dermatitis [43]. As it is known house dust mites produce proteins with proteolytic activity on the skin that contributes to delayed barrier recovery and barrier impairment in patients with AD [44]. Experimental cutaneous house dust mite (HDM) exposure by inhalation of house dust mite allergen and atopy patch test can provoke eczematous skin lesions and induce AD flares [45]. However the early use of mite-impermeable mattress covers has not been demonstrated to reduce the risk of eczema or allergic sensitization and is successful only in reducing exposure to Der. f1 [46]. Prospective birth cohort study (PIAMA) that included children with allergic mothers who have received the mite-allergen-impermeable matress covers at birth showed a paradoxical result with a higher frequency of AD in people who received the mattress than in those who did not. The result may be influenced by other factors like the increased sweating because of the active (polyester-cotton) mattress covers but further studies are needed [46]. Currently there is no evidence to support routine use of HDM-proof bed covers for AD [47].

CONCLUSIONS

There is no general consensus at this moment regarding the influence of certain factors in evolution or prevention of childhood eczema.

Latest findings in literature recognize factors like low diversity of the microbiota to have a negative influence in disease evolution and a positive influence is due to delaying solid food introduction and increased fish intake. Vitamin D plays an important role in preventing skin infections but there is insufficient evidence regarding its influence in reducing the risk of developing atopic dermatitis.

In children with atopic dermatitis enhancing the skin barrier function by using emollients has a positive effect but additional measures such as using HDM-proof bed covers in children with allergic mothers or water softener is not indicated for prophylactic use .

An increased benefit was observed in proactive long-term continuous topical anti-inflammatory therapy, twice weekly application of topical cortisone or calcineurin inhibitors, and has been indicated to prevent AD flares.

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