RISK FACTORS OF ATOPIC DERMATITIS IN CHILDREN AND THE MEANS FOR INDIVIDUAL PROGNOSIS

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Despite considerable progress in prevention and treatment of atopic dermatitis made in recent years, the issue remains topical, since in recent decades a significant increase in the prevalence of atopic disorders is observed all over the world. The increased incidence of atopic dermatitis results from the human body exposure to the wide range of factors, as well as from the factors' specificity and mutual activation. Atopic dermatitis is a multifactorial disorder associated with genetic predisposition to atopy, realized under the influence of environmental factors. The risk factors of pediatric atopic dermatitis are divided into endogenous and exogenous factors, which are also affected by genetic susceptibility. It is worth paying attention to the fact that the factors are enhanced by triggers, which both directly and indirectly influence the body in children and adolescents. A combination of multiple factors plays a key role in chronic pediatric atopic dermatitis. Also do not forget about the impact of sanitation, hygiene, environmental factors, urbanization of the area of residence, and the presence of industrial enterprises in the residential area on the health of children and adolescents. Atopic dermatitis has a negative impact on the quality of life of children and their families. There is a clear need for further research. Currently, monitoring the effects of atopic dermatitis becomes relevant, it is aimed at addressing the issues of prevention. For its part, timely identification of the risk factors and concomitant disorders are of inestimable value for the course of the disorder.

Keywords: hygiene, children and adolescents, atopic dermatitis, genetic factors, prognosis

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ФАКТОРЫ РИСКА ВОЗНИКНОВЕНИЯ АТОПИЧЕСКОГО ДЕРМАТИТА У ДЕТЕЙ И ПУТИ ПЕРСОНАЛЬНОГО ПРОГНОЗИРОВАНИЯ

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Несмотря на значительный прогресс, достигнутый за последние годы в профилактике и лечении атопического дерматита, эта проблема не утратила своей злободневности, так как во всем мире в последние десятилетия отмечается значительный рост атопических заболеваний. Увеличение заболеваемости атопическим дерматитом вызвано воздействием обширного комплекса факторов на организм человека, их спецификой и взаимоактивацией. Атопический дерматит относится к многофакторной патологии с наследственной предрасположенностью к атопии, осуществляемой под влиянием факторов внешней среды. Факторы риска развития атопического дерматита у детей подразделяют на эндогенные и экзогенные факторы, на которые также влияет генетическая предрасположенность. Стоит обратить внимание на то что факторы усугубляются действием триггеров, которые как на прямую, так и косвенно воздействуют на детский и подростковый организм. При течении хронического атопического дерматита у детей ключевую роль играет совокупность множества факторов. Не стоит забывать о влиянии санитарно-гигиенических и экологических факторов на состояние здоровья детей и подростков, урбанизации местности их проживания и промышленных предприятий на ней локализованных. Атопический дерматит негативно влияет на качество жизни пациентов и их семей, существует явная необходимость проведения дальнейших исследований. На сегодняшний день мониторирование воздействия атопического дерматита приобретает значимость и направлено на решение вопросов профилактической направленности. В свою очередь, своевременное выявление факторов риска его развития, а также сопутствующей патологии имеет неоценимо важное значение в течении данной патологии.

Ключевые слова: гигиена, дети и подростки, атопический дерматит, наследственность, прогнозирование

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In recent decades, atopic dermatitis has been classified as a socially significant disease, the so-called "disease of civilization" [1, 2, 3]. Risk factors, directly related to lifestyle and habitat, play a vital part in the atopic dermatitis development and progression [4, 5, 6].

Atopic dermatitis is a multifactorial disorder associated with genetic predisposition to atopy, realized under the influence of environmental factors [7, 8, 9, 10].

Children have some risk factors for atopic dermatitis, which are divided into endogenous (genetic factors, atopy, skin hyperreactivity) and endogenous (food, household, pollen, epidermal, fungal, bacterial, and vaccine-associated factors, as well as tobacco smoke, pollutants, xenobiotics, etc.) factors [11]. It is worth paying attention to the fact that the triggers could be enhanced by such factors as climate, geographical factors, malnutrition, non-compliance with personal hygiene practices, viral infections, and psychological stress, which is confirmed by research data [12].

Currently, genetic predisposition in patients with atopic dermatitis is not in dispute [13, 14, 15, 16]. According to the research [17], 53.4% of children had a family history of atopic dermatitis. Moreover, in 9 patients, allergic diseases were diagnosed in both patients (14.3%). According to other reports, predisposition to allergy was observed in 82% of cases [18]. I. M. Shevchenko et al. (2015) believe that it's allergy in mother's history that increases the risk of atopic dermatitis in children in their first year of life ($\chi 2 = 24.04$, $p = 0.000001$), TORCH infections ($\chi 2 = 9.93$, $p = 0.001$) [19].

The combination of socio-hygienic, biomedical, environmental and hygienic factors plays a key role in the development and persistence of chronic atopic dermatitis [20, 21, 22].

In recent years, the impact of environmental factors on the pediatric allergic diseases was investigated and proven [23, 24]. The relationship between the degree of air pollution and the prevalence of allergy was detected [25, 26]. It's been proven that higher incidence of atopic dermatitis is found in children who live in urban areas, especially in the environmentally damaged regions [27].

In scientific literature, the researchers focus on the impact of antenatal and neonatal risk factors on the development of atopic dermatitis in children [28, 29, 30].

Factors constituting the primary entities of atopic dermatitis, such as alimentary factors, infection, preventive vaccination, taking medications, genetic factors, fetal diseases, have been specified [31, 32]. It's been proven that caesarean delivery results in higher likelihood of early-onset atopic dermatitis compared to normal delivery [33]. Furthermore, complicated pregnancy is observed in 96.7% of mothers of the surveyed children with atopic dermatitis [34].

METHODS

The review of 67 papers addressing the course of atopic dermatitis in children and adolescents was the research method. Assessing the data on the risk factors and disease development enables complete and detailed specification of the preventive medical and recreational guidelines for both individuals and groups.

RESULTS

The impact of biomedical and socio-hygienic risk factors on the development of allergy in children was assessed [35, 36]. Factors related to inadequate sanitation, poor hygiene and unfavorable environmental conditions in the child's residential space, such as occupational hazards, maternal smoking cessation, toxicosis of the first or second half of pregnancy, delivery complications, breastfeeding duration, have a prominent effect [37, 38].

The impact of sanitation, hygiene and environmental factors, such as the amount of living space per household member and passive smoking, on children's health was assessed. In that connection, the disappointing trend was revealed, i. e. the increase in the number of smoking mothers by 2.5 times over the past decade [39, 40].

The data on the impact of parental occupational factors on children's health were studied; high prevalence of allergic diseases in children of employees working at the chemical and petrochemical enterprises was revealed [41].

The impact of miltiple factors on the development of fungal infections in children with atopic dermatitis was studied; the degree of influence and magnitude were assessed for risk factors affecting the children at various stages of life starting with intrauterine development [42, 43]. The study [44] emphasizes that the development of cutaneous mycoses is interrelated with the atopic dermatitis severity and the extent of the lesion. Such symptoms of atopic dermatitis as dry skin, itching, erythema, peeling/oozing, edema/papules, excoriation, lichenification, and sleep disorder positively correlate with the development of cutaneous mycosis.

Information is provided on the degree of the risk factors influence on the development of atopic dermatitis combined with respiratory allergy in children [45, 46].

Forecasting, which is currently widely used in many fields of research, also finds its use in medicine [47, 48, 49, 50]. Predicting the course of various disorders is a topical issue in medicine due to the possibility of disease prevention by targeting various stages of the disease and managing their development in the right direction. In their papers, researchers show the feasibility of using mathematical methods for individual prediction of pediatric allergic diseases.

The prognosis of respiratory and cutaneous manifestations of allergy in children with early-onset exudative diathesis was defined. The method for early prediction of allergic reactions based on the family history and the course of intrauterine development was developed in order to identify the groups at high risk. The method for prediction of pediatric allergic diseases was tested in the context of identifying the allergy clinical form.

A model was developed enabling individual prediction of the risk of atopic dermatitis in children based on the combination of maternal and children's risk; the measures for eradication or reduction of unfavorable social, hygienic and other factors, contributing to the disorder, were recommended. The method for prediction of the extended immune parameters in children with allergic dermatoses was also proposed.

The diagnosis of gnoseological indicators, sich as medical history, clinical and laboratory data, and immune parameters, is essential for the prediction of the atopic dermatitis course in the newborn and first year babies with food allergies.

The method for prediction of early-onset atopic dermatitis based on the family history, associated with atopic dermatitis, has been identified, which could increase the efforts to develop the groups for primary disease prevention.

Mathematical model for individual prognosis of the development and progression of pediatric allergic disorders was developed based on asessing the strength and hierarchy of influences for various group of factors [50]. Stages of the prevalence of allergic diseases were predicted based on the planned alterations in air

pollution: namely, the annual increase in the prevalence of atopic dermatitis could reach 0.4–0.9% of cases.

The use of mathematical forecasting of immune parameters in older children with atopic dermatitis, and software developed based on the research results and calculations are recognized by scientists as a creative way to predict the impairments in patients with this disorder.

The use of mathematical models to define the risk of the atopic dermatitis symptom emergence in children of various age and predicting the sustained remission are beneficial. The authors have defined the adverse factors, such as diffuse and extensive forms of atopic dermatitis, concomitant skin diseases, early disease onset, affecting the duration of the recurrent disease.

Mathematical model for prediction of the pediatric atopic dermatitis course is recommended. The authors emphasize that the use of the logistic regression equation developed based on 16 predictor variables, for which the significance levels were within 5% (Wald test), facilitates identification of children at risk of atopic dermatitis in the population. Alternative study performed by the same researchers reports the use of mathematical model to predict the risk of bronchial asthma in children with this disorder. The logistic regression equation includes 7 predictor variables (age; intrauterine infection; pneumonia, acute obstructive bronchitis, and chronic adenoiditis in children above the age of two; paternal and maternal (mother's relatives) history of allergy).

An individual predictive model of hypersensitivity to fungal allergen Phoma betae in children with atopic dermatitis was developed. The method for individual prognosis of the combined forms of atopic dermatitis in children with respiratory allergies based on the Bayesian approach was detailed.

DISCUSSION

Many authors point out that studying the factors contributing to allergic reactivity and the use of those in combination with forecasting are primary points for minimization of the disorder.

CONCLUSIONS

Regardless of multiple studies and reviews focused on studying the role of potential risk factors in the development and progression of atopic dermatitis, we have found no reports of the comprehensive studies of the impact of risk factors on the emergence of the atopic dermatitis complicated forms aimed at developing predictive models. Such studies are essential, these would make it possible to develop individual predictive models of the course of atopic dermatitis complicated by bacterial and fungal infections. This aspect would enable the development of the recovery program and the number of preventive measures for the groups with atopic dermatitis at high risk of complications.

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