

Prevalence and etiology of allergic rhinitis in the conditions of North Vietnam the countries of south-east Asia

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The article presents an analysis of epidemiology and characteristic of the clinical course of allergic rhinitis in the conditions of northern Vietnam and the countries of south-east Asia through previous research publications from the 1990s to 2016, starting from the 1990s to 2016.

Keywords: allergic rhinitis, epidemiology, characteristic, IgE, mite, pollen.

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TO CITE THIS ARTICLE:

Allergic rhinitis (AR) is an IgE-mediated inflammatory reaction, resulting from exposure of allergens to the mucous membrane of the nasal cavity, clinically manifested by abundant rhinorrhea, nasal congestion, itching in the nasal cavity, repeated sneezing and often loss of smell [1, 2]. These symptoms are able to reverse evolution and enlargement after cessation of exposure to allergens or under the influence of treatment.

AR is a widespread disease that adversely affects patients's quality of life and is one of the most pressing problems facing modern otorhinolaryngology and allergology [3]. AR plays an active role in the pathogenesis of bronchial asthma, which occurs in 20–40% of patients with AR, and 60–70% of children with asthma are diagnosed with AR [4]. It has to do with the structural and functional unity of the mucous membrane and the general mechanisms of development of the inflammatory process in the upper and lower respiratory tract.

The main etiological factors of AR are pollen of trees, meadow and weeds, as well as spores of mold fungi (*Alternaria*, *Aspergillus*, etc.), household allergens (house dust mites, cockroaches), the epidermis of animals. The main pollen allergens are usually water-soluble proteins or glycoproteins with a molecular weight of from 10 to 70 kDa [5].

The pollen contains many components, such as pigments, fats, amylase and proteins, but only a fraction of the protein is subject to interact with the human immune system and cause allergies.

In epidemiological studies, that the prevalence of AR affected by the regional characteristics, such as climatic geographical (temperature variability, air humidity, vegetation) and social characteristics of the region [6].

According to statistical reports, the high AR rate is determined by the population living in areas with highly developed industry, and in ecologically disadvantaged areas these figures reach 30% and more [7].

The current of AR differs high index of comorbidity [8]. The results of the examination of children with AR testify that 70% of them detect inflammatory changes in the mucous membrane of the sinuses (ONP), in 30–40% — adenoids, in 30% — recurrent exudative average otitis, in 10% — the defeat of the larynx [9].

The average debut age of AR is 10 years, and the majority of them were recorded between the ages of 13 and 19 years [7, 10]. The prevalence of allergic rhinitis varies in different countries and between regions within the same country [11–13]. The incidence of AR in European countries is 20–30%: in the UK — about 30%, in Sweden — about 28%, in Russia — 25–38%; South Africa — this fig-

ure reaches 17%, in the US — 20%; in New Zealand and Australia — about 40% [14, 15].

Only several works on the prevalence of AR among adult of South-east Asia were published [16]. Thus, the occurrence of AR in Hong Kong amounted to — 43%; in India — 26%; in Japan — 13—20% [17].

The prevalence of AR in Vietnam, its territory differs by the peculiarity of climate-geographical conditions, remains understudied. Vietnam is located in the tropical zone and narrow from the east to the west, much longer from north to south. In this regard, the climate in the north is different conditions in the south of Vietnam. Characteristics of this region are wet summers and relatively cool humid winters. In the flat areas, the average temperatures of three winter months are 17—20 °C, rarely below 5 °C. From the end of January to mid-March, rain is usually drizzling. Summer rainy season lasts from April to October. From July to September, approximately 80% of the annual rainfall rate falls. In the hottest months, the average maximum air temperature in the capital is 31—32 °C, registered absolute maximum 42.8 °C. The air humidity in North Vietnam is 65—70% in the dry season and 85—95% in the rainy season. The vegetation of northern Vietnam is rich and varied. These features contribute to the transfer of plant pollen over long distances and the spread of pollen allergies. Currently, there are very few works devoted to the study of the peculiarities of the pollen content of plants in the air on the territory of Vietnam. However, the results of studies show a high concentration of plant allergens in the northern regions of Thailand, similar to Viet Nam, which is five times higher than the pollen level of the southern regions of the country [18]. In Southeast Asia, a correlation was found between the concentration of pollen in the atmosphere and the temperature (maximum and average) of the air. For example, in Manila and the Philippines, the concentration of pollen peaks (55%) between March and May, and only 13% of the pollen concentration in the air is observed during the rainy season (June—October). Thus, in this region, a negative correlation exists between the concentration of pollen in the air and the intensity of precipitation and humidity [19].

The modern features of the development cycle and the time of flowering of plants associated with an increase in global temperature, compared with similar indicators of 20—30 years ago, have been revealed [20]. In China, pollen *Artemisia Humulus* is the main allergen in the fall and summer, and its highest level in the air is observed between August 24 and September 5. Pine pollen and Poplar pollen are main causes of spring pollinosis, and their highest records appear from March 10 to 15; willow pollen and walnut pollen are the main allergens in early spring; but in late spring pine pollen becomes the dominant; and in summer and autumn, pollen *Artemisia Humulus*, *Ambrosia*, and *Amaranthaceae* are cause late summer or autumn seasonal pollinosis [5].

In Vietnam, there is a high prevalence of AR in 5—11-year-old children, which is 34.9%, and in patients with bronchial asthma, this figure reaches 48.5% [21]. At the same time, between 10 and 25% of adults and 42% of the child population of Vietnam suffers from seasonal or year-round AR.

According to other data, 12.3% of the population of Vietnam suffers from AR, and the incidence of this disease in the residents of the capital — Hanoi is 29—32%.

The negative impact on the prevalence of allergic diseases are the processes of industrialization, urbanization. The prevalence of AR in the residents of Hanoi is much higher than that of residents in rural areas (29.6% and 10.0%, respectively; $p < 0.001$) [16]. In this case, there is a decrease in the number of patients suffering from seasonal AR, but increases in 3—4 times the proportion of patients sensitized to domestic and industrial dust [20]. There is an increased risk of allergic diseases in individual industries. The workers of poultry farms, AR are most frequently diagnosed in the age group of 26—35 years old (in 33.4% of the examined). The AR is slightly less likely to be male (23.9%) than women (28.1%). The dependence of the prevalence of AR on the length of work at the production-higher frequency of occurrence of ar (34.3%), revealed in the workers with the experience of 11—15 years less (12.82%) — the worked 6—10 years [22].

Home dust is a complex of allergens, consisting of many different elements, such as human dander, animals, bird feathers, fungal spores, food particles, wool and other. However, the main allergens are house dust mites and fungal spores. The life cycle of dust mites depends on the humidity and temperature of the atmosphere. They are widely distributed in humid climates and do not survive with a decrease in humidity below 50% and temperature — 25—35°. Therefore, in Southeast Asia, as well as in conditions of northern Vietnam, where air humidity is continuously kept at the level 70—95%, allergic diseases caused by sensitization to house dust occupy the leading place [23, 24].

In Vietnam, there are practically a reported 10 types of house dust mite — *D. Pteronissinus*, *G. domesticus*, *Dermatophagoidessp*, *Tyrophagusputrescentiae*, *Tyrophagus*sp, *Dermanyssussp*, *Rhiniglyphussp*..., the fertile period for their development is during spring and autumn. The most common types of mites that play a major role in the pathogens of allergic rhinitis, asthma and other allergic diseases in the north of Vietnam are *D. pteronissinus* and *G. Domesticosus*, which are found in 91.59% of the samples and account for 52.2% and 40.9% of the overall number of house dust mites [25]. In central and rural areas of Hanoi, the most common allergens are *B. Tropicalis* mites (sensitization frequency in men — 27.7%, in women — 8.7%, $p=0.013$), *D. Pteronyssinus* (in men — 16.5%, for women — 10.6%, $p=0.45$), *D. Farinae* (for men, 15.3%, for women, 6.3%, $p=0.001$) and cockroaches (the frequency of sensitization in men is 16.5%, in women — 10.2%, $p=0.33$) [26]. However, these studies have not established the exist-

ence of a link between sensitization to house dust mites and the characteristics of the AR clinic.

The peculiarities of the climate of the north of Viet Nam affect the prevalence of fungus spores—such as *Alternaria*, *Aspergillus* and *Cladosporium* [27]. Fungal spores are more prevalent in tropical areas with persistent high humidity, such as in Malaysia, Singapore, Vietnam. In tropical and humid areas, the number of fungal spores usually over the amount of pollen in 100 times [28]. In Thailand, the average number of fungal spores in the north, where the high temperature and humidity, is 12 times higher than in the south. In the research of aeroallergens, study of baseline concentrations and species

range of the aeroallergens of a particular locality was emphasized.

On the background of the significant prevalence of AR further research requires the identification of pollen, which plays a leading role in the etiology of the AR in the conditions of North Vietnam [18]. There is little studied the prevalence of respiratory fungal allergies and types of fungal spores that cause AR in the region. The results of such studies are of great scientific and practical importance for substantiating the system of diagnostic and treatment and rehabilitation measures, taking into account the specific features of the epidemiology of AR in the climatic and geographical conditions of North Vietnam.

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Поступила 03.11.2018

Received 03.11.2018

Принята к печати 12.12.2018

Accepted 12.12.2018