



The Peculiarities of Different Types of Chronic Rhinitis in Children and Adolescents in Kazakhstan

**Saule ZHUMAMBAYEVA¹, Rafail ROZENSON¹, Marina MORENKO¹, Mazhit SHAI DAROV², Vera ZATONSKIKH³, Asem KAZANGAPOVA¹, Zaure ZHUMADILOVA⁴, Roza ZHUMAMBAYEVA⁵*

1. Dept. of Children Diseases N1, Astana Medical University, Astana, Kazakhstan
2. University Administration, Astana Medical University, Astana, Kazakhstan
3. Dept. of ENT, Head and Neck Surgery, Astana Medical University, Astana, Kazakhstan
4. Dept. of Internal Medicine, Semey State Medical University, Semey, Kazakhstan
5. Dept. of Propedentics of Internal Medicine, Semey State Medical University, Semey, Kazakhstan

***Corresponding Author:** Tel: +7-778-364-44-08, Email: saulezhumambayeva@rambler.ru

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Abstract

Background: The aim was to study the peculiarities of differential diagnosis, prevention and treatment of different forms of rhinitis in Kazakhstan children and adolescents.

Methods: 124 children and adolescents aged 1-17 years were randomly enrolled in our hospital based study in 2010 and 2011. Skin prick tests and total serum IgE level were assessed in all allergic patients. Subcutaneous specific immunotherapy was performed in 57 (70.3%) allergic patients. For the treatment of the developed rhinitis, we used intranasal glucocorticosteroids in all 47 (37.9%) patients with rhinitis medicamentosa.

Results: Allergic rhinitis was diagnosed in 81 (65.3%), infectious rhinitis in 43 (34.7%) and rhinitis medicamentosa in 47 (37.9%) cases. High mono sensitization was mainly to Artemisia Absinthium 55 (67.9%) and Sunflower 20 (24.7%) species, whereas multiple sensitization was caused by the mix of weeds in 55 (67.9%) and the mix of meadow grass in 31 (38.3%). The mean IgE level was 323.2 ± 264.9 SD. Only 5 (17.2%) patients with specific immunotherapy developed rhinitis medicamentosa. 35 (74.5%) patients treated by nasal glucocorticosteroids stopped taking the decongestants.

Conclusions: The incidence of rhinitis medicamentosa depends on duration of decongestants use. Specific immunotherapy is recommended for the prevention of rhinitis medicamentosa in patients suffering from allergic rhinitis, whereas intranasal glucocorticosteroids are the most appropriate for the treatment regardless initial cause of rhinitis development.

Key words: Rhinitis differentiation, Prevention, Treatment, Children, Kazakhstan

Introduction

In Kazakhstan, allergic rhinitis is a prominent problem and is the most common pathology among all allergic diseases. The true incidence of different types of chronic rhinitis in Kazakhstan children and adolescents is not known because there is no generally accepted standard criterion of its diagnosis.

Rhinitis medicamentosa is a drug-induced, nonallergic form of chronic rhinitis caused by excessive use of topical nasal decongestants (1, 2). One of the most important problems is the prevention of rhinitis medicamentosa formation in patients, suffering from prolonged allergic rhinitis and infectious rhinitis or rhinosinusitis,

which are compelled to use the vasoconstrictor nasal drops. The other important problem is the development of sufficiently easy and simple in performance method of differential diagnosis between allergic and noninfectious process. Children and adolescents have specific features of clinical manifestation and it is important to note that the problem of allergic rhinitis diagnosis often cause great difficulties in this population group. Though several studies about allergic rhinitis differentiation exist (3,4), determination of allergic process versus bacterial inflammation is essential and should be carried out carefully, because chronic infectious rhinosinusitis and allergic rhinitis, including seasonal hay fever exacerbations, very often lead to rhinitis medicamentosa formation. Immunotherapy is the only etiology-based treatment that has the potential for disease modification, as reflected by long-term remission following its administration, prevention of disease progression and onset of new allergic sensitizations (5, 6). Nasal glucocorticosteroids have been shown in many studies and trials to be efficient and beneficial in the treatment of different types of rhinitis (7, 8). That is why we considered this way as the best matching in our study implementation. We aimed to study the peculiarities of differential diagnosis, prevention and treatment of different forms chronic of rhinitis in Kazakhstan children and adolescents.

Materials and Methods

Our research is considered as hospital based study. The study was conducted during pollen season from the beginning of May to the end of October in two consequent years 2010 and 2011. Totally 124 children and adolescents at the age of 1-17 years and underwent consultations at the allergological center "Umit" (Astana, Kazakhstan) were randomly enrolled in our observation. All children's parents or trustee signed written informed consent for publication, and the study was approved by the ethics committee of JSC "Medical University Astana", Astana, Kazakhstan in accordance with the ethical standards of the

responsible committee on human experimentation and with the Helsinki Declaration of 1964, as revised in 2008 (9).

Patients with a history of any nasal or adenoid surgery and those with nasal polyps were excluded. Physical examination with additional anterior rhinoscopy was conducted and detailed case records were completed for all patients. Clinical data consisted of identity information, age, sex, presence or absence of nasal symptoms, i.e. itching and nasal congestion, sneezing, rhinorrhea, mucus dripping at the back of the throat, snoring. Exceeded use was considered as if the duration of nasal decongestants use exceeded eight days or dose overlapped 3 times per day. According to anamnesis data, the most common nasal decongestants that were used by patients were imidazolines. Diagnosis of allergic rhinitis included generally accepted methods. Based on the ARIA guidelines, intermittent allergic rhinitis (also known as seasonal allergic rhinitis or hay fever) was determined in the presence of symptoms for less than 4 days during a week or less than 4 consecutive weeks, whereas persistent allergic rhinitis was determined in the presence of nasal symptoms for more than 4 days during a week or over 4 weeks (10). Chronic rhinosinusitis was defined as persistence of upper respiratory symptoms longer than 8 weeks. Symptoms of chronic infectious rhinosinusitis included mucopurulent nasal discharge, facial pain and pressure, olfactory disturbance, and postnasal drainage. Skin prick tests were performed by doctors in all allergic rhinitis patients (N=81) using the same standard procedure. The results were evaluated by standard method and assumed as positive if the mean diameter was 3 mm or more. Total serum immunoglobulin E level was determined in blood tests of all allergic rhinitis patients. Specific immunotherapy was performed in 57 (70.3%) of 81 allergic patients by standard subcutaneous method. Intranasal glucocorticosteroids were used in all 47 (37.9%) rhinitis medicamentosa patients. Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) version 11 (SPSS Inc., Chicago, IL, USA). Quantitative data were expressed as mean \pm SD while qualitative data were presented as number and percentage.

Significance tests were done using the Student's t - test to compare quantitative variables, and chi-square (χ^2) test to compare qualitative variables. Statistical significance was considered as *P* value of less than 0.05.

Results

Allergic rhinitis was diagnosed in 81 (65.3%) cases and the infectious rhinitis in 43 (34.7%) cases of total 124 patients. Basic clinical data is shown in

Table 1. Both infectious and allergic rhinitis patients were matched regarding age and sex ($P>0.05$). The clinical symptoms of patients suffering from allergic or infectious rhinitis are present in Table 2.

Skin prick test results (Table 3) revealed a high sensitization level to the weed plant pollen among allergic children and adolescents. This high sensitization level was determined due to high mono sensitization mainly to *Artemisia Absinthium* 55 (67.9%) and Sunflower 20 (24.7%).

Table 1: Basic clinical and demographical data of the patients

	Chronic infectious rhinitis n=43 (34.7%)	Allergic rhinitis n=81 (65.3%)	Test of Significance
Age			
1-3 years	14 (32.6%)	24 (29.6%)	
4-6 years	16 (37.2%)	19 (23.5%)	$\chi^2=4.26$
7-10 years	7 (16.3%)	26 (32.1%)	$P>0.05$
11-17 years	6 (13.9%)	12 (14.8%)	
Sex			
Male	24 (55.8%)	38 (46.9%)	$\chi^2=0.89$
Female	19 (44.1%)	43 (53.0%)	$P>0.05$
Onset of the disease in years Mean (\pm SD)	5.7 \pm 0.5	7.4 \pm 0.3	$t=23.65$ $P<0.001$
The average duration of symptoms (in years)	2.7 \pm 0.2	4.9 \pm 0.3	$t=43.22$ $P<0.001$

Table 2: Clinical symptoms of patients with infectious and allergic rhinitis

	Infectious rhinitis n=43 (34.7%)	Allergic rhinitis n=81 (65.3%)	<i>P</i> value
Rhinorrhea	37 (86.0%)	75 (92.5%)	>0.05
Nasal itching	3 (6.9%)	46 (56.7%)	$< 0.01^*$
Nasal Obstruction	32 (74.4%)	63 (77.7%)	>0.05
Sneezing	15 (34.8%)	60 (74.0%)	$< 0.01^*$
Eye symptoms	2 (4.6%)	74 (91.3%)	$< 0.01^*$
Snoring	19 (44.1%)	12 (14.8%)	$< 0.01^*$

*Highly statistically significant

Multiple sensitizations to the mix of weeds was found in 67.9%, the mix of meadow grass in 38.3%, to the mix of meadow grass+ mix of weeds in 22.2% and to the mix of trees in 7.4%. The mean IgE level in blood tests was 323.2 \pm 264.9SD with minimum of 31 IU/ml and maximum of 990 IU/ml. Rhinitis medicamentosa

was diagnosed in 47 (37.9%) of the total amount of patients, among them 29 (61.7%) were from allergic rhinitis group and 18 (38.3%) from infectious one. According to anamnesis data, patients used oxymetazoline in 36 (76.6%) cases, naphazoline in 8 (17.0%) and xylometazoline in 3 (6.4%) cases.

Table 3: Skin prick test results expressed as valid percent after exclusion of missing data

Allergens	Negative	Weak	Moderate	Strong	Very strong
Sunflower	14.9	18.9	13.5	27.0	24.7
Artemisia Absinthium	4.5	5.7	5.7	15.9	67.9
Ambrosia	18.8	37.5	21.9	15.6	6.3
Orach	33.3	46.7	6.7	0	13.3
Timthy	31.7	38.1	14.3	4.8	11.1
Fescue	22.9	29.2	20.8	14.6	12.5
Hemp	49.2	28.8	8.5	3.4	10.2
Dandelion	31.8	45.5	9.1	13.6	0
Rye	20.0	74.0	6.0	0	0
Foxtail	31.1	37.8	15.6	2.2	13.3
Birch	14.3	28.6	28.6	28.6	0

Depending on clinical duration, rhinitis medicamentosa distribution in both groups was prominent after 30 days of nasal decongestants use (69.4% vs. 65.3%) and there was no statistically significant difference between patients with infectious and allergic rhinitis ($P>0.05$) (Fig. 1).

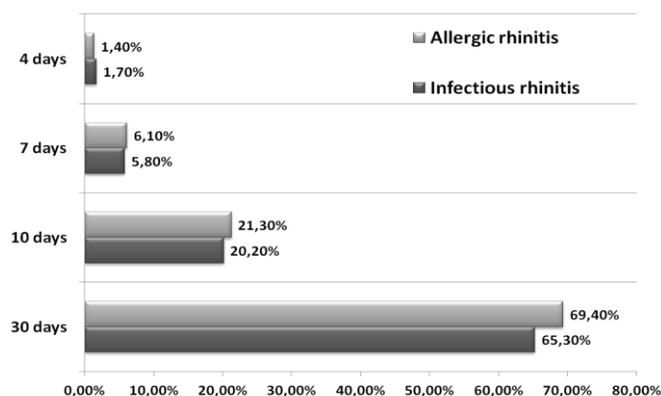


Fig. 1: Rhinitis medicamentosa depending on the duration of decongestants use

Fifty-seven (70.4%) of 81 allergic patients obtained specific subcutaneous immunotherapy. These patients were divided into three groups according to the treatment course. The first one consisted of 27 (47.4%) newly enrolled allergic rhinitis patients, the second of 18 (31.6%) and the third of 12 (21.0%). To the beginning of pollination, season rhinitis medicamentosa was not found in patients from advanced specific immunotherapy group and to the end of pollination season rhinitis medicamentosa developed

only in 5 (17.2%) patients from advanced specific immunotherapy group. Whereas those patients without specific immunotherapy ($N=24$) to the beginning of pollen season had rhinitis medicamentosa in 8 (33.3%) cases and to the end of season in 11 (45.8%). For the treatment of the developed rhinitis medicamentosa, we used intranasal glucocorticosteroids in all 47 (37.9%) patients. During anterior rhinoscopy before treatment it was found that nasal mucosa had hyperemia with bleeding zones in 29 (61.7%) of the patients, edema with sick mucous in 9 (19.1%) and pale mucous with atrophy zones and dry crusts were formed in 8 (17.0%) of patients with rhinitis medicamentosa of more than two years duration. After 6 weeks of treatment we found that nasal symptoms severity with anterior rhinoscopy results improved and the patency of nasal airways were achieved in 35 (74.5%) children and adolescents, but in 12 (25.5%) stayed without changes ($P<0.01$).

Discussion

We had not found any differences in sex, nationality, social level or other attempts in obtained data stratification. The determined early age of infectious rhinitis onset at 5.7 ± 0.5 ($P<0.001$) in our study may indicate the vulnerability of children (due to the prolonged presence of infections). A longer course of disease among individuals with allergic rhinitis suggests the persistence of clinical symptoms associated with increasing levels of sensitization in the older age

groups. Nasal itching, sneezing and eye symptoms were more frequently reported among patients with allergic rhinitis compared to patients with infectious rhinitis with statistically significant differences ($P<0.01$), while snoring was more frequently reported among patients with infectious rhinitis. At the same time statistically significant differences were not found between both groups in rhinorrhea and nasal obstruction ($P>0.05$).

The duration of pollen season mainly depends on pollen type and usually lasts for 2 months in average in Kazakhstan. Thus, patients suffering from allergic rhinitis are obliged to use nasal decongestants all this period with following rhinitis medicamentosa formation, which is frequent but unexamined condition in Kazakhstan children and adolescents. An enhanced management requires the solution of the problems in standardized diagnosis criterion and differential diagnosis, prevention and treatment in patients with prolonged rhinitis. Despite preventive measures rhinitis medicamentosa was found in 47 (37.9%) patients who mostly used oxymetazoline (in 85.3% cases). The rebound effect was prominent after 30 days of nasal decongestants daily use and these findings are consistent with previous research, demonstrating that the rebound congestion worsens after 10 days of use (11).

Our findings are consistent with Molgarrd et al., who have investigated the differences between allergic and non-allergic rhinitis in 1186 adolescents and found that patients with allergic rhinitis have more often sneezing, itchy eyes and food allergy, whereas the patients with non-allergic rhinitis often suffer from rhinosinusitis. Non-allergic rhinitis was found more frequently among women, as well as associated with headaches and sinusitis compared with allergic rhinitis (12).

It is important to identify properly and timely infectious rhinitis in order to avoid the development of complications in children. Some of the most reliable methods in differential diagnosis are Computer Tomography (CT) and Radiography (4), but these methods are difficult to perform in an outpatient settings and rather expensive. Patient history data coupled with physi-

cal examination helped us to differentiate infectious rhinitis from allergic and avoid the use of additional expensive diagnostic methods. The mean IgE level in blood tests 323.2 ± 264.9 IU/ml proved the true allergic nature in our patients.

In a country with moderately continental climate like Kazakhstan, extending over a large territory in the middle of Asia, with the range of temperature from -45°C in winter and $+40^{\circ}\text{C}$ in summer, the main cause of seasonal allergy was found to be weeds plants pollen. Turkish scientists obtained similar results, reporting that sensitivity to pollen was the leading cause of positive results in 44.3% patients (13). In contrast, in countries with hot and humid climate like Iran, the pattern of sensitization to environmental allergens as in other reports from Arabian Peninsula was shown in 385 patients aged 5-50 years demonstrated that the most common allergens are house dust mites and cockroaches (14). The crucial aims of rhinitis medicamentosa treatment are firstly to stop the use of nasal decongestants and secondly to cure the underlying cause of condition, that led to the initial use of vasoconstrictor nasal drops. Regardless of initial allergic or infectious genesis we administered intranasal glucocorticosteroids standard treatment in appropriate age dosing to all 47 (37.9%) rhinitis medicamentosa patients. 35 (74.5%) patients stopped taking the decongestants and as a result nasal mucosa recovered with obtaining its integrity and normal function. Our results demonstrated that rhinitis medicamentosa developed only in 5 (17.2%) patients with advanced specific immunotherapy to the end of pollination season. Thus, this substantial finding is consistent with previous research (15) and is an additional evidence for the statement that specific immunotherapy is reliable, etiology based treatment of allergic rhinitis, playing another significant role in rhinitis medicamentosa prevention. Our clinical study has some limitations: all children and adolescents were recruited from the same allergological center, thus forming a small sample size that may restrict generalization of the findings. The other weak point of our study is a failure to obtain the follow up data for all patients.

Conclusions

A crucial area of future research should be the development of standardized diagnosis and treatment guidelines for Kazakhstan doctors that will lead to medical respiratory care optimization and improvements in patients' quality of life. The incidence of rhinitis medicamentosa does not significantly depend on baseline cause of nasal blockage but depends on duration of decongestants use and their type. Specific immunotherapy is recommended for the prevention of rhinitis medicamentosa in patients suffering from allergic rhinitis with revealed high sensitization level to the weed plant pollen. Intranasal glucocorticosteroids are the most appropriate for the treatment of prolonged rhinitis types.

Ethical considerations

Ethical issues (Including plagiarism, Informed Consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc) have been completely observed by the authors.

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