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THE STATUS OF ALLERGIC RHINITIS AND INTERVENTION EFFECTIVENESS OF FLUTICASONE TREATMENT IN JUNIOR HIGH SCHOOL STUDENT IN VINH CITY, NGHE AN PROVINCE IN 2014-2016

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SUMMARY OF PUBLIC HEALTH PHD DISSERTATION

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1.

2.

INTRODUCTION

The recent epidemiological studies showed that 20% of the world's population and 40% of children have allergic rhinitis (AR). AR in children has a significant effect on the quality of life, sleep and school performance, it can also cause cognitive dysfunction, especially in junior high school age because this is the physical and physiological development stage of the child.

The use of anti-inflammatory drugs with corticosteroids for treatment as well as control of nasal symptoms of allergic rhinitis is well evaluated, and the recommended international guidelines for nasal corticosteroids (INS) are the first therapy for AR patients have all symptoms from the mildest. Fluticasone Furoate Nasal Spray (FFNS) - Avamys is a glucocorticoid produced to treat allergic rhinitis in the form of a spray and is managed by using a dose spray device. The drug is designed to be easy to self-use by children or for their parents, their caregivers while take care the children. Vinh city in Nghe An province is located in the center of the north central region in the monsoon tropics and divided into two distinct seasons: the cold winter and the hot and humid summer affected by two types of monsoon: Northeast monsoon and Southwest wind. To assess the incidence of AR among junior high school students in Vinh city of Nghe An province, to determine the factors related to AR and which interventions are most effective for AR in this population, we have conducted the research ***"The status of allergic rhinitis and intervention effectiveness of Fluticasone treatment in junior high school students in Vinh city, Nghe An province in 2014-2016"*** with the following purposes:

1. *To describe of the status of allergic rhinitis in the junior high school students Vinh city - Nghe An in 2014-2016.*
2. *To describe the factors related to allergic rhinitis in junior high school students in Vinh City - Nghe An.*
3. *To evaluate the effectiveness of treatment with Fluticasone in secondary school students with allergic rhinitis in 2014 - 2016.*

THE CONTRIBUTION OF THE THESIS

The study result has found that the prevalence of children with allergic rhinitis in 6 secondary schools in Vinh City in Nghe An province was 15.3% with a tendency to increase with age, higher than in urban areas compared with foreign city and in the winter months (though not statistically significant). The result of positive rate for some house dust allergens, feathers, cotton dust is very noticeable. The finding of an association between nasal septic deformities and allergic rhinitis is a good reference for studies of allergic rhinitis in the field of public health. The results of the drug intervention with Fluticasone furoate provided evidence of the effectiveness of interventions on clinical and subclinical indicators and the quality of life of 45 subjects.

STRUCTURE OF THE THESIS

The main part of the thesis is 115 pages long, consisting of the following sections: Introduction: 2 pages; Chapter 1- Overview: 30 pages; Chapter 2 - Research Object and Method: 20 pages;

Chapter 3 - Research Results: 28 pages; Chapter 4 - Discussion: 29 pages; Conclusions and recommendations: 3 pages

The thesis has 140 references, of which 24 are in Vietnamese and 116 are in English. The thesis has 26 tables and 13 pictures. There are 7 appendices of 16 pages.

Chapter 1. OVERVIEW

1.1. Allergic rhinitis

1.1.1. Definition

Allergic rhinitis is an inflammation of the nasal mucosa with the role of IgE antibodies, often caused by exposure to allergens of the respiratory tract, with pathological manifestations characterized by some symptoms like sneezing, runny nose , stuffy nose and / or itchy nose. These symptoms last for at least two or more consecutive days or more than an hour in most days (ARIA-WHO 2007).

1.1.2. Epidemiology of Allergic rhinitis

AR is the most prevalent form of rhinitis, it is also one of the most common allergies in hypersensitivity. AR occurs in all age groups with the most common onset in children with an average age of 8-11 years, affecting boys more than girls, but this affects become almost equally in adulthood age.

In Vietnam, according to many different studies, the rate of AR accounts for 10-18% of the population. In Japan, 20% of the population often suffer from AR. With a high incidence, the epidemiology of AR is increasingly concerned with preventive medicine. However, in fact, the epidemiology of AR has not been

properly concerned, especially the initial health care information is difficult to identify and not fully exploited.

1.1.3. Causes of Allergic rhinitis

AR is an immune disease caused by foreign allergens and the path of entry is mainly the nasal mucosa. According to the author Skoner DP: Many pathogens have been associated with AR including pollen, mold, house dust mites and animal skin flakes.

1.1.4. Risk factors of AR

There are many studies around the world which have showed some most common risk factors associated with AR are: a history of family allergies; habitat contaminated with dust and smoke including pollution of cigarette smoke; pet and some other factors.

A cohort study was conducted among 150 children and adolescents with an average age of 13 ± 2.8 years with diagnosed long-term allergic rhinitis following ARIA guidelines and nasopharyngeal examination by Mariño-Sánchez F detected 87% of cases of nasal septal deformities. Yu HA et al conducted a study on 113 patients with nasal septum deflected with long-term allergic rhinitis, these patients have undergone surgery to correct the nasal septum to treat rhinitis. After 3 months of follow-up, 94.7% showed the effective treatment. After 1 year of follow-up, the authors found that the effectiveness of the surgery of the nasal septum to treat allergic rhinitis was 90.3% (102/113 cases). A study published in 2014 by the author author Zhao Y et al. also confirmed that nasal septal defect surgery is effective in improving symptoms of allergic rhinitis.

1.2. Treatment of Allergic rhinitis

Treatment of AR is based on the pathogenesis of the disease by understanding and avoiding allergens causing allergies such as

education, antihistamine use to limit the effects of intermediates chemically, corticosteroids therapy to reduce the mobilization of inflammatory cells, anti-IgE to prevent IgE from adhering to Mast cells, Cromoglycate to stabilize Mast cells or specific immunotherapy to change the course of allergic reaction.

The nasal spray Avamys (Fluticasone furoate)

The nasal spray contains Fluticasone furoate, a product of Glaxo Smith Kline, which has been marketed since 2009. The drug is used in this study because it addresses the limitations of current Corticosteroids and has some advantages: pleasant taste; easy to use and convenient spray bottle; concomitant effect for both eyes and nose symptoms; 24h efficiency; high selectivity and affinity for glucocorticoid receptors; rapid onset of action; safe records and favorable tolerances. Avamys is indicated for the treatment of allergic rhinitis patients aged 2 years and older.

1.3. *Allergic rhinitis and quality of life*

Today the study of allergic rhinitis does not stop at evaluating classic symptoms such as sneezing, runny nose, nasal congestion, and itchy nose but also assess the effect of disease on the patient's life. The effects on quality of life, work, and learning are common in people with moderate and severe allergic rhinitis.

Chapter 2. RESEARCH OBJECT AND METHOD

2.1. Research subjects, locations, time and study

2.1.1. Subject

2.1.1.1. Subjects of descriptive research (objective 1 and 2):

The object of the study is junior high school students in Vinh City, Nghe An province..

Inclusion criteria: Students reside and study at Vinh city secondary schools; Agree to participate in the study

Exclusion criteria: Students are not present during the investigation; Do not agree to participate in the study

2.1.1.2. Subjects of the intervention study (objective 3)

The junior high school students who has participated in the first episode and has been diagnosed AR caused by D.pteronyssinus, coton dust, feathers, mushrooms allergens.

Inclusion criteria:

- Students diagnosed AR; Test skin positive for allergens; voluntarily participate in research and are eligible for outpatient treatment for at least 1 year.

Exclusion criteria:

- Students with AR are suffering from acute bacterial infection in the sinus nose and in the lower respiratory tract; Patients with combined systemic diseases; Being treated within the previous 2 weeks with antihistamines, corticosteroids, cell membrane stabilizers, beta2-adrenergic stimulants or general allergy remedies. These patients, after stopping the drug for more than 2 weeks, will be selected to the study team if they meet the selection criteria.

2.1.2. Study timing

Study was conducted from 12/2014 to 12/2016

Episode 1: description phrase from 12/2014 to 5/2015.

Episode 2: intervention phrase from 6/2015 to 6/2016.

2.1.3. Location: Our study was implemented in 6 secondary school in Vinh city of Nghe An province. There are 4 suburban schools includes Bến Thủy, Cửa Nam, Hưng Dũng, Trường Thi and 2 inner schools includes Hưng Lộc and Nguyễn Trường Tộ.

2.2. Research method

2.2.1. Study design

The study was carried out under two successive designs: cross-sectional descriptive epidemiological studies and comparative intervention study.

2.2.2. Sample size and sampling method

2.2.2.1. Sample size for the descriptive study

$$n = Z^2_{(1-\alpha/2)} \frac{p(1-p)}{\varepsilon^2}$$

Actually, we examined all of 3366 students of 6 selected secondary schools in the city.

2.2.2.2. Sample size for the intervention study

Use the formula to calculate the size of the intervention sample:

$$n = \frac{[Z_{1-\alpha/2}.\sqrt{2.p.(1-p)} + Z_{\beta}\sqrt{p1.(1-p1)+p2.(1-p2)}]^2}{(p1-p2)^2}$$

According to the formula, n = 35 patients.

In fact, there are 45 eligible patients who follow the study protocol.

2.3. The study procedure

2.3.1. Data collection for objective 1 and 2*: describe of the current situation of allergic rhinitis and some factors related to AR in the junior high school students in the Vinh city*

Conduct interviews, clinical examination with ENT endoscopy, skin test and blood test. From historic exploring, scoring clinical examination, selected AR patients were patients who got a total score of 16 or more points from these two criteria. The applies tests were: skin test with *D.pteronyssinus allergens, feathers, cotton*

dust; Mastocyte decomposition reaction; Quantification of serum IgE and IgG.

2.3.2. Data collection for objective 3:

2.3.2.1. Intervention activities for patients: Intervention by treatment with Avamys for 45 patients diagnosed with AR during 3 months (from September 2015 to December 2015). Evaluate functional symptoms, physical and subclinical symptoms of AR patients at 2 times: 3 months before intervention and after intervention.

2.3.2.2. Evaluation of intervention results: Evaluation after 3 months of treatment

Evaluate clinical effectiveness: based on the progress of clinical symptoms: functional symptoms (nasal itching, sneezing, runny nose, stuffy nose) and physical symptoms (nasal mucosal condition , the situation of overheating under the nose

Evaluation of changes in some subclinical indicators: All paraclinical tests are repeated after 3 months of treatment and compared with pre-treatment, based on the level of change to assess the effectiveness of the treatment in term of subclinical indicators.

Quality of life assessment: Students were asked about the effects of allergic rhinitis within the previous week on their lives. The quality of life of patients was assessed by Juniper's RQLQ questionnaires with improvements to the study subjects.

2.4. Management, processing and analysis of data*:*

Data collected after being cleaned are then entered and analyzed using Epi data 6.04 software.

2.5. Research ethics: The research was approved by the Council through the outline of Haiphong University of Medicine and Pharmacy and the leader of study site. Research subjects are provided

clear information related to the objectives and content of the study. Research aim is only for students' health care, there is no other purpose.

Chapter 3. RESEARCH RESULTS

3.1. The status of allergic rhinitis among pupils

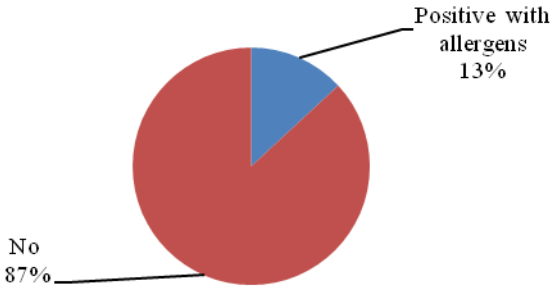

Figure 3.4. The prevalence of pupils who had a positive skin test with allergens (n=3366)

Comment: There was 13% (437) pupils who had a positive skin test with at least 1 of the 4 types of allergens (house dust, feathers, cotton dust, mold).

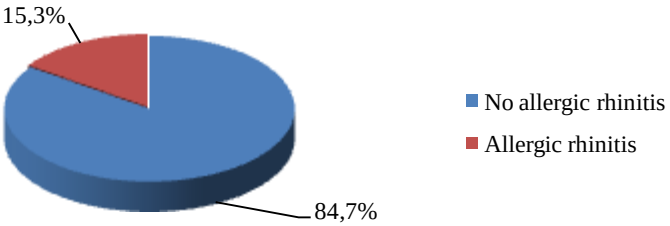

Figure 3.7. The prevalence of allergic rhinitis of research objects (n=3366)

Comment: The prevalence of allergic rhinitis among pupils was15,3%

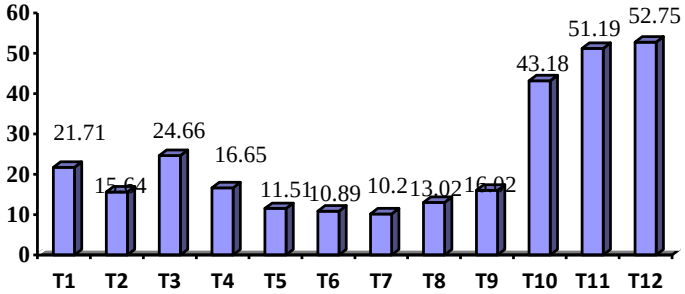

Figure 3.8. The prevalence of allergic rhinitis symptoms appears in the months of year (n=515)

Comment: The symptoms of allergic rhinitis occurred much in October, November and December with 43.18%; 51.19% and 52.75% respectively. The months that it appear less were June and July, accounting for 10.89% and 10.20% respectively.

Table 3.3. The prevalence of allergic rhinitis by gender (n=3366)

Allergic Rhinitis / Gender	Yes		No		Total		P
	n	%	n	%	n	%	
Male (n=1759)	268	15,2	1491	84,8	1759	52,26	0,99
Female (n=1607)	247	15,4	1360	84,6	1607	47,74	
Total	**515**	**15,3**	**2851**	**84,7**	**3366**	**100,0**	

Comment: The above table results showed that the prevalence of allergic rhinitis in male pupils was 15.2% lower than that in female pupils was 15.4%. The difference is not statistically significant with $p > 0.05$

Table 3.4. The prevalence of allergic rhinitis of study subjects by ages (n = 3366)

Allergic rhinitis / Age	Yes		No		P
	n	%	n	%	
6th Grade (n=1011)	142	14,05	869	85,95	0,55
7th Grade (n=748)	115	15,37	633	84,63	
8th Grade (n=847)	133	15,70	714	84,30	
9th Grade (n=760)	125	16,45	635	83,55	
Tổng	515	15,3	2851	84,7	

Comment: The above table results showed that the prevalence of rhinitis at the age of 11-12 years (6th Grade) was 14.05%; at the age of 13, 14, and 15 years old (7,8,9th grades) were 15,37; 15.70 and 16.45% respectively. The difference in the prevalence of allergic rhinitis by ages was not statistically significant with p> 0.05.

Table 3.5. Prevalence of allergic rhinitis among study subjects by area (n = 3366)

Allergic rhinitis / Area	Yes		No		Total		$p_{1\&2}$
	n	%	n	%	n	%	
Urban	383	15,84	2035	84,16	2418	71,84	0,165
Suburban	132	13,92	816	86,08	948	28,16	
Total (n=3366)	**515**	**15,3**	**2851**	**84,7**	**3366**	**100,0**	

Comment: The above table showed that prevalence of rhinitis in Ben Thuy school was 14.02%; in Cua Nam school was 15.18%; in Hung Dung, Hung Loc and Nguyen Truong To schools were 15.2; 15.17 and 13% respectively. The prevalence of allergic rhinitis among pupils in inner city schools was 15.84%, higher than that of suburban pupils (13.92%) but the difference did not have statistical significance with p> 0.05.

3.2. Several factors related to allergic rhinitis

Table 3.13. Multivariate analysis table of some factors related to allergic rhinitis (n = 3366)

Factors		OR adjusted	95%CI	p_value
School group	*Suburban*	-		
	Urban	1,15	0,90-1,46	0,253
Personal urticaria history	*No*	-		
	Yes	1,31	1,05-1,64	0,016
Personal asthma history	*No*	-		
	Yes	2,33	1,67-3,26	<0,001
Personal eczema history	*No*	-		
	Yes	2,13	1,08-4,18	0,028
Family allergy history	*No*	-		
	Yes	2,16	1,73-2,69	<0,001
History of exposure to smoke, dust, pets hair	*No*	-		
	Yes	2,29	1,83-2,85	<0,001
Nasal septum deformities	*No*	-		
	Yes	**117,34**	**46,91-293,5**	<0,001

Considering the inclusion of multivariable models of p<0,2 in multivariable analysis, the results suggested that personal allergy history, family allergy history, exposed to smoke, dust, pets hair and nasal septum deviationsome were factors associated with allergic rhinitis (p <0.05). In which pupils with personal allergy history (urticaria, asthma, eczema) were 1.31 to 2.33 times more likely to get disease than others. Pupils who had family allergy history were 2.16 times more likely to suffer from allergic rhinitis than those without family allergy history. Pupils who have been exposed to smoke, dust, and pets hair were 2.29 times more likely to have allergic rhinitis

than the other groups. Pupils with nasal septal deformities were 117 times more likely to get disease than those without deformities (OR = 117.34; 95% CI: 46.91-293.50; p <0.001) .

3.3. Evaluation of treatment results of Fluticasone furoate (Avamys)

3.3.1. Clinical treatment results

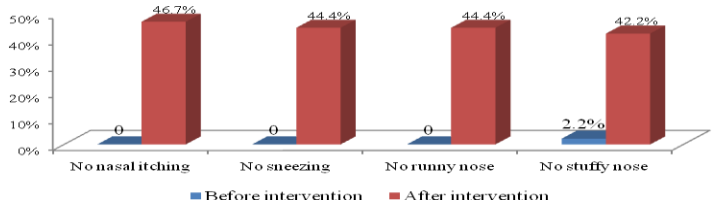

Figure 3.9; 3.11-3.13. Results of improve symptoms

After 3 months of treatment with Avamys, the prevalence of people who no longer have symptoms increased over 40% with all manifestation.

Table 3.14-3.15. Results of physical symptoms improvement

Level / **Symptoms**	Severe		Moderate		Common		No		$P_{yes/no}$
	Before intervention (n,%)	After intervention (n,%)	Before intervention (n,%)	After intervention (n,%)	Before intervention (n,%)	After intervention (n,%)	Before intervention (n,%)	After intervention (n,%)	
Overgrownth of nasal mucosa	11 (24,4)	0	20 (44,4)	8 (17,8)	12 (26,7)	17 (37,8)	2 (4,4)	20 (44,4)	< 0,001
Overgrownth of inferior conchae	11 (24,2)	4 (8,9)	20 (44,4)	7 (15,5)	12 (26,7)	13 (28,9)	2 (4,4)	21 (46,7)	< 0,001

After 3 months of treatment with Avamys, the prevalence of severe and moderate symptoms was significantly reduced. Symptoms of overgrownth of nasal mucosa were no longer severely affected. The average level after intervention was reduced over 20%. The

assessment of changes before and after with and without symptoms was statistically significant with p<0.001

Table 3.16. Degree of change in clinical manifestations before and after intervention (n = 45)

Progression / Symptoms	Reduced level 1		Reduced level 2		Reduced level 3		No reduce	
	n	%	n	%	n	%	n	%
Sneeze	38	84,44	7	15,56	0	-	0	-
Runny nose	33	73,33	12	26,67	0	-	0	-
Stuffy nose	33	73,33	7	15,56	0	-	5	11,11
Itchy nose	34	75,56	11	24,44	0	-	0	-
Diminished sense of smell	34	75,56	10	22,22	0	-	1	2,22
Nasal mucosa	34	75,56	9	20,0	0	-	2	4,44
Status of inferior conchae	30	66,67	8	17,77	0	-	7	15,56

After treatment, the clinical symptoms were improved compared with before treatment.

Table 3.17 - 3.18. Effectiveness of intervention on skin prick test, mastocyte decomposition reaction on the research object (n = 45)

Test / Positive level	Skin prick test		Mastocyte decomposition reaction	
	Before intervention n (%)	After intervention n (%)	Before intervention n (%)	After intervention n (%)
1 (+)	8 (17,78)	9 (20,0)	9 (20,0)	14 (31,11)
2 (+)	28 (62,22)	31 (68,89)	25 (55,57)	24 (53,33)
3 (+)	9 (20,0)	5 (11,11)	11 (33,33)	7 (15,56)
p	> 0,05		> 0,05	

Among 45 students participating in the study, 100% had a positive skin test and mastocyte decomposition reaction from 1 (+) to 3 (+) at the time before the intervention. After the intervention, the positive

prevalence of 1 (+) and 2 (+) increased slightly, while the rate of 3 (+) decreased from 20% to 11.11% at skin test and from 33.3% to 15,56% in mastocyte decomposition reaction. However, the difference was not statistically significant.

Table 3.19 - 3.20. Intervention effect on changes in IgE and IgG serum levels (n = 45)

Indicators		X	**SD**	**SE**	**Min**	**Max**	**p**
IgE (IU/ml)	Before intervention	719,5	319,5	174,9	174,9	1318,7	>0,05
	After intervention	638,71	253,83	126,3	126,3	1137,5	
IgG (mg%)	Before intervention	1441,1	443,67	715,0	715,0	2481,0	>0,05
	After intervention	1543,73	464,53	892,0	892,0	2616,0	

The mean of IgE serum decreased from 719.5 IU/ml to 638.7 IU/ml after treatment. The average IgG index increased from 1441.1 mg% to 1543.7 mg% after treatment. However, the difference between before and after treatment was not statistically significant (p> 0.05).

Table 3.26. Effective interventions on quality of life indicators (n = 45)

Index of quality of life	**Before treatment (X± SD)**	**After treatment (X± SD)**	**p**
Personal activities	2,84 ± 0,67	0,78 ± 0,76	<0,001
Nose symptoms	3,98 ± 0,72	0,76 ± 0,74	<0,001
Eye symptoms	2,93 ± 0,72	0,71 ± 0,76	<0,001
Practice issues	2,67 ± 0,98	0,67 ± 0,71	<0,001
Overall average quality of life score	3,11 ± 0,93	0,73 ± 0,74	<0,001

After 3 months of treatment, quality of life scores on individual

activities, nasal, eye symptoms and practice as well as overall score decreased by over 70% with significant differences compared with before treatment.

Chapter 4. DISCUSSION

4.1. The status of allergic rhinitis in the study subjects

In our study, there were 3366 pupils from 6 secondary schools in Vinh city, Nghe An province were selected to participate in the research. When considering about allergy status with 4 types of allergens (house dust (D.pteronyssinus), feathers, cotton dust, mold), we obtained the results (Figure 3.4): There were 437 turns of students have positive reactions with 1 of 4 types of allergens. Evaluating the situation of allergic rhinitis in secondary school students in Vinh city (Nghe An), we obtained results (Figure 3.7): The prevalence of allergic rhinitis among students was 15.3%. The results of our study were similar to previous research results: According to the international study of asthma and allergies (ISAAC) stage III, the rate of allergic rhinitis in the age group 6-7 ranging from 0.8 to 14.9% and from 1.4% to 39.7% in the 13-14 year old group worldwide. A research which was conducted by Ahmad R. Sedaghat and colleagues found that 26.9% of children with allergic rhinitis. A study in Korea on 14,356 students participated in health screening from 2010 to 2014 also found the prevalence of allergic rhinitis was 20.8%.

The results in our study were lower than that obtained in the study of Vu Trung Kien when conducted a research about the status of allergic among secondary school students in Thai Binh and Hai Phong city in 2012: The prevalence of disease of study subjects in Thai Binh and Hai Phong city was 23.6%, of which the inner city was 27.5% and the suburban was 19.8%. The rate in female was 27.3%,

higher than male (19.8%). However, the results obtained in our study were higher than those in the research of Do Huu Loc of over 623 pupils of Le Hong Phong primary school, Hai Phong city in 2017 (10.6%). The secondary school students are the developing period of psychophysiology, allergic rhinitis has a great influence on the development of children.

When considering the occurrence of allergic rhinitis symptoms over time of the year, we obtained results (Figure 3.3): The symptoms of allergic rhinitis appear more frequently in October, November and December with the rate is 43.18%; 51.19% and 52.75% respectively. According to the literature, allergic rhinitis is the body's response to the intrusion of foreign substances into the upper respiratory tract, particularly common during the transition season (hot to cold, cold, heavy rain). The time of October, November, and December in the North and Central Vietnam is winter, the cold weather is often accompanied by wet or dry drizzle which is a favorable condition for allergic rhinitis. Considering the prevalence of students with allergic rhinitis by gender, we obtained results (Table 3.3): The rate of female students with allergic rhinitis was 15.4% higher than male students (15.2%)), the difference was not statistically significant with p> 0.05. The results in our study were similar to those of some other authors.

Table 3.4 showed that the prevalence of rhinitis in grade 6 pupils (aged 11 years) was 14.05%; in 7, 8 and 9 grades students were 15,37; 15.70 and 16.45%, although the rate of allergic rhinitis tends to increase with age, but the difference in the prevalence of allergic rhinitis among ages was not statistically significant with p> 0.05. Considering the prevalence of allergic rhinitis among students

by area, we obtained results (Table 3.5): The rate of disease among students in urban schools was 15.84% higher than that of suburban (13.92%), however the difference was not statistically significant with p> 0.05. It could be explained that in our research area, the environmental difference between the inner and suburban areas was not clear.

4.2. Several factors related to allergic rhinitis in secondary school students in Vinh city

Considering the multivariable models by factor associated analyzing with p <0.02, the results of multivariate analysis (table 3.13) showed the personal allergy history, family allergy history, history of exposure to smoke, dust, pets hair and nasal septum deformities were factors associated with allergic rhinitis (p <0.05). In which students with a personal allergy history (urticaria, asthma, eczema) were 1.31 to 2.33 times more likely to get allergic rhinitis than those who did not have a history of allergy themselves. Students with a family allergy history were 2.16 times more likely to develop allergic rhinitis than those without a family allergy history. Students who have been exposed to smoke, dust, and pets hair were 2.29 times more likely to have allergic rhinitis than other groups. Students with nasal septum deformities were 117 times more likely to develop allergic rhinitis than students without deformities (OR = 117.34; 95% CI: 46.91-293.50; p <0.001) . The results of the association between allergic rhinitis and family allergy history in our study were similar to those of other authors:

Duksal F and colleagues (Turkey); Kim WK (Korea, 2012); Salehi M and colleagues also found that a family allergy history is the only important factor related to allergic rhinitis (OR 23.64; 95% CI =

11.63-48.04). The association between allergic rhinitis with environmental dust and smoke factors, history of exposure to dust, pets hair has also been confirmed in other studies. The results of multivariate analysis also showed that the most influential factor on the occurrence of allergic rhinitis in secondary school students in Vinh city is the nasal septum deformity. The findings in our study were similar to those of some other authors' studies: Mariño-Sánchez F and CS in a follow-up study of 150 children and adolescents with an average age of 13 ± 2.8 years with diagnosed long-term allergic rhinitis under the guidance of ARIA and endoscopic examination of the nasopharynx detected 87% of cases of nasal septum deformities. Yu HA and partners conducted a study to observe on 113 patients with nasal septum deflected with long-term allergic rhinitis, these patients have undergone surgery to correct the nasal septum to treat allergy rhinitis and follow-up after 3 months, the authors concluded: For patients with long-term allergic rhinitis who had nasal septum deflected after conventional drug treatment did not achieve expected results while surgery editing can achieve better results. A study published in 2014 by Zhao Y and partners also confirmed that nasal septum deflected surgery is effective in improving symptoms of allergic rhinitis.

4.3. Treatment effect of Avamys

In our study, 45 students were randomly selected among students with allergic rhinitis, who were intervened with Avamys spray once a day for 3 months. The symptoms (itchy nasal, diminished sense of smell, sneezing, runny nose, stuffy nose), physical symptoms (condition of the nasal mucosa, nasal concha) and clinical indicators (Total IgE, total IgG, Mastocyte decomposition

reaction) were evaluated before and after intervention with the same assessment method. The quality of life of patients was also assessed at two times before and after the intervention to compare the changes in patient's quality of life.

The results of our research showed that Avamys treatment was effective both clinically, subclinically and the quality of life of students who had allergic rhinitis in Vinh City, Nghe An. Clinically, the symptoms and physical symptoms after treatment were significantly reduced. The clinical efficacy of Avamys is also described in several studies around the world. In Japan, the author Okubo studied on 446 patients with allergic rhinitis showed that the use of fluticasone furoate 110 μg once daily showed symptoms of sneezing, runny nose and stuffy nose were reduced from the first day of treatment. In the research of Meltzer E.O in 360 adult patients with seasonal allergic rhinitis in the US also showed the effect of reducing all four symptoms of sneezing, runny nose, stuffy nose and nasal itching. In the subclinical view, the results from table 3.17 showed that after 3 months of treatment, the change in skin test results in both the number of positive cases and the positive levels was not different with $p > 0.05$. We also evaluated mastocyte decomposition reaction - indirect method to quantify specific IgE, results after 3 months of treatment, mastocyte decomposition reaction in allergic rhinitis patients were conducted before treatment and given rate positive 100%, after treatment there was no negative case; level 1 (+) increased, level 3 (+) decreased. Analysis of each patient before and after treatment showed no significant change with $p > 0.05$ This might be because the mechanism action of avamys was making the membrane cells more stable, thus limiting the breakage after 3

months of treatment, but due to the short duration of treatment, the drug did not alter the IgE production when exposed to allergens, so the change was not statistically significant. Considering the results of quantitative IgE and IgG (table 3.19) showed that there was no statistical difference before and after treatment, even when analyzing the change in total IgE content in each patient. Due to the role of IgE antibodies associated with allergic disease type I (classified by Gell and Coombs) included diseases such as allergic rhinitis, bronchial asthma, allergic dermatitis, so the determination of IgE was necessary. However, IgE levels vary between allergic people with an allergy and they with many allergens.

Another effect of the intervention is evaluated as an impact on the quality of life of the study subjects. Allergic rhinitis reduced quality of life in many respects, causing the patient felt tired, uncomfortable, reduce concentration, headache, irritable, more easily angry. The results of our study showed that, after 3 months of Avamys spray treatment, quality of life was improved in all activities, nose and eye symptoms and practical issues as well as general average, reduced from 70 to 80% in all indicators, the difference was statistically significant with $p < 0.01$ (Table 3.26). Our results were higher with some other studies.This difference may be due to the following reasons: firstly, the initial evaluation time selected patients with obvious symptoms or clinical manifestations, so quality of life at the beginning of the study is greatly affected; secondly, because the assessment results were compared with the starting time of the patients themself; thirdly, due to different tools for assessing quality of life, mostly using Juniper’s quality of life table, combining using SF - 36 tables, or quality of life table of nationally specific; Fourth,

because our study only followed for 3 months, shorter than some other studies. However, this result also once again confirmed the effectiveness of Avamys treatment in students with allergic rhinitis.

4.4. Limitations of the research

Representation of the sample was not high because of the selection in a central province. Due to the cross-sectional descriptive study design, the analysis of the relationship between different environments, factors causing different allergic rhinitis to allergic rhinitis among students could not be done deeply and comprehensively. Design intervention for treatment with fluticasone furoate (Avamys) and evaluation of post-intervention on the same group (self-control) because no control group was somewhat limited in evaluating the effectiveness of intervention.

CONCLUSION

1. The status of allergic rhinitis in the junior high school students Vinh city

The prevalence of allergic rhinitis in secondary school students in Vinh city was 15.3%; The prevalence of allergic rhinitis in male students was 15.2%; in female students was 15.4% (p> 0.05); The prevalence of allergic rhinitis of students in inner city schools was 15.84%; suburban students was 13.92% (p> 0.05); The disease occurs seasonally, rising in October, November and December.

2. The factors related to allergic rhinitis in junior high school students

Multivariate analysis results:

- Students with a history of self-allergy were 1.31 to 2.33 times more likely to develop allergic rhinitis than those without a history of self-allergy;

- Students with a history of family allergy were 2.16 times more likely to develop allergic rhinitis than those without a family history of allergy;

- Students who have been exposed to animal hair , smoke, dust were likely to have 2.29 times higher levels of allergic rhinitis than the other groups;

- Students with nasal septal deformities were 117 times more likely to develop allergic rhinitis than those without deformities (OR = 117.34; 95% CI: 46.91-293.50; p <0.001).

3. The effectiveness of treatment with Fluticasone (Avamys)

a. Clinical efficacy: After treatment, the functional symptoms decreased from 100% that infected to 46.7% without symptoms of nasal itching; 44.4% had no symptoms of sneezing; 37.8% had a mild degree of runny nose; 42.2% had no symptoms of nasal congestion;

b. Subclinical efficacy: The rate of patients with strong positive skin test decreased after treatment but was not statistically significant (p> 0.05); The proportion of patients with reactive decomposition of Mastocyte is strongly reduced after treatment but not statistically significant (p> 0.05); Total IgE content, total IgG in each patient changed statistically insignificantly compared to before treatment (p> 0.05).

c. Improve the quality of life: After 3 months of treatment, the quality of life improves with a statistically significant difference compared to pre-treatment in all aspects of evaluation as well as

overall GPA. Specifically: 42.2% of patients were not limited to activities; 42.2% were no longer affected by nasal symptoms; 46.7% were not affected eye symptoms; Practical problems decreased significantly ($p < 0.05$).

RECOMMENDATION

From the research results, we make the following recommendations:

1. For students' parents

To pay attention to measures to avoid allergens for children, especially those with a history of personal allergies (neonatal eczema, urticaria, asthma) or a history of family allergy;

Recommended measures: Keeping the bedroom clean; closing the bedroom window, using air conditioner; Do not keep pets in the house; Do not use items from feathers; To pay attention to measures to keep children warm when the weather changes.

2. For the school

Notify the results of examination to the parents to enable them to be proactive in the prevention / treatment of allergic rhinitis for their children; Make a list of student management with allergic rhinitis as a material for managing students' health and facilities to implement intervention programs (if any).

3. For health workers

Avamys should be used in the treatment of allergic rhinitis for secondary school students in particular and children with allergic rhinitis in general.

LIST OF RELATED RESEARCH PROJECTS PULISHED BY AUTHOR

1. Tang Xuan Hai, Vu Minh Thuc, Pham Van Han (2019). "The status of allergic rhinitis in junior high school students in Vinh city, Nghe An province in 2015". *Journal of Community Medicine*. Volum 1(48), 2019.

2. Tang Xuan Hai, Tran Thi Thuy Ha, Pham Van Han, Vu Minh Thuc (2018). "Factors related to allergic rhinitis in secondary school students at Vinh city, Nghe An province in 2015". *Vietnam Journal of Preventive Medicine*. Volum 9 (28), 2018.

3. Tang Xuan Hai, Hoang Thi Giang, Tran Thi Thuy Ha, Pham Van Han, Vu Minh Thuc (2018). "Effectiveness of Avamys drug intervention for allergic rhinitis among junior high school students in Vinh city, Nghe An province". *Vietnam Journal of Preventive Medicine*. Volum 9 (28), 2018.