

## DISEASES DUE TO AIR POLLUTION IN ORADEA CITY: ALLERGY

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### Abstract

*Air pollution can affect human health from subtle biochemical and physiological changes to difficulty breathing, wheezing, coughing and aggravation of existing respiratory and cardiac conditions and has an impact on rising incidence of allergies and asthma. Allergy, a hypersensitivity disorder of the immune system, affects currently a high number of people around the world.*

*In this paper we present the results concerning the amount of some anti-allergy medicines released between 2009-2011, in a public pharmacy in Oradea. The study of anti-allergy drugs revealed an increase in the usage of antihistamine medicines for the treatment of allergic rhinitis which is in accordance with the competitive blocking effect of these compounds on the histamine receptor sites. The second generation antihistamines which possess selective pharmacological effect and less adverse effects, so called "non-sedating" antihistamines, are more often used currently for the therapy of children and adults allergies. The high number of antihistamine medicines released reveals a high number of patients suffering from allergy in accordance with the low air quality in Oradea city.*

**Key words:** air quality, allergy, allergic rhinitis, anti-allergy medicines, antihistamine medicines.

### INTRODUCTION

Air pollution is a broad term that includes many chemical (e.g. ozone O<sub>3</sub>, nitrogen oxides NO<sub>x</sub>, sulfur dioxide SO<sub>2</sub>, carbon monoxide CO), physical (particulate matter) or biological (e.g. bacteria, viruses, house dust, saliva and animal dander, pollen) agents that modify the natural characteristics of the atmosphere. Outdoor and indoor air pollution is a major environmental risk to human health that may cause respiratory disease, allergy and a large number of deaths. The World Health Organization estimates that 4.6 million people die each year from causes directly attributable to air pollution and research studies published in 2005 showing that 310,000 Europeans die annually due to air pollution.

Allergy is an abnormal reaction of immune system to allergens manifested by release of histamine (hypersensitivity disorder of the immune system). Many allergens such as gases emissions, dust or pollen are airborne particles. In these cases, symptoms arise in areas in contact with air such as eyes, nose and lungs. *Allergic rhinitis*, also known as *hay fever*, causes irritation of the nose, sneezing, itching and redness of the eyes.

Air we breathe can affect human health from subtle biochemical and physiological changes to difficulty breathing, wheezing, coughing and

aggravation of existing respiratory and cardiac conditions and has an impact on rising incidence of allergies and asthma. Hay fever was rare in Japan before the World War II but it is now common and mostly affects people living in Japanese cities and near highways. Allergic disease is also more common in highly developed countries in North America and Europe and less common in Third World countries. There is also a higher rate of allergic disease in urban populations versus rural populations although these differences are becoming less defined (sources: GINA 2009; <http://www.epa.gov>; <http://www.sciencedaily.com>; Kay, 2000; Bope et al., 2005; <http://www.medicinenet.com>; <http://www.lbl.gov.html>; <http://www.merckmanuals.com>; Cooper, 2004).

The prevalence of allergic diseases increased but the recent years showed a possible plateau in the prevalence of these diseases in economically developed countries. Romania, as a developing country, is still on the upward slope for the prevalence of allergic diseases. Even if in the last 20 years the number of patients suffering from allergies increased in Romania, we are still below the level of economically developed countries. Thus, allergic rhinitis in Romania is diagnosed in 8-10% of adolescents compared to 20-30% in economically developed countries (sources: <http://www.saptamanamedicala.ro>).

## MATERIAL AND METHOD

Research has been made about the release of some anti-allergy medicines between 2009-2011 in a public pharmacy in Oradea. We tried to determine the increase or the decrease of using these medicines along three years, watching the turnover of these products and determining thereby the exact amount of drugs needed to accomplish the pharmacological effect and not the marketing of these pharmaceutical products, represented through an increase or a decrease in sales.

Treatment for allergies include avoiding known allergens and use of medication such as:

- *antihistamines* (histamine H<sub>1</sub>-receptor antagonists) are used primarily for the symptomatic relief of hypersensitivity reactions such as allergic rhinitis, urticaria, allergic conjunctivitis, angioedema. Antihistamines diminish or abolish the main actions of histamine in the body by competitive, reversible blockade of histamine receptor sites and specifically prevent allergic reactions;
- *glucocorticosteroids* that modify the immune system;
- *anti-leukotriene* such as montelukast (Singulair) or zafirlukast (Accolate);
- *other medication* such as decongestant (pseudoephedrine) or bronchodilators (anti-asthma medicines) that alleviate the symptoms.

## RESULTS AND DISCUSSIONS

Comparing the held data, we found that antihistamine drugs are most commonly used in therapy and the study was undertaken on these kind of pharmaceutical products (13 pharmaceutical products, tables 1-4, fig. 1-4). In the management of allergic rhinitis, the active drugs are given by mouth. When skin disorders (urticaria, prurit) are associated with allergic rhinitis, the topical application of antihistamines is possible but not recommended because of a high risk of skin sensitisation.

*Table 1*  
Amount of antihistamine preparations containing loratadine issued in 2009-2011.

Item No.	Commercial name	International common name/ composition	2009 (boxes)	2010 (boxes)	2011 (boxes)
1.	CLARITINE	loratadine 10 mg x 10 tablets	210	216	199
2.	FLONIDAN	loratadine 10 mg x 10 tablets	216	234	95
3.	SYMPHORAL	loratadine 10 mg x 10 tablets	52	50	253

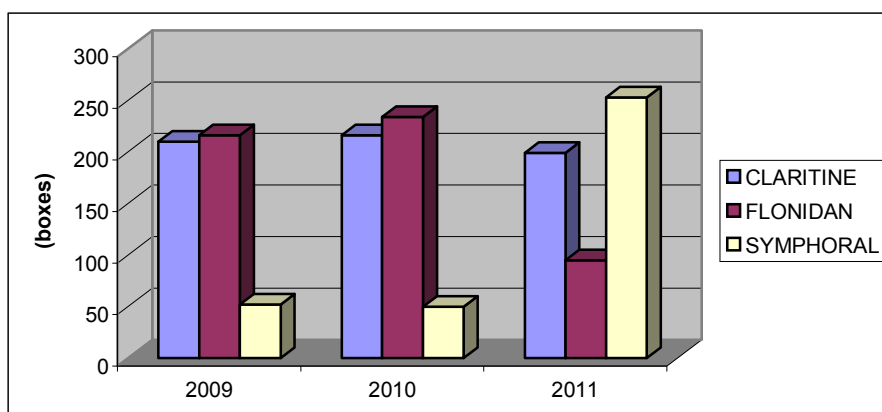


Fig. 1. Variation of release from the pharmacy of antihistamine preparations containing loratadine.

*Table 2*  
Amount of children antihistamine preparations containing loratadine issued in 2009-2011.

Item No.	Commercial name	International common name/ composition	2009 (boxes)	2010 (boxes)	2011 (boxes)
1.	CLARITINE SYRUP	loratadine 1 mg/1 ml	68	60	57
2.	FLONIDAN SYRUP	loratadine 1 mg/1 ml	25	17	14

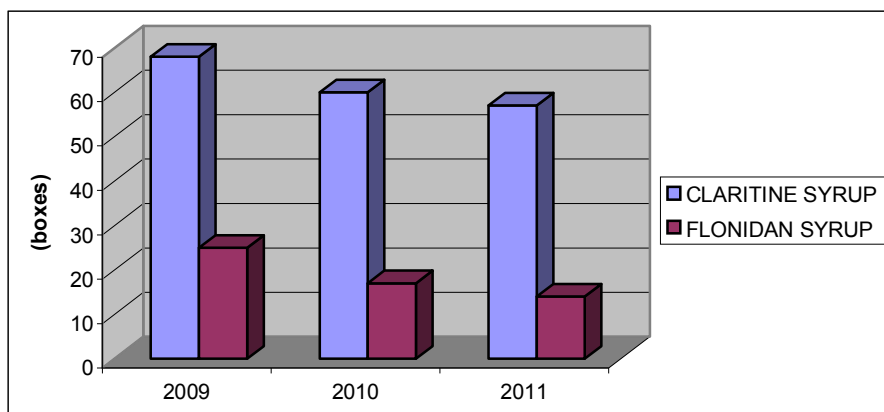


Fig. 2. Variation of release from the pharmacy of children antihistamine preparations containing loratadine.

Table 3

Amount of anti-allergy preparations containing other antihistamine compounds issued in 2009-2011.

Item No.	Commercial name	International common name/ composition	2009 (boxes)	2010 (boxes)	2011 (boxes)
1.	AERIUS	desloratadine 5 mg x 30 tablets	136	159	119
2.	ALERID	cetirizine 10 mg x 10 tablets	54	37	35
3.	KETOTIFEN	ketotifene 1 mg x 20 tablets	51	28	17
4.	XYZAL	levocetirizine 5 mg x 30 tablets	185	160	300
5.	ZYRTEC	cetirizine 10 mg x 7 tablets	0	6	16

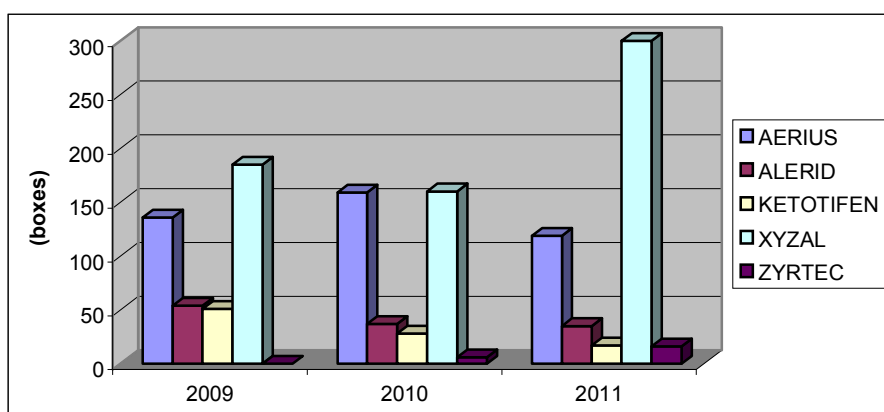


Fig. 3. Variation of release from the pharmacy of anti-allergy preparations containing other antihistamine compounds.

Table 4

Amount of children anti-allergy preparations containing other antihistamine compounds issued in 2009-2011.

Item No.	Commercial name	International common name/composition	2009 (boxes)	2010 (boxes)	2011 (boxes)
1.	KETOF SYRUP	ketotifene 1 mg/5 ml	9	42	36
2.	XYZAL	levocetirizine 5 mg/1 ml	5	9	11
3.	ZYRTEC	cetirizine 20 mg/1 ml	49	45	60

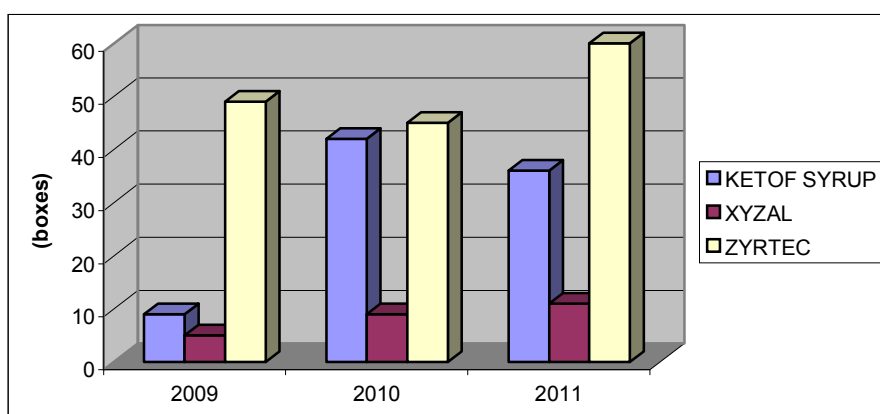


Fig. 4. Variation of release from the pharmacy of children anti-allergy preparations containing other antihistamine compounds.

The study of data revealed that *loratadine*, a second generation antihistamine drug, is often used in the therapy of adults and children suffering from some allergic disease because of its two important advantages: does not generally cause sedation or antimuscarinic effects (less adverse effects) and has long half-life time which allows the administration in a single daily dose.

Among the anti-allergy preparations containing other antihistamine compounds, the *cetirizine* can be mentioned as the most used recently. Cetirizine crosses the blood-brain barrier only slightly, reducing the sedative side-effect common with older antihistamines. The metabolic effects of cetirizine are long acting, remaining in the body for a maximum of 21 hours before being excreted and allow the administration once daily. Levocetirizine (Xyzal), the levo enantiomer of cetirizine (racemic), is more often used in the treatment of adults allergies, since cetirizine (Zyrtec) is more often used in the treatment of children allergies (sources: Martindale, 2002; Gupta et al., 2006; Anderson et al., 2002; <http://www.pfizer.com>).

## CONCLUSIONS

Study of anti-allergy drugs revealed an increase in the usage of antihistamine medicines for the treatment of allergic rhinitis. Other anti-allergy medicines as glucocorticosteroids are less used because of their significant adverse effects. Among the antihistamine drugs, the traditional antihistamines have been associated with troublesome sedative and antimuscarinic effects. The second generation antihistamines which possess selective pharmacological effect and less adverse effects, so called "non-sedating" antihistamines, are more often used currently for the therapy of children and adults allergies.

The high number of antihistamine medicines released in only one public pharmacy in Oradea revealed a high number of patients suffering from these diseases in accordance with the low air quality in this city.

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