

Original Research Article

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## Influence of Pollen Grains in Allergic Diseases

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### ABSTRACT

#### Keywords

Allergens, Allergic diseases, Pollen grains, Allergy tests

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In this study is presented the influence of different plant's pollen grains on the spread of allergic diseases in people sensitive to allergic factor living in Elbasan region of Albania for 2018. To achieve this goal, allergy tests have been performed by prick test on a number of individuals who have shown signs of allergies. 10 plant allergens (*Alnus glutinosa*, *Artemisia vulgaris*, *Ambrosia* sp., *Betula pendula*, *Corylus avellana*, *Parietaria officinalis*, *Phleum pratense*, *Platanus orientalis*, *Quercus* sp., *Secale cereale*) were used and the variability of allergenic disease by pollen was studied by age group, place of residence, gender and months of the year. From the study it turned out that the worst affected age group is 20-30 years old; the largest number of allergy sufferers was in the city, *Alnus glutinosa* was the main cause of the allergic diseases and the largest number of people suffering during the spring seasons.

### Introduction

Although allergy is an allergic disease of centuries-old background, it is one of the most important health problems present everywhere in the world. In the last 20 years, the frequency of allergic diseases in developed countries of the world has doubled and quadrupled, concerns raised the reason for a new epidemic of the 21<sup>st</sup> century. It is estimated that allergies and asthma affect almost one in nine adults and one in five children, with negative impacts on quality of life, work and school life. They may still cause death (Lewis and Lewis, 1977; Lewis *et al.*, 1991; Bauchau and Durham, 2004).

Significant factors that favor the development of allergic diseases are: foods, plants and domestic dust (Ducker and Knox, 1986). Allergic individuals should be particularly careful, consult with allergists and adapt their lifestyle through the application of simple protective measures (Kallajxhiu, 2011). Although science has progressed so much today, it is necessary to provide doctors with a lot of technological support to diagnose allergic diseases and ongoing therapy (Bottelli *et al.*, 1982).

One of the major diseases is allergy caused by pollen of different herbs. Since this disease is widespread in the Elbasan district, the first

study and the exact definition of their cause emerge. Elbasan is one of the most affected cities by allergic diseases in Albania. There are many pollen plants in the district of Elbasan cause allergy in the particular patient (Paparisto *et al.*, 1988; Qosja Xh., 1988; Vangjeli *et al.*, 2000; Lekli *et al.*, 2008; Miho *et al.*, 2011).

The increase of the number of allergic patients in our city has also affected the environmental pollution since, for about three decades, Elbasan's Metallurgical Combine discharged into large quantities of harmful gases to the organism. The literature shows that in the spread of allergic diseases, one of the factors influencing, among other things, is the pollution (Gega and Shehu, 2007; Hoxha and Avdolli, 2007).

High sensitivity of patients to allergic plant pollen has many elements of genetic origin but the spread of this disease is also related to urban development, pollution, traumas and psycho-emotional stresses of the environment where populations live (Galli, 2000; De Swert, 1999). By detecting the local allergens, we help the allergic physician to diagnose the diagnosis correctly, to help the sick people to recognize and avoid the causes of their illness, to sensitize the companies and the relevant instances to take action in limiting plants that cause allergies but also serve the plants ornamental (Knox, 1979).

The object of this study is to know the allergic plants, the distribution and their quantity in the district of Elbasan; the spread of allergic diseases in residents as well as the impact of environmental pollution on the development of this disease.

The concrete objectives of our study are:

1. The identification of allergenic plants of the area as well as the different spectrum of flora.

2. The prevalence of allergic diseases during 2018 it depends on the gender, the age group and the place of residence.
3. The measures to be taken to improve the situation.

## **Materials and Methods**

Precise determination of allergy syndrome is done in two ways, with the skin test and with the immune blood tests. These methods help to prevent symptomatology of allergic diseases. Recognizing the cause allergen, the patient receives the information about the flourishing and the pollinating period of a large number of plants. By studying local allergens, the patient is also assisted by the allergologist, by accurately diagnosing the disease, assisting the patient to avoid the cause of the disease as well as sensitizing society to take measures to limit the plants that cause allergic diseases. Allergy tests are done with 10 plant allergens. They belong to 7 families. Their list is presented in Tab. 1.

## **Diagnostic mode**

Prior to carrying out the allergy test, the patient was asked about the environment in which he lived and worked, we were informed about the country of birth and the geographic character of the territory of his residence.

These data are very important because they allow us to know the allergologic flora of the patient's living area, and we are able to correlate the patient's symptoms with the pollen period. Next, we asked the patient at what age the first signs of allergy have started, what changes have been verified in later years, if they have an annual periodicity if they are noticed more day or night if they appear in circumstances and locations certain if the concerns grow or improve in the windy or rainy days.

Here not left behind the question of whether the subject has undergone allergology investigations and what their results are; if a specific hypnosis-type therapy has been practiced for how long and how to give, frequency, dose, and so on. Also, the patient was asked whether he is following a drug therapy and what medicines are used. With this data we have completed the anamnestic framework.

## Results and Discussion

### Morphological description of plants causing allergy

For each plant causing allergy in Elbasan region of Albania is presented:

- The family to which it belongs;
- The gender to which it belongs;
- Species name, followed by the initial author who has described the first;
- A brief morphological description of the plant;
- The habitat where it lives;
- Blossoming period.

### Comparative analysis of allergic cases for 2018

The following tables (1-4) show the data of patients suffering from allergic diseases caused by plant pollen of different plant families for 2018. The results are obtained after the allergy tests have been made with the appropriate methods. It is known that high sensitivity to allergic factor in patients varies in age, gender and different months of the year.




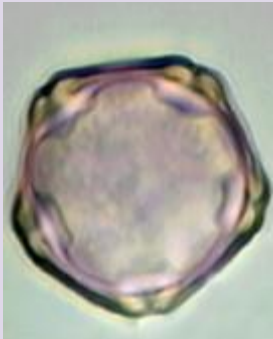
These reports range from one region to another. The table 3 shows the allergy tests for 2018 in the "Genius" laboratory developed for 140 patients. Of these, 83 patients were males and 57 were females.

The following chart clearly shows that the allergen of the *Alnus glutinosa* plant is the main cause of allergy from pollen for patients who have undergone allergy tests during this period; namely 47 patients. Then follows *Betula pendula* with 25 patients and *Quercus* sp. with 13 patients. Other allergens have fewer positive cases.

**Table.1** List of allergenic plants used for allergy tests







Nr.	The name of allergenes	Family	Bloosoming period
1.	<i>Alnus glutinosa</i>	Betulaceae	February - March
2.	<i>Artemisia vulgaris</i>	Compositae	July - October
3.	<i>Ambrosia sp.</i>	Compositae	July - September
4.	<i>Betula pendula</i>	Betulaceae	March - April
5.	<i>Corylus avellana</i>	Corylaceae	February - March
6.	<i>Parietaria officinalis</i>	Urticaceae	May - October
7.	<i>Phleum pratense</i>	Graminaceae	May - August
8.	<i>Platanus orientalis</i>	Platanaceae	April - May
9.	<i>Quercus sp.</i>	Fagaceae	Aprile - May
10.	<i>Secale cereale</i>	Graminaceae	May - July

**Table.2** Morphological features of herbs and microscopic photos of pollen grains

Characteristic features of plants	Photos of plants in a natural habitat	Microscopic photos of pollen grains (equatorial and polar views)
<p>I. Family: Betulaceae</p> <p>1.1. Gender: <i>Betula</i> L.</p> <p><i>Betula pendula</i> Roth.</p> <p>It is a monoik tree up to 20 m with white skin. The leaves are triangular or rombic, glabrous. Male flower are 3-6 cm and are formed in the fall; Planted in parks and streets as ornamental tree (Paparisto <i>et al.</i>, 1988). The pollen of this plant is considered strongly allergic to people sensitive to allergy (Vaughan and Black, 1948; Stanley and Linskens, 1974; Lewis and Lewis., 1977; Bassett <i>et al.</i>, 1978).</p>	 <p>Bloom: <i>March to April</i></p>	 <p>(discoverlife)</p>
<p>1.2. Gender: <i>Alnus</i> Miller.</p> <p><i>Alnus glutinosa</i> (L.) Gaertner.</p> <p>It is wood up to 20 (25) m, rarely bushy, with holes, dark brown. New branches are contagious and usually shabby. The leaves are elliptical-oval, upside-down and almost rotational, double-edged, squashed, overcast with dark blisters. The female gaths and the 3-5 (-6) fruits are found in every villa. This type of wood is frequent in streams and wetlands, rarely in wet forests (0-1600 m) This plant has industrial-agricultural values (Paparisto <i>et al.</i>, 1988). Studies show that pollen grains of this plant are present in the air in large concentrations and can provoke polynose. The pollen grains of this plant is strongly allergic (Lewis and Lewis., 1977).</p>	 <p>Bloom: <i>Februar to March</i></p>	 <p>(photo: Camacho I.)</p>

<p>II. Family: Platanaceae</p> <p>2.3. Gender: <i>Platanus</i> L.</p> <p><i>Platanus orientalis</i> L.</p> <p>It is wood up to 40 m, with white holes dividing tiles-tiles. The leaves are wavy, with push when new and then slender. The flowers are monoich; female claws usually 3-6, hanging on a long tail. Grows near the rivers and water; planted in parks and streets.. It is an ornamental wood and is used in carpentry and sculpture (Paparisto <i>et al.</i>, 1988). When it is in large quantities in the air, the pollen of this plant is allergic (Lewis and Lewis, 1977, Stanley and Linskens, 1974).</p>	 <p>Bloom: April to May</p>	 <p>(photo: Kallajxhiu N.)</p>
<p>III. Family: Fagaceae</p> <p>3.4. Gender: <i>Quercus</i> L.</p> <p><i>Quercus</i> sp.</p> <p>This gender includes 11 species in the Albanian flora (<i>Quercus coccifera</i>, <i>Quercus ilex</i>, <i>Quercus trojana</i>, <i>Quercus macrolepis</i>, <i>Quercus cerris</i>, <i>Quercus petraea</i>, <i>Quercus dalechampii</i>, <i>Quercus robur</i>, <i>Quercus frainetto</i>, <i>Quercus virgiliana</i>, <i>Quercus pubescens</i>).</p> <p>All are woods, rarely shrubs. Leaves are squashed or serrated, rarely full, falling or evergreen. The male flowers are numerous (Paparisto <i>et al.</i>, 1988). Pollen grains of all species of this genus result allergic (Basset <i>et al.</i>, 1978).</p>	 <p><i>Quercus coccifera</i> L.</p>  <p><i>Quercus cerris</i> L.</p>  <p><i>Quercus ilex</i> L.</p>	 <p>(photo: Kallajxhiu N.)</p>  <p>(photo: Kallajxhiu N.)</p>  <p>(photo: Kallajxhiu N.)</p>

<p>IV. Family: Corylaceae                  4.5. Gender: <i>Corylus</i> L.  <i>Corylus avellana</i> L.</p> <p>It is a shrub up to 6-7 m, with smooth brown holes. 2 year old branches are strong and with smooth skin. Hanging roses, up to 8 cm long and 5-6 mm thick. It is a frequent plant and is located in the hills and the mountains forming small forests (0-1400 m).</p> <p>From literature, it turns out that when the pollen grains of this plant are in high concentrations in the air it is a cause for allergic diseases (Lewis and Lewis, 1977; Bassett <i>et al.</i>, 1978).</p>	<p>Bloom: <i>April to May</i></p>  <p>Bloom: <i>February to March</i></p>	 <p>(Pollen catalogue of the British Isles)</p>
<p>V. Family: Gramineaceae                  5.6. Gender: <i>Secale</i> L.  <i>Secale cereale</i> L.</p> <p>It is one-year herbaceous plant. Leaves are 5-10 mm broad, flat, usually tough on the upper surface. The leaves are 6-15 mm, dense to the carina, without or with a short hernia. It is a cultivated plant. Forage plants (Vangjeli <i>et al.</i>, 2000). The pollen grains of this plant cause allergy (Bassett <i>et al.</i>, 1978; Lewis and Lewis, 1977; Stanley and Linskens, 1974).</p>	 <p>Bloom: <i>May to July</i></p>	 <p>(photo Kallajxhiu N.)</p>
<p>5.7. Gender: <i>Phleum</i> L.  <i>Phleum pratense</i> L.</p> <p>It is a perennial plant, 6-150 cm tall. Leaves up to 45 cm x 10 mm, tough on either side or at least in the direction of the tip and lips. It is found in meadows, pastures and often cultivated as forage plants (Vangjeli <i>et al.</i>, 2000). The pollen grains of this plant are allergic (Bassett <i>et al.</i>, 1978; Lewis and Lewis, 1977; Stanley and Linskens, 1974).</p>	 <p>Bloom: <i>May to August</i></p>	 <p>(photo Kallajxhiu N.)</p>

<p>VI. Family: Compositae</p> <p>6.8. Gender: <i>Artemisia</i> L.</p> <p><i>Artemisia vulgaris</i> L.</p> <p>It's a perennial herbaceous plant, aromatic, without winter rosettes. The stems are (30-) 60-120 (-210) cm, usually red or purple. The leaves are well-developed. Wreath is usually reddish brown. It is located in grassy areas, hedges, canals, etc. It is a medicinal herbs and is used against anemia, epilepsy, digestive acceleration, etc. (Vangjeli <i>et al.</i>, 2000). The pollen grain of this plant, from foreign literature results to be strongly allergic (Lewis and Lewis, 1977; Stanley and Linskens, 1974).</p>	 <p>Bloom: <i>Jul to October</i></p>	 <p>(photo <i>Kallajxhiu N.</i>)</p>
<p>6. 9. Gender: <i>Ambrosia</i> L.</p> <p><i>Ambrosia artemisiifolia</i> L.</p> <p>It is 30-100 cm high herbaceous plants, branched, nonaromatic. Leaves with pearls, often reddish. Naturalized plants in our country, mainly in the coastal regions (Vangjeli <i>et al.</i>, 2000). The pollen grains of this plant from foreign literature results to be strongly allergic (Lewis and Lewis, 1977; Stanley and Linskens, 1974).</p>	 <p>Bloom: <i>July to September</i></p>	 <p>(photo: <i>Camacho I.</i>)</p>
<p>VII. Family: Urticaceae</p> <p>7.10. Gender: <i>Parietaria</i> L.</p> <p><i>Parietaria officinalis</i> L.</p> <p>It's a perennial plant, 30-100 cm high. The leaves are like silky, elliptical, full, 3-12 x 2-3.5 cm. The roses are multi-lobed circles; lower flowers are female, others hermaphrodite or male flowers. It grows in cobblestones, low-back walls and ruins.. It's a medicinal herbs and is used against urinary diseases and rheumatism. (Paparisto <i>et al.</i>, 1988). The pollen grains of this plant is considered strongly allergic (Lewis and Lewis, 1977; Stanley and Linskens, 1974).</p>	 <p>Bloom: <i>May to October</i></p>	 <p>(photo: <i>Kallajxhiu N.</i>)</p>

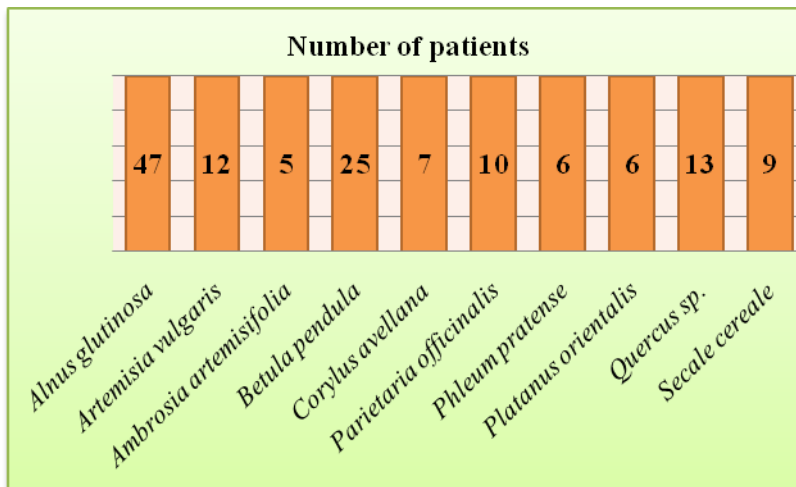
**Table.3** Allergology analysis by gender

Gender of patients	Number of patients
Men	83
Female	57

**Tab.4** Summary table of allergic patients by place of residence for 2018

Area where he live	Number of patients
Village	85
City	55

**Chart.1** Number of patients that suffered from allergenic plants



**Chart.2** Number of allergic patients by month 2018

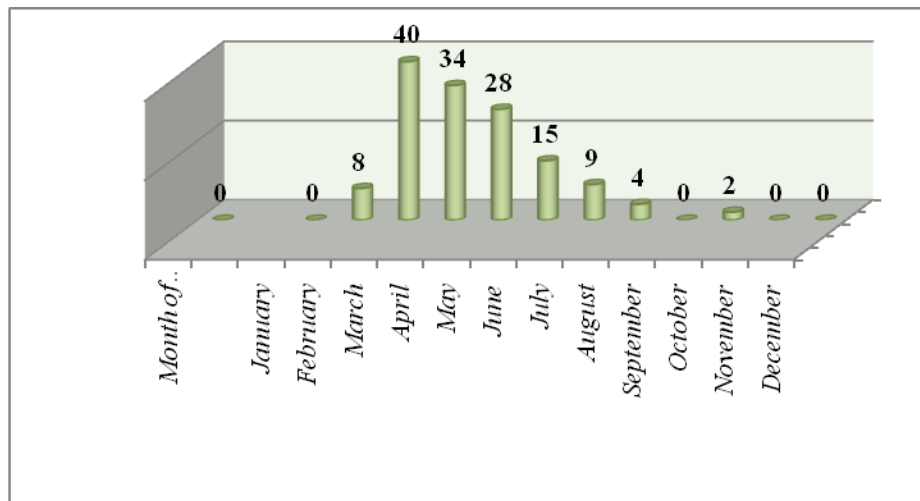
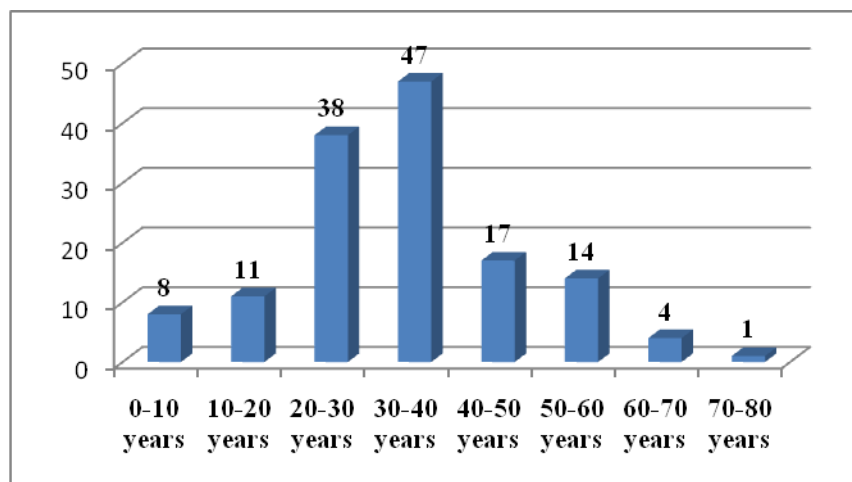




Chart.3 Allergy cases by age group



There is a significant change in the number of analyzes during the months of 2018. The following chart shows that the highest number of patients participating in allergic tests is in April with 40 patients, the following month in May with 34 patients and so in turn. This, in my opinion, is related to the fact that most of allergenic plants have a period of bloom in these months.

The largest number of patients belongs to the population of the city, namely 85 allergic patients. This is related to the biggest pollution that is observed in the city. This is explained from the data of table 4.

Moreover, the city of Elbasan is one of the most polluted cities in Albania. (Gega and Shehu, 2007; Hoxha and Avdolli, 2007). Starting from foreign and Albanian literature, we have a record of the values recorded on this fact.

From the above graph it is clear that for 2018, the patients who suffered the most from allergy of pollen grains belong to the age group 30-40 years with 47 cases. Further, age groups 20-30 years old with 38 cases and so on. I think that this occurs because of the fact that these age groups are the most active and are more in contact with the allergenic pollen.

Also, they are more in closed environments and where more tobacco is smoked. These factors greatly affect the appearance of allergic diseases.

The conclusions we have drawn from this study are based solely on data obtained at the "Genius" laboratory, located in Tirana. It is understandable that the number of patients who may have undergone allergy tests from the Elbasan district may be even greater because many others may have done these tests in other laboratories.

From the study it turns out that:

During 2018, the number of patients who tested allergy from pollen grains in the Elbasan region was 140 patients. The main cause was the pollen of the *Alnus glutinosa* plant, with 47 cases. This plant is also cultivated as decorative trees of the streets. Allergic diseases are most commonly encountered in the city than in the village, respectively with 85 cases in city. The most affected gender was male, with 83 patients. The largest number of patients suffering from allergy is observed during the spring season. This matched with the flourishing period of allergenic plants.

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