

Effects of Air Pollution on Allergic Properties of Wheat Pollens (*Triticum aestivum*)

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ABSTRACT

To study the effect of air pollution on allergic properties of wheat pollens (*Triticum aestivum*), aquatic extracts of pollens were collected from clean and polluted environment, were used for performing an experiment on guinea-pigs aged 3 months. This was done by eyes and nose tests and intradermal injection. After 15 to 20 minutes, animal reaction towards extract of 2 testable groups was appeared by sneeze, cough and itch of eyes. In that point of intradermal injection, after mentioned time as well as signs of itch, red flare was appeared. In all cases, reaction of polluted extract is more than of clean or unpolluted extract. Blood factors such as blood sugar, eosinophil and IgE have increased in the allergic mode.

Key words: air pollution, allergic properties, Wheat pollens

Introduction

Plants which belong to *Compositae* have analogous and like kinds and types that spread worldwide and they have been from upper Kertase period as yet. All plants of this division are grassy and rarely wooden. These plants have special shape and form that is called wheaten mode (gramini form). Graminis are grasses aged one or several years which cause to congested, pressed growings. Rhizome of wheats that is agent of stability and durability of plants in few years has accompaniment branches and growth (Sampodic) and various aerial stalks are caused by it yearly.

Pollen grains of wheat divisions always blow in flower before ovule. So pollination in these plants is like cross. Pollination is done by wind or indirectly. Ancient information about allergy that is available, relates to Galen and Hippocrates. They have detected that some people sneeze in the vicinity of plants and flowers but they were not aware about its quality. Today we know that some of allergic patiences such as asthma, hay fever, migraine are intensified by some groups of plants. Scientists determine a different nature for pollen allergies. In 1970, Hesslop

and Harisson have assigned the situation of allergen proteins, in exine of pollen grains especially near to growing holes. In 1970, Knox announced the collection of allergen ingredients related to pollen in the cover of pollen. According to Havok opinion [4], part of pollen allergies has glycoprotein structure that for example causes to allergic reactions of pollen seeds of juniper.

Materials and methods

Method for Preparing the Pollens to Study with Scanning Electron Microscope:

For studies of scanning electron microscope, after full drying of samples, they were dried by critical point dryer (Balz Rsumion, CPD) by dioxide carbon, then after attaching on the aluminum base, were covered by covering unit of golden and were studied and photographed using scanning electron microscope (SEM).

Method of Preparing the Pollens for Direct Observation:

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One of current methods for morphological studies of pollen grain is (steulize) that was used in 1960 by Swedish scientist Erdtman for the first time. Natural mature pollens and pollens collected from regions with polluted air were prepared by steulize method and were compared under microscope.

Preparing the Pollen Extract:

To study allergic effects of pollen grain and considering the allergens, pollen extract is needed. So, different amounts of extract seed were weighted and were positioned in salt phosphate buffer. This pollen mixture was shaken at 4°C for 24 h, and after centrifugation (4600 gr in 50 min); produced fluid was kept at 20°C until its use.

Testable Animals:

Since some scientists have focused on sensitivity of guinea-pigs towards allergen agents and also on external allergic similarity of animal with human, in this study guinea-pigs aged 3 months were applied.

Experiments Performed for Studying the Allergic Figures:

1. Intradermal experiment:

to perform that trial, we have injected extract of pollens by insulin seringue in abdomen or thigh in which there are many jointed tissues. In the point of injection, local edema (wheal) was produced embossedly and with obvious borders. In experiments having positive result, after 10 to 20 minutes, red halo (Flare) was appeared in that point. Assay of wheal and Flare was done according to (mm) as a criterion in evaluating the allergic reaction in extract.

2. Experiment of Nose and Eyes:

in this method, few drops of extract were poured on the nose and eye mucus of Indian pig by a glass pipette. And the effect of pollen allergic reaction was studied by observing the nose mucus, severity and number of sneeze, stimulation and exudation of nose and also appearing the reactions such as itch, inflammation, more blood and histamine. Control test was done by pouring distilled water in nose and other eye, every 2 hours.

3. Assay of Blood Factors:

8 hours after injection, approximately 5 cc blood was got from the heart of guinea-pig and by using clinical methods, blood factors such as number of white corpuscle, sugar and IgE were studied and compared with existing Indian pig.

Results and discussion

Study of Allergic Reaction by Extracts:

Injecting different amounts of pollen extract related to testable plant to guinea-pig causes allergic symptoms such as sneeze, trembling of body, teardrop and reddening the eyes. Deadly concentration of extract was 10% concentration of extract that causes to allergic mode, for pollen extracts of clean air and for pollen extracts of polluted air was 7.2% and 4.2%, respectively. Injection of phosphate buffer (0/5 cc) as control to guinea-pigs of control group, have been not lead to positive skin reaction.

Results Earned from Skin Test:

Intradermal injection of pollens causes to itch firstly and after half hour leads to inflammation and reddening in the point of injection. Then it maximizes after 1 hour. Amount of inflammation in each 2 cases of pollen extract related to polluted and unpolluted air, was intensified as compared with clean samples. Also, red and inflammation rate in polluted samples was increased as compared with unpolluted samples, and inflammation has continued few days later (Fig. 1)

Results from Assay of Blood Factors:

IgE rate in blood is one of best indices related to allergic reactions. Study of IgE rate showed that its rate was increased because of the injection of pollen extract as compared with injection of phosphate buffer without extract (Fig. 2). Also, we have observed high improvement in P lower than 0/05 ($P < 0.05$) by comparing IgE in pollen extract of polluted air with pollen extract of clean air.

Blood sugar rate in guinea-pigs, was 120 mg% naturally, 193 mg% in allergic mode in comparison with pollen extract of clean air and 240mg in pollen extract of polluted air, in which we can observe high increase in P lower than 0/05 ($P < 0.05$) (Fig. 3). Study of Neutrophils and Eosinophils rate shows that their rate has been increased by injecting the pollen extract as compared with its rate in blood serum of animal before injection and also as compared with injection of buffer. Neutrophils and Eosinophils rate in pollen extracts of polluted air have developed as compared with extracts of clean air (Fig. 4).

Discussion:

Allergic patience's are damages that humans have been confronted with them and always paid so much value to detect, appease and cure them. Today, human civilization factor, creating different sources

of pollution in environment and also applying the special management have opened new door to allergen; these factors have few scientific confidence and lead to waste human resources.

Allergic reaction in one kind of pollen relates to frequency and power of its allergen [2]. With total results earned by skin test of breathing and eyes, power of allergic reaction in pollens of plants such as pine [8], silvery cypress [10], red rose and meadow, pennyroyal and thyme was confirmed.

Pollen grains of grasses are one of important allergen sources worldwide [5]. Abandoning the ingredients related to pollen grain in grasses causes to increase the allergens in environment and allergic reactions, after long periods of moisture especially in spring and summer.

Using the mentioned tests and confirmed experiences on guinea-pigs by scientists, in this study, also allergen of wheat pollen is confirmed.

Severe Eosinophil of blood [9] was introduced as a proof about creating the allergic reactions in body. According to this matter, increasing the Eosinophil of guinea-pigs after injection of pollen extracts is one of the reasons for its allergic reactions.

Increasing of blood factors such as blood sugar and IgE are proofs for allergic reactions caused by plant pollens.

In current decade, this matter has drawn many scientists attention that pollens act as a receiver and vector from different kinds of environmental pollution. With having the narrow and many holes in their exine, they also attract the mineral elements and other environmental pollutions and influence on sensitive animals as a store center of many kinds of allergic ingredients [1].

In recent years, some researches were done about allergic properties of pollen grains in Iran and the effects of environmental pollution on power of allergic reactions by pollens. Some of these searches include: studies of DiGiacchino & al. [2] about pollens of meadow in Iran, plane and slap in Tehran; about mercury [10]; about thyme and spearmint [9]. Recent study showed that in all experiments, effects of allergens of polluted pollens have been more specified and more severe in comparing with pollens collected from uncontaminated regions.

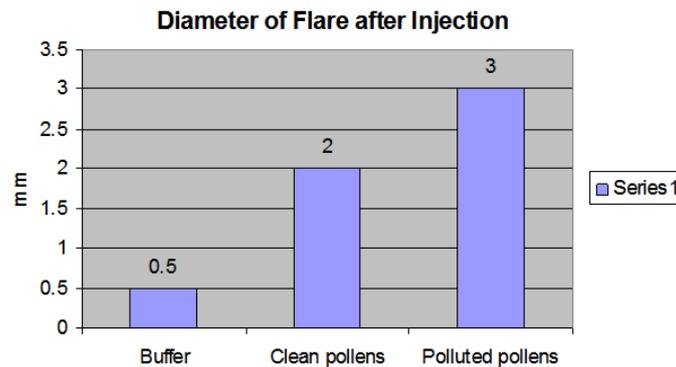


Fig. 1:

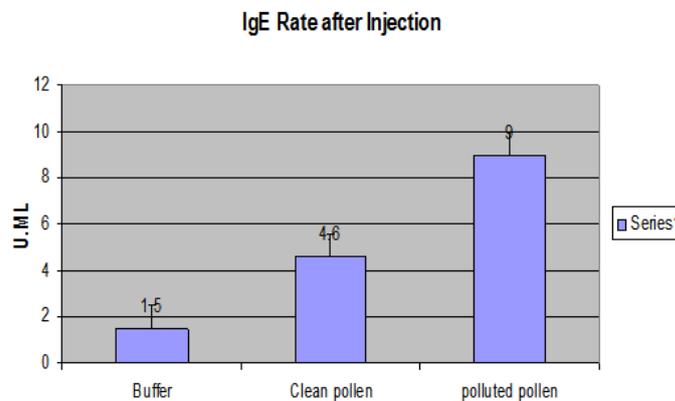


Fig. 2:

Rate of blood suger after Injection

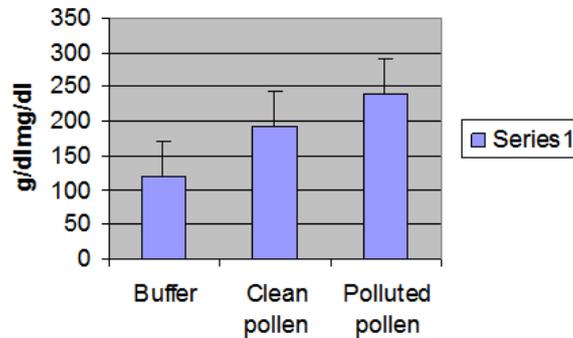


Fig. 3:

Changes of Eos %

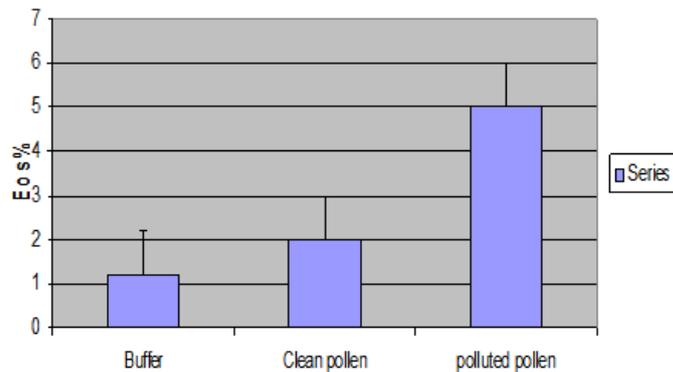


Fig. 4:

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