Aerobiological Pollution in the Fez-Meknes Region: Factors and Repercussions Affecting Health

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Abstract— **Aerobiological pollution is an emerging topic especially in the era of climate change. The region of Fez-Meknes is closely concerned by this problem since it is considered an agricultural area. In this study, we have conducted a survey among 190 participants whom are allergic to pollens in this region. At first, we have identified allergenic plants as well as periods of pollen allergies. In a second step, we have collected clinical manifestations and treatments used in pollen allergies. The results showed that herbaceous and olive trees are the most incriminated in pollen allergies. Other plants such as grasses, cypress and bitter orange were also allergenic. The plane tree (Platanus), plant less known to the general public, was also a source of pollen allergy. In addition, allergies to these plants are recorded mainly in early spring and can be observed throughout the year. The clinical manifestations related to these pathologies vary between ocular (27%), nasal (24.3%), respiratory (21.5%) and cutaneous symptoms (24.2%).The severity of the clinical signs varies according to the pollination periods of certain plants and the pollen's allergenic power seems to be increased in recent years. To circumvent these effects, the allergic persons use drug treatments. However, a good proportion of these people also opt for traditional treatments (32%). It was also supported that the treatments by medicinal plants are sometimes completed by Pharmaco-synthetic medicine intake (30%).**

In conclusion, the results presented in this work highlight the close relationship between air pollution, climate change and allergic pathologies and their impact on health in the Fez-Meknes region.

Keywords— **Atmospheric allergens, Allergic pathology, Medicinal plant, Pollen, Global warming**.

I. Introduction

Air pollution remains a major public health problem and has become a hot topic [1]. Many people are concerned with the harmful effects of air pollution, especially allergies to pollen [2],[3],[4].

Indeed, climate change influences pollen production [5],[6],[7] and the duration of pollination[8],[9],[10]. The number of individuals suffering from allergic diseases has increased considerably in recent years [11]. In addition, air pollutants appear to increase the allergenic power of pollen leading to an exaggeration of immune responses [12],[13],[14]. Allergic manifestations have also become more virulent and more difficult to treat [15],[16]. In this context, medical treatments as well as the management of these pathologies still cause problems from the point of view of efficiency [17].

In the present work, we are interested in pollen allergies in the region of Fez-Meknes. This choice is based on the fact that this region is closely concerned by this problem of pollen allergy.

II. Material and Methods

To study the allergic context in the region of Fes-Meknes, we conducted a survey of 190 people allergic to pollens. This sample included 112 males and 78 females. The majority of respondents were between the ages of 15 and 30 years old. In addition, 144 people lived in the city versus 46 who were in rural areas. To carry out our survey, we used a targeted questionnaire covering the seven zones of the region. These are Fez, Meknes, Boufekrane, El hajeb, Azrou, Ain Leuh and Lake Aouaa. These areas were visited during the first phase of the survey according to a pre-established plan (pre-survey). All participants in this study were informed of the purpose of the survey and participated anonymously. The data collected included personal information (sex, age, housing area, education level) and the main allergenic plants as well as the associated symptoms and the intensity of the allergy during the different seasons, on the other hand. The questionnaire also focused on the types of treatments adopted by people allergic to pollens (drug versus traditional treatment). Similarly, questions about traditional recipes used in the relief or prevention of symptoms of pollen allergy have been reported. It should be noted that we made sure that each interviewee was satisfied with the interviewees.

The various data we collected were analyzed on IBM SPSS Statistics 20.

III. Results

The results showed that plants are most involved in the initiation of allergy attacks in people with allergies (37.6%). The olive tree was also a source of allergens (23.39%) followed by grasses (11.93%), bitter orange (7.80%) and cypress (7.34%). In addition, we found allergenic plants, ignored or underestimated by people such as walnut, pomegranate and lemon tree. The plane tree, even less known, also triggers allergies in some people (Fig1).

Regarding the clinical manifestations of people with pollen allergies, ocular, nasal, respiratory and oral symptoms are the most common with a respective percentage of 27%, 24.30%,

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21.50% and 18.10%. Cutaneous manifestations come at last (Fig2).

Ocular manifestations of pollinosis result in tearing, itching and redness of the eyes (Fig3).

Nasal symptoms vary between itching and runny nose. A loss of smell and a runny nose with blood were also reported by 4.60% and 3% of the pollen-allergic individuals we interviewed during our survey (Fig 4).

As for respiratory manifestations, asthma is the most common clinical manifestation during pollinosis as 32.8% of the patients interviewed suffer from it, followed by shortness of breath. Cough and chest pain were also among the respiratory manifestations of pollen allergies (Figure 5).

Pain in the throat and mouth as well as laryngitis, tonsillitis and swelling of the oral cavity were cited by allergic people in our sample, with percentages varying from 37.40% to 9.90% (Figure 6).

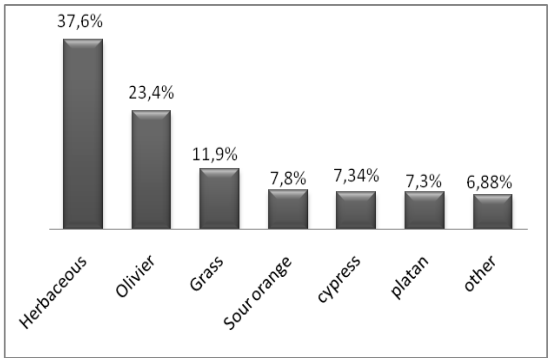

Fig 1: Allergenic plants in the Fez-Meknes region

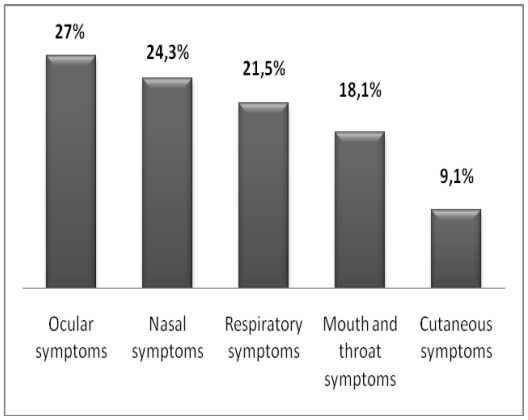

Fig 2: Clinical manifestations during pollen allergies

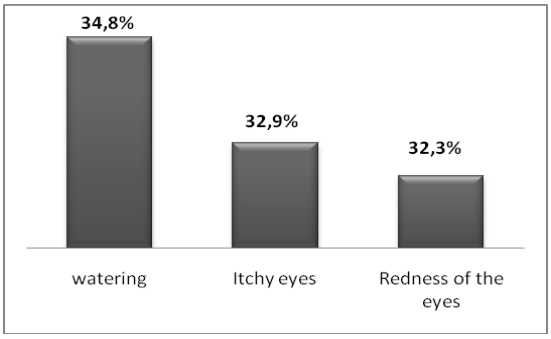

Fig 3: Ocular manifestations during pollen allergies

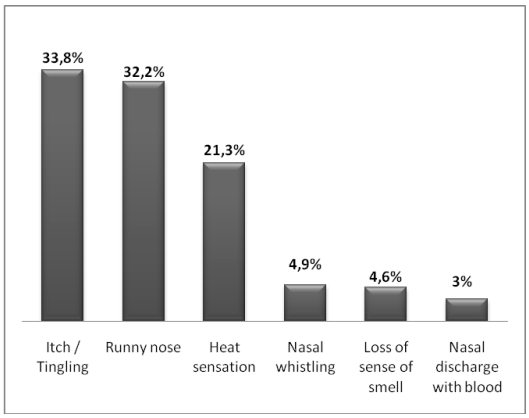

Fig 4: Nasal manifestations during pollen allergies

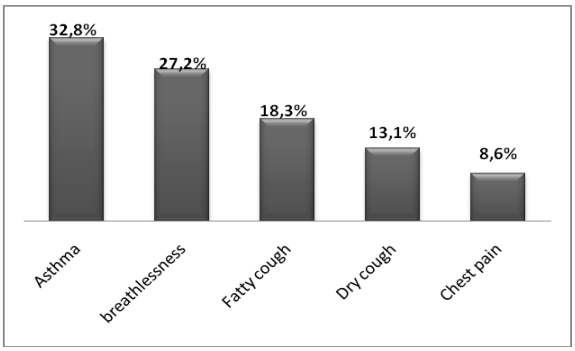

Fig 5: Respiratory manifestations during pollen allergies

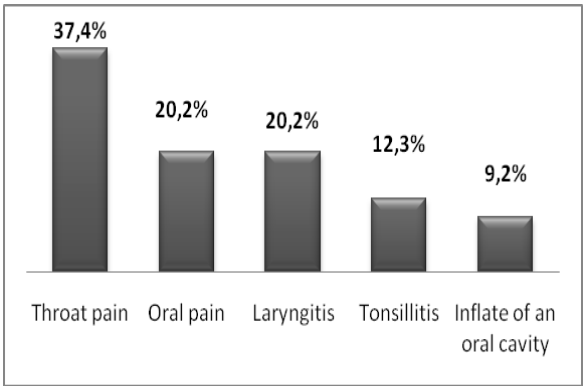

Fig 6: The manifestations of the ENT sphere during pollen allergies

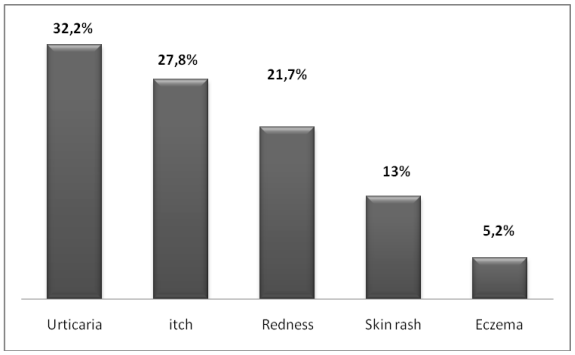

Fig 7: Skin manifestations during pollen allergies

Regarding cutaneous manifestations, hives, itching and redness of the skin were the most frequent in patients with allergies to pollen with respective percentages of 32.20%, 27.80% and 21.70% (Fig 7).

However, the severity of the clinical signs varies according to the pollination periods of certain plants, according to the answers we have collected. In addition, the allergenic power of pollen seems to be increased in recent years according to these same people. Three pollen seasons were identified based on pollination periods. Pollen allergies occur especially in the early spring and persist longer since 81.9% of people in our sample develop an allergy from the beginning of February to May.

It should be noted that the people in our study can develop allergic reactions to pollens throughout the year. In this context, sick leave and absenteeism have been reported in some cases of disabling allergies.

The hereditary nature of pollen allergies was also raised in our study. In fact, 33.2% of our sample confirmed the presence of a parent, a brother or a sister with at least one allergic pathology to pollen.

It should be noted that part of the population of our survey is insufficiently informed about pollen-related pathologies. However, the evolution of clinical symptoms over the years was recurrent in the responses collected and the environmental factor was often incriminated. In addition, these people describe typical symptoms of pollen allergy without correlating with the pollination of certain plants.

This finding was independent of their level of education. In addition, the vast majority of allergies suffered in our survey (60.5%) consult a doctor on a regular basis. We also observed through our survey that 23.20% of allergy sufferers opt for traditional treatments versus 28.4% who take medication.

In addition, a certain percentage of patients with pollen allergies use the combination of the two treatments (30%).

However, some people do not use any medicine to treat their allergy (18.40%). Regarding the actual medical treatment, 50.40% of allergy patients take antihistamines, to reduce runny nose, itchy nose and sneezing, as well as tingling of the throat and eyes. Corticosteroids are less used than antihistamines (24.80%).

However, these treatments do not seem to be of great use in 48.90% of allergy sufferers in our sample. In addition, the occurrence of side effects related to the use of these drugs was reported in our study (drowsiness, dizziness, nausea).

The use of traditional treatments based on natural recipes was mentioned by the patients we interviewed. The recipe made of common stramony (Datura stramonium) is the traditional treatment most used by the population of our survey.

IV. Discussion

Pollen allergies are becoming an increasingly important part of public health [18]. In this context, we conducted a survey of 190 people allergic to pollen in the region of Fez-Meknes to determine the allergenic plants and clinical manifestations on the one hand and the treatments used by these people to remedy or relieve their suffering from allergies. The results obtained showed that this region is full of allergenic plants. Herbs, olives and herbs are the most incriminated in triggering pollen allergies.

Indeed, the region of Fez-Meknes is known for its green spaces in the spring which are the result of several factors edaphic (type of soil ...) and climatic (precipitation, temperature ...) which create conditions favorable to the survival and development of this type of allergenic plants, especially herbaceous plants, olive trees and grasses. These plants are found mainly in the vicinity of Meknes, Boufekran, Hajeb and Fez while the Bigaradier and Platane are planted by the urban and rural communities of the region. These plants mainly release their pollens between February and May, which explains the high percentage of people with pollen allergies during this period.

The clinical manifestations reported by respondents correspond to those of upper respiratory tract disease (allergic rhinitis), ocular conjunctivitis, bronchial tube (asthma) and skin (dermatitis).

These results correlate with the clinical picture of allergies. In addition, periods of allergy appear to be influenced by several factors that would further aggravate the clinical picture of pollinosis. Many studies have reported that climate change plays an important role in triggering these pollen allergies [18],[19],[20] and in particular the severity of clinical manifestations [21],[22]. The latter intervenes by means of the increase in pollen season intensity, generally indicated by the sum of the daily pollen concentrations measured over a whole pollen season, for many species [23],[24],[25],[26],[27].

Authors have also reported that climate-induced changes in temperature and precipitation influence the duration and length of the pollen season [16],[19].The quantity of pollen produced throughout the season, the pollen allergen content and the spatial distribution of allergenic pollens are thus in significant quantity [3],[20].

To relieve their clinical symptoms, people with allergies to pollens use medical and traditional treatments. Some systemic treatments, such as antihistamines, which are used to reduce the symptoms of pollen allergies. However, the cost of these treatments as well as their low efficiency according to our

sampling; Some people suffering from pollen allergies push for traditional treatments regardless of their level of education.

Similarly, side effects associated with certain medications such as drowsiness and weight gain justify trying traditional recipes. Indeed, we have been able to collect many preparations made from recipes of natural origin including herbal. The therapeutic efficacy of the active ingredients of these medicinal plants deserves to be verified in the treatment of pollinosis. Moroccan traditional medicine has been proven efficiency in the treatment of many diseases[28].

V. Conclusion

The present study is one of the major allergenic plants of the Fez-Meknes region and the clinical manifestations and treatments adopted by allergy sufferers. Indeed, herbaceous plants are most commonly implicated in allergy attacks and allergies. Other plants are also allergenic such as cypress, orange bitter and plane tree. The effects of pollen on these plants in people with allergies include ocular symptoms and breathing difficulties. These results would be of great value in the choice of plantations in the Fez-Meknes region as well as in the strategy to combat the harmful effects of pollen. In the same way, the traditional recipes, which we have reported in this work, deserve a very thorough study and this, to determine their therapeutic value in the treatment of pollen allergies.

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