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Original article

Airborne pollen concentrations and the incidence of allergic asthma and rhinoconjunctivitis in Lebanon

Comptes polliniques et incidence de l'asthme et de la rhinoconjonctivite allergique au Liban

C. Irani [a,*], M. Karam [a], Z. Baz [b], H. Maatouk [c], F. Zaitoun [d]

[a] *Department of Internal Medicne and Infectious Diseases, Allergy/Immunology Section, Hôtel Dieu de France, Beirut, Lebanon*
[b] *Department of Pediatrics, Saint-Georges Hospital, Beirut, Lebanon*
[c] *Department of Microbiology, Hammoud Hospital, Saida, Lebanon*
[d] *Department of Pediatrics, American University of Beirut, Lebanon*

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Abstract

Background. – Pollen monitoring is essential in the case of pollen-related allergic diseases. It may guide physicians and patients towards better prevention strategies, diagnosis, and treatment.
Methods. – One hundred and twenty four patients suffering from rhinoconjunctivitis and/or asthma from different cities around the country, and consulting our allergy clinic between January 2008 and December 2008, were reviewed in a randomized, retrospective study. Skin prick-tests to a battery of perennial or seasonal allergens were performed to all patients during their visit. An airborne pollen investigation was performed in different cities around the country during this period. The Rhinoconjunctivitis Quality of Life (RQLQ) and the Asthma Quality of Life (AQLQ) questionnaires were used to assess the severity of symptoms. Results of the symptoms evaluation were then correlated to the peaks and total concentrations of airborne pollens.
Results. – The airborne pollen sampling showed that Cupressaceae species were the dominant pollen persisting almost at all seasons. A tremendous surge in pollen count was noted in March at all stations with remarkably high level of pollen averaging about 400 pollen/m^3/day in the one station. Pollens such as olive, and grass were noted as the spring developed. Urticaceae most likely of the Parietaria species, the pollen specific to the Mediterranean area was noted starting in the spring at all stations. The incidence of exacerbations of rhinoconjunctivitis or asthma was highest during the spring season with a frequency of 58.87%. There was another lower peak in the fall with a frequency of 23.3%. A total of 15.32% of patients were allergic to Cupressaceae; 73.68% of them experienced symptoms during spring and 52.63% during fall. A total of 17.75% were allergic to grass; 59.1% of these patients suffered of symptoms during spring and 36.36% during the fall. A total of 24.2% were allergic to Parietaria; 76.67% of these patients endured symptoms during spring and 43.3% during fall. A total of 16.2% were allergic to olive; 70% of these patients experienced symptoms during spring and 30% during fall. A total of 24.2% were allergic to mites; 36.67% of these patients experienced symptoms during spring and 30% during fall.
Conclusion. – There was a good correlation between the peaks of the pollen count and the exacerbations of rhinoconjunctivitis and asthma symptoms. To our knowledge, this is the first study of clinical correlation with pollen count done in Lebanon. Continued monitoring and further studies will confirm our data, and support in better diagnosis and treatment of pollen-related allergic diseases.

Keywords: Pollen; Allergic rhinoconjunctivitis; Asthma; Clinical correlation; Pollen count

Résumé

L'étude des pollens est essentielle dans les pollinoses. Elle peut guider les praticiens et les patients pour la mise en œuvre de stratégies de prévention, de diagnostic et de traitement.
Méthodes. – Cent vingt quatre patients présentant une rhinoconjonctivite et/ou un asthme, originaires de différentes villes du Liban et pris en charge dans notre institution pour bilan allergologique entre janvier 2008 et décembre 2008 ont été randomisés dans le cadre d'une étude

* Corresponding author.
E-mail address: iranica@yahoo.com (C. Irani).

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rétrospective. Des *prick-tests* pour une batterie d'allergènes perannuels ou saisonniers ont été effectués chez tous les patients. Durant cette même période, les comptes polliniques ont été assurés dans différentes villes. La sévérité des symptômes a été appréciée par des scores de qualité de vie pour la rhinite (RQLQ) et pour l'asthme (AQLQ). Les résultats des scores de symptômes ont été corrélés aux pics polliniques et à la concentration totale des pollens atmosphériques.

Résultats. – Les échantillons de pollens recueillis ont montré que les Cupressacées étaient les taxons dominants pendant presque toutes les saisons. Un pic pollinique important était noté en mars dans toutes les stations avec des taux particulièrement élevés à plus de 400 pollens/m^3 par jour dans une station. Les pollens d'olivier et de graminées étaient présents dès le début du printemps. Les Urticacées et plus spécialement les espèces de pariétaire, pollens spécifiques du bassin méditerranéen, étaient également présents dès le printemps dans toutes les stations. L'incidence des exacerbations de rhinoconjonctivite ou d'asthme étaient plus importantes durant le printemps (58,87 %). On constatait un autre pic à l'automne avec une incidence de 23,3 %. Par ailleurs, 15,32 % des patients étaient allergiques aux Cupressacées, 73,68 % d'entre eux étant symptomatiques au printemps et 52,63 % à l'automne. Parmi les 17,75 % des patients allergiques aux graminées, 59,1 % étaient symptomatiques au printemps et 36,36 % à l'automne, alors que chez 24,2 % patients allergiques aux pariétaires, 76,67 % étaient symptomatiques au printemps et 43,3 % à l'automne. Pour l'olivier, l'incidence des allergiques était de 16,2 % avec une incidence de symptômes de 70 % au printemps et 30 % à l'automne. On retrouvait également 24,2 % patients allergiques aux acariens et 36,67 % d'entre eux étaient symptomatiques au printemps et 30 % à l'automne.

Conclusion. – Il existe une bonne corrélation entre les pics polliniques et les exacerbations de rhinoconjonctivite et d'asthme. À notre connaissance, cette étude est la première effectuée sur ce thème au Liban. La poursuite de la surveillance et d'autres études sont nécessaires pour confirmer nos résultats dans le sens d'une meilleure prise en charge du diagnostic et du traitement des pollinoses.

Mots clés : Pollen ; Rhinoconjonctivite allergique ; Asthme ; Corrélation clinique ; Compte pollinique

1. Introduction

Lebanon is situated on the Mediterranean coast. Despite a small surface of 10,452 km^2, there is a rich flora of plants and trees. The temperature fluctuates during the same season, making the weather feel spring-like sometimes, even in the fall or wintertime.

Allergic diseases constitute, as classified by the WHO, the fourth major chronic disease; they cause a significant morbidity in different countries. They have a considerable impact on the quality of life of patients and affect work productivity. Pollen allergens constitute a major cause of allergic rhinitis and asthma. Therefore, it seems important to evaluate, in Lebanon, the impact of pollen allergens on patients suffering from allergic diseases.

Our study's main objective is to demonstrate the clinical correlation between clinical exacerbations and pollen concentration.

Secondary objectives are:

- to determine the types of pollen genera or species present in different regions of the country (qualitative analysis);
- determine the temporal evolution of the pollen concentration (temporal analysis).

2. Materials and methods

This is a retrospective study of patients presenting to the allergy clinic of a tertiary university hospital in Beirut, and coming from different parts of the country, from January 2008 till end of December 2008. It includes two parts: measurement of pollen distribution and clinical correlation.

A sampling of pollen is done, in collaboration with the French national network for pollen survey « le Réseau national de surveillance pollinique en France (RNSA) ». Four regions of Lebanon are chosen in correspondence with the administrative division of the country: North of Lebanon, the South, Beirut and the Bekaa valley. In these four locations, pollen traps of the Hirst Lanzoni type (volumetric) are placed on the roof of buildings in populated areas, with maximum efforts made to avoid roofs with surrounding obstacles. The representative sampling is valid for a perimeter of 20 to 30 km from the trap. These pollen traps will catch particles of 10 to 100 µm and record data that permits daily analysis. The results collected from such traps are reproducible.

Geographic and meteorological parameters (altitude, precipitations, wind) are adjusted in order to be able to compare data from different sites. Weekly sampling is done at each site at a fixed hour. The analysis were made in Lebanon by analysts trained by RNSA, some slides were controlled by RNSA, who work also on comparison. The reading of the slides is done by optic microscopy × 400 according to the recommendations of the International Association of Aerobiology (IAA) and RNSA.

The following parameters are determined: total number of grains/m^3 per month, the mean for each pollen and the regression line that determines the mean annual pollens found in a year.

The study includes 200 patients, aged 14 to 50 years, presenting to our clinic for allergic diseases such as rhinoconjunctivitis or asthma. We exclude patients with pets at home, tobacco smoking and wall-to-wall carpeting. The severity of allergic symptoms and the impact on the quality of life are determined using a questionnaire based on the RQLQ (Rhinoconjunctivitis Quality of Life Questionnaire), AQLQ (Asthma Quality of Life Questionnaire) (Appendix 1) and the ''RNSA'' clinical electronic bulletin: (Appendix 2) [1,2].

Allergy prick-skin testing to environmental allergens to all patients is done.

To study the correlation between the Pollen Index and the incidence of monthly allergic exacerbations [3], we apply Pearson test.