Allergenic Sensitization to pollen extracts in allergic patients. General “Calixto García” University Hospital, 2017.

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Research

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Title: Allergenic Sensitization to pollen extracts in allergic patients.

Abstract:
Background: Nowadays, the allergic diseases are affecting the population at worldwide level and Cuba does not escape to this, inside the aeroallergens that trigger the crises we can find the pollens. The main goals of this study were to determine the allergenic sensitization to pollens in allergic patients and their relationship with the presence of allergic diseases.
Methods: A cross-sectional descriptive observational study was performed in patients suffering from asthma, rhinitis, allergic rhino-conjunctivitis, atopic dermatitis and allergic conjunctivitis. All patients underwent an allergic clinical history and skin prick test with allergenic extracts of *Helianthus annus, Cosmos bipinnatus, Cynodon dactylon, Quercus sp, Eucalyptus sp*. Frequencies and percentages were determined for its analysis.
Results: Thirty-three patients were studied. The average age was found in the third decade of life, with a predominance in women. More than half of the patients were sensitized to pollens and 24.24% of them were polysensitized; the most frequent pollen was the *cynodon dactylon*. The patients with rhinitis were the most sensitized with the pollens.
Conclusions: There is sensitization to pollen in our patients.

Key words: Seasonal, allergic, rhinitis.

Background:
The aeroallergens most frequently causing allergic illnesses are anemophylus pollens, which every day increase the incidence due to present climatic changes. They are able to trigger rhinitis, asthma, rhinoconjunctivitis and allergic conjunctivitis. [1, 2] International studies state its high incidence triggering allergic diseases, which are found in 4th place at world level. [3, 4] As well as they can travel long distances and can be dragged since other territories where does not exist that plant provider of grains. [5]

In Cuba its marine clime, subtropical and high relative humidity has created the false myth that pollens are translated to long distances and produce sensitivity in the atopic patient giving no value to the pollens effects for the good health of the Cubans, but it is true that there is increasing of the allergic symptoms in the period from March to October. [5, 6, 7, 8]

Cadrecha made the first research about pollinosis in our country in 1946.[9] Likewise, in 1955, the investigator Quintero registered allergenic pollens as Zacates mainly C*ynodon dactylon*. For González et al pointed out that pollen allergy in this island does not present a seasonal pattern. [10] Rodríguez and collaborators (2013), [11, 12] studies in Camaguey province have found prevalence from 79 to 81% sensitization to *Parthenium hysterophorus* L pollen (it is a compound species) and a *Cynodon dactylon L Pers* (it is a wild gramineous species) both wide spread in the whole country. The biological particles causes problems for the health of the individuals such as rhinitis, conjunctivitis and asthma. What has motivated several authors to express their concern about the subject. [13]

The asthma having a prevalence of 17.8% according to ISAAC [14] studies and allergic rhinitis with high prevalence in the Cuban population (figures of more than 15% from teenagers from 13 to 14 years of age in 2014) represent a health problem in the country with increase of morbidity due to pollens and high cost for the family and the society. [14] Even though the studies for pollen sensitization are still insufficient. Moreover, the patients have no possibilities of having treatment with therapeutic vaccines from allergenic extracts from pollens, which are very used worldwide nowadays; mainly in Europe where they have excellent results.[1, 15, 16, 17, 18]

Climatic changes at world level nowadays make that pollenic stations keep longer time and the pollen quantity increases. The heat waves and the high temperatures can increase the ozone level of the soil and can accelerate the beginning of the pollen station, favoring asthma attacks in that way. [2, 5, 8, 19]

Experts from USA Universities of Yale and Brown found a state that even having medications for the daily treatments the children with sensibility to pollen were 37% more likely to have respiratory symptoms and to receive rescue treatment when the pollen concentration in the air was from 6 to 9 grains/m^3. A level considered low officially.[20]

In Cuba in 2018, Aira and collaborators recorded 45 pollen types in the atmosphere of Havana. 21 Among them, Urticaceae (mainly *Cecropia* and *Urera* type), Poaceae and Casuarina were particularly abundant. They found that in periods with no rainfall, average daily counts ranged from 10 to 17 pollen grains/m^3, compared with 9–11 grains/m^3, on rainy days. Something that gives the idea that the Cuban population is at risk of triggering asthma attacks, rhinitis or rhinoconjunctivitis when be exposed to low levels of pollens. [21]

The main goals of this study were to determine the allergenic sensitization to pollens in allergic patients and their relationship with the presence of allergic diseases.

Methods:

A cross-sectional descriptive observational study was performed at University Hospital General "Calixto García" in the period from March to June 2017. It was not an aleatory study to avoid slant to the sample. The universe was composed by all patients that assisted to the allergic service in the period stated. The sample was integrated by 33 patients older than 18 years old from both sexes, who are suffering asthma, rhinitis, rhinoconjunctivitis and atopic dermatitis. They all gave informed consent to be participated in the study.

All the patients underwent an allergic clinical history and skin prick test with allergenic extracts of *Helianthus annus, Cosmos bipinnatus, Cynodon dactylon, Quercus sp, Eucalyptus sp*. The technique for doing the test consisted in cleaning with ethylic alcoholic at 70%, the ventral face of each forearm, 5cms above the wrist and 3 cms below the anticubital fosse. The points where substances are deposited to be tested are marked with a ballpoint pen, separated 2 cms one from the other. The dropping is applied and it is punctured with 1 mm lancet at a 90° angle in relation to the skin keeping stable pressure during one second approximately. Later, it is retired and the dropping is dried smoothly with a cotton swab. The reading is done 15 minutes later and it is considered positive if there is a papule similar or greater than 3 mms diameter in relation with the negative control (buffer solution). As positive control it was used a histamine solution in a concentration of 1 mg/mL.

All the patients were ordered to suspend the medications that could interfere with the test results (antihistamines, thricycles antidepressants and tranquilizers, beta-blockers, corticosteroids) the necessary days for each medication.[22, 23]

The clinical results were analyzed using descriptive statistics with Statistical Package for the Social Sciences (SPSS Ver22). The results were expressed in absolute frequency and percentages, stander deviation for its analysis and frequency tables and graphs were made where study variables were included.

Different bibliographies were consulted related with the topic using Pubmed, Medline, Cochrane researchers and consulting medical books. The Scientific Council and the Ethical Committee of the medical institution approved this investigation. This investigation was done according to the principles of Helsinki and the World Medical Association and according to the medical ethic, beneficence, justice, autonomy, and not malignity. The identity of the patients will not be revealed under any condition. It will only be used with scientific purposes.[24]

Results

The final analysis include 33 clinical history with its demographic data of the patients included in the study where female sex was predominant with 20 women (60.61%). The relation female-male is 1.5:1. The mean age is 36.9 (± 14.56 SD) years. The age limit was from18 and 65 years and the group of age that predominated was the 18 to 25 years with 33.33%. (Table 1)

Taking into account the sensitization according to pollen number, the 24.24 % of the patients in the study was polisensitized and the 21.21% of the patients had positive test to one allergenic extract from pollen monosensitized. (Table 2).

Table 3 shows the sensibility of the patients according to pollen typeby performing skin testswhere the most frequent is the *Cynodon dactylon* with 33.33 % followed by the *Cosmos* and the *Helianthus* with 30.30 %.

Regarding the allergic disease present those that suffer allergic rhinitis are more sensitized with 36.36 % followed by those that have asthma with 24.24%. And the female sex was the most sensitized. (Table 4)

Discussion

In Cuba there are few studios that can describe the prevalence of sensibility to pollens in patients. Identify what aero-allergens are more sensitive give medical specialists a tool that can achieve a more effective environmental control. Therefore, in that way they can provide a specific treatment and proper follow up of the allergic diseases.

The female group presented more sensibility frequency, the same as the study done by Rodríguez [11, 12] in Camaguey City. In the Mediterranean zone, Yalcin and collaborators found that women were the most affected, and the percentages per sex were similar to this research.[25] In the same way were the results of Buckley and Rojas-Méndez et al.[1, 26] In Mexico, Bedolla found more prevalence in females, but of the fourth decade of life, differing from this investigation that was in the third decade of life.[6] Narváez-Gómez in the South of Bolivia had similar results and the most affected were the women regarding allergic sensitization.[27] However, in this research donot have coincidence with Gaspar-López and collaborators because they found predominance of male sex with 70%, but there is coincidence with the mean age 34 ±16 years. [2]

The tests done by cutaneous puncture in the analyzed period showed more number of polisentitized patients regarding monosensitized. These results are similar to those done by Carretero his patients were more sensitized to gramineous considering these pollens of great allergologic relevance in Burgos City. [28] And Kim et al identified patients allergic to tree pollens are multi-sensitized. [29] Differing from this investigation Mallol in his study in Santiago de Chile found that his patients were monosensitized. [30]

Among the gramineous, we have the grass whose pollens affected the patients in our study. In the Mediterranean region of Turkey, Yalcin and collaborators found that, the meteorological conditions from April to June due to hot and humid weather favor the development of allergies.[25] Gramineous was the mayor allergens in his research with 81.2 % of the patients sensitized who increased their symptoms of allergic rhinitis and asthma from May to June, period of little rain and warm winds in this period of the year. [20, 25, 28]

The *Cynodon dactylon* belonging to the Poaceae family was the pollen, which was more sensitized in the population studied. These results coincide with the ones obtained by Aira and colaborators in 2018. They stated that this atmosphere was predominant in the family in Havana. [21] Likewise authors such as Rodríguez [12] had similar results to the ones presented here finding higher sensitivity at *Cynodon dactylon* (62.9%). This result coincide with the studies that show that pollens in urban areas where environmental contamination is much more come to be allergenic when it joints to carbon monoxide particles when they are eliminated by the gas or oil motors from vehicles and industrial factoring. [31, 32]

The tree pollens, among them the *Quercus* had a sensitivity in this study of 27.27 %, result below of the gramineous that is the predominant pollen, and which matches what was found by Carretero et al, although their figures (18.37 %) are lower than ours. [2, 6, 28, 33,] For Rojas-Méndez, *Quercus* was the greatest skin reactivity (12.72 %) followed by *Cynodon* (8.09 %). [26]

Our study does not coincide with the investigation of Narvaez-Gómez who had 21 % of positivity for the *Salix* followed by *Chenopodium* and *Amaranthus* with 20 and 19 % respectively.[27] Neither with the study done by Gazpar-López and collaborators in the South of the Mexican Federal District. Then the positivity for the tests was first for the weeds with 56 %, followed by trees with 33%, which are less sensible to the gramineous with 11%, nevertheless the sensitivity of the trees are very similar to this research.[2]

Allergic rhinitis is considered the allergic disease which has the most prevalence at worldwide and this study show similar results,[2, 4, 31] like the results found by Rojas-Méndez et al and Rodríguez in Camaguey City. [12, 26]

Nevertheless, Mallol and collaborators found in their study that the asthmatic patients were the most sensitized to pollens.[30]

The prevalence of allergic rhinitis was the highest followed by those who suffered from asthma. The population living in the South of the Mexican Federal Distric behaves equal by 53 % and 47 % respectively, although they are figures that double ours.[2]

In our study, the adult females are the most affected with 39.39 %. However, Calderon-Ezquerro and collaborators found in their study that male children were the most affected suffering conjunctivitis, rhinitis and other respiratory allergies with 70%. [34]

When analyzing sensitivity to the pollen according to personal history, we find that allergic rhinitis is the predominant disease in our patients. In this way, our study coincides with other studies such as the one done by Rojas-Méndez et al where 87.27 % of the patients studied suffered this illness, [18] it also matches the study of Rodríguez. [12, 14]

Conclusions

There is sensitization to pollens in more than the half of our patients and the allergic rhinitis is the disease causing more affection. The sensibility to *Cynodon dactylon* is the most frequent in our patients and so as it is considered at world level.

List of Abbreviations

SD: standard deviation
ISAAC: International Study Asthma and Allergies in Childhood.
SPSS: Statistical Package for the Social Sciences

Declarations:

Ethics approval and consent to participate

The study was conducted following the ethical principles contained in the Declaration of Helsinki, 64th WMA General Assembly, Fortaleza, Brazil, October 2013. Subjects were for their written informed consent to participate in the study. The study was approved by the Ethics Commitee of the University Hospital “General Calixto García”.

Consent for publication

All authors gave its written consent for publication.

Availability of data and material

Please contact autor for primary data requests.

Competing interests

The authors declare that they have no competing interests.

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DE: Conceived of the study, and participate in its desing and performed of study.

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LR: supported and guided the literatura review process.

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Table 1.Patients distribution according toage groups and sex.

AgeGroups	Females		Males		Total	
	No	%	No	%	No	%
18 to 25	6	18,18	5	15,15	11	33,33
26 to 33	2	6,06	2	6,06	4	12,12
34 to 41	2	6,06	2	6,06	4	12,12
42 to 49	4	12,12	1	3,03	5	15,15
50 to 57	4	12,12	2	6,06	6	18,18
58 to 65	2	6,06	1	3,03	3	9,09
Total	20	60,61	13	39,39	33	100

Source: Questionnaire

Table 2.Pollen type number Sensitization by sex.

Pollen type number	Females		Males		Total	
	No	%	No	%	No	%
1	7	21,21	0	0,00	7	21.21
2	2	6,06	0	0,00	2	6.06
3 or more	3	9,09	5	15,15	8	24.24
Total	12	36,36	5	15,15	17	51.51

Source: Questionnaire.

Table 3. Sensitization by pollens types.

Species of pollen	Positives		Negatives	
	No	%	No	%
1. Cosmos bipinnatus	10	30,30	23	69,70
2. Helianthus annus	10	30,30	23	69,70
3. Quercus sp	9	27,27	24	72,73
4.Eucaliptus sp	8	27,27	24	72,73
5. Cynodon dactylon	11	33,33	22	66,67

Source: Questionnaire.

Table 4. Pollens Sensitization according to Personal Antecedents.

Personal Antecedentes	Femenines		Masculines		Total	
	No	%	No	%	No	%
Bronchial Asthma	6	18,18	2	6,06	8	24.24
Allergic Rhinitis	5	15,15	7	21,21	13	36.36
Rhinoconjunctivitis	0	0,00	0	0,00	0	0
Atopic Dermatitis	2	6,06	2	6,06	4	12.12
Allergic Conjunctivitis	0	0,00	1	3,03	1	3.03

Source: Questionnaire.