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Prevalence of Pollen Allergy in Rural Telangana (Bhongir) and the Need for Continuous Monitoring of Allergens - A Pilot Study

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Abstract: ***Prevalence of pollen allergies in the rural population of Telangana is under-studied. The objective of this work was to estimate the prevalence of pollen allergy in the rural town of Bhongir, Telangana and to evaluate the need for further investigation of environmental effects on the onset of pollen allergies. A pilot survey was conducted among fifty randomly selected individuals of Kisan nagar area in Bhongir, Telangana (India) and its nearby localities using a questionnaire. Patients with known allergies were further asked to provide information about their allergic conditions and treatment. Six out of the fifty participants (CI: 1.5-10.5) were found to be allergic to pollen. The allergic participants did not have symptoms from birth but rather developed them during the later stages of life. The study also identified the potential pollen allergens in the locality which might be the cause of the allergies in the affected individuals. Furthermore, the study revealed that the commonly recommended medications were neither the preventive measures nor the permanent cure against the symptoms of pollen allergy. The results suggest a trend of rural youth with no genetic predisposition, developing pollen allergies due to environmental sensitization. The study highlights the need for the establishment of regional monitoring stations, and future studies with larger samples to understand the sensitization pathways to help the locals take preventative measures.***

Keywords: Pollen, Allergy, Immunology, Telangana, India

I. INTRODUCTION

Even though 25% of the India's population is affected by at least one kind of allergen[1], limited data is available on the prevalence of allergies in the rural parts of the country. Pollen is one of the major source of allergens in the sub-continent [2]. However, the prevalence of pollen allergens in the air is not recorded in most parts of the country. Pollen allergy induces severe rhinitis, also called hay fever [3] and asthma[4]. Atopic diseases present differently in different individuals with symptoms affecting not just the nasal regions but also oral and gastrointestinal systems [5]. The socio-economic implications of the disease are severe. In 2003, allergic rhinitis costed the US $2-$5 billion USD in direct costs[6]. Quantification of economic impact of healthcare costs associated with allergic rhinitis in India is quite limited and does not consider the severe indirect costs incurred due to loss of productivity [7].

Previous studies on the prevalence of atopic diseases have been heavily done in urban centers [5], [8]–[10] with very few studies looking into the rural populations [7]. Owing to India's varied climatic conditions and geographical features, there is a need to characterize pollen sensitization in different regions across the country. With global temperatures on the rise, the pollination cycles are being altered and the cases of allergies in the country's population are also on the rise [4]. India's worsened air pollution with elevated PM2.5, PM10 and carbon dioxide levels, known co-morbidities for allergic rhinitis, is also one of the major factors in the rise of cases in the country [4], [11].

Bhongir is a town in the Indian state of Telangana and is located about 50km from the closet metropolitan city of Hyderabad. Only about 53,339 people live in this region compared to the 6.9 million in Hyderabad [12]. The aim of the current study was to gather pilot data to estimate the prevalence of pollen allergies in towns and villages surrounding the city and evaluate the need for local monitoring stations in rural centres to help residents take preventative measures accordingly. Also, the study aims to identify the allergens in the region affecting the patients to identify the source of the allergen wherever possible.

II. METHODOLOGY

A. Study Area

Bhongir is located at 17.5108°N 78.8889°E in the Indian state of Telangana. Kisan Nagar, Housing Board and Vidyanagar localities of the town were randomly sampled during the study.

B. Study Participants

Written informed consent of fifty participants (25 male and 25 female) from the identified localities was obtained prior to the study. Participants between the ages of 10-50 years were randomly selected asked about their medical history of allergies. Participants who had known allergies to pollen were further asked to complete a questionnaire asking about their allergic conditions and other personal details.

C. Identification of Pollen Allergens

Patients with known allergies were asked to list the allergens based on their prick test reports. Pollen allergens from the patient's responses were identified. Other kind of allergens mentioned in the responses were not included in the study.

D. Statistical Analysis

All statistical analyses were performed with SPSS 23 (IBMCorp, Armonk, New York) via frequency distribution. Prevalence is presented with the 95% confidence intervals (CI), calculated by normal approximations.

III. RESULTS

12% (n=6/50, CI: 3%-21%) of the participants surveyed had known pollen allergies. 67% (n=4/6, CI: 30%-100%) of the affected were female. Figure 1 summaries the study findings. All the six allergic patients had previously been diagnosed with pollen allergy to at least one kind of allergen using prick test. All the six participants had symptoms of itching, running nose followed by stuffiness, burning sensation, and watery eyes accompanied by redness. Along with the common symptoms, one patient also had trouble with breathing when exposed to allergens. All the allergic patients were below the age of thirty years and most of them were students. One of the six patients associated exposure to allergens to the nature of their work as a field worker. Other patients reported no workplace exposure to allergens. Also, the symptoms do not appear at the same time in all the patients.

The patients had no genetic predisposition to allergies and that they developed the allergic symptoms in the later stages of their life. Most of the patients were living in the area for more than ten years with one patient living for as long as twenty-one years. Table 1 summarizes the medical treatment sought by each afflicted patients and the duration of the treatment.

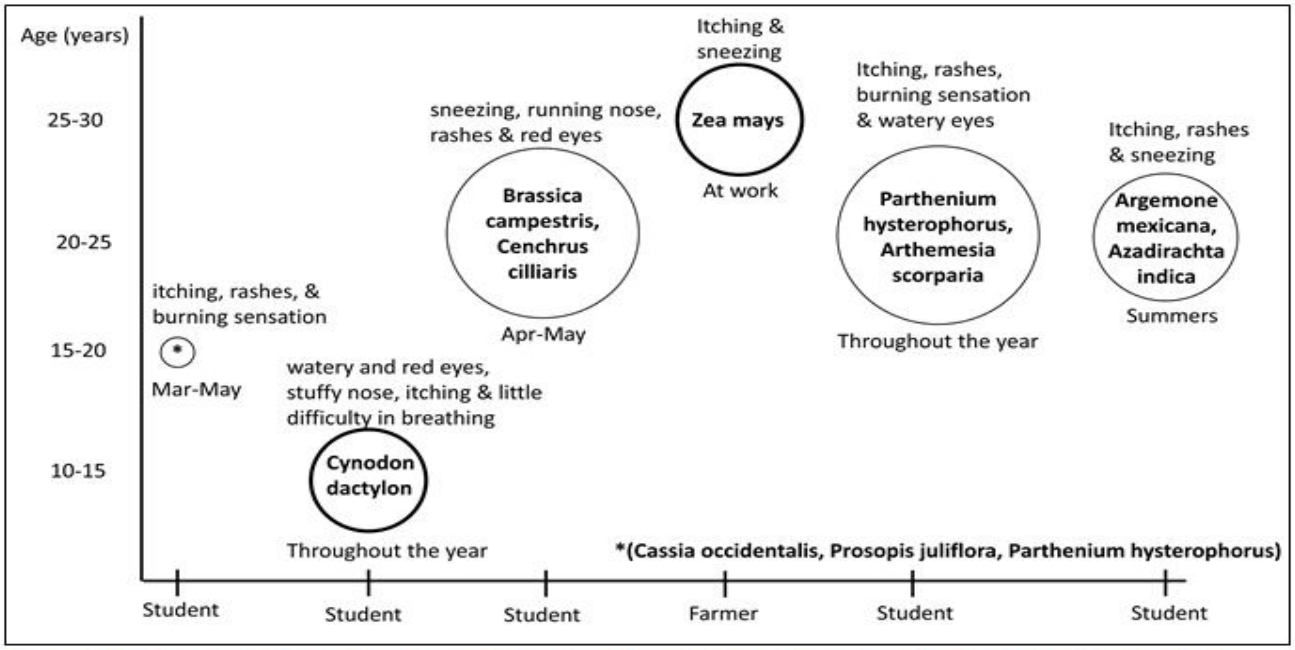

Figure1: The diameter of the circles represents the number of years the participants have lived in the locality. The allergic symptoms are on the top, the time of occurrence on the bottom with the allergens listed inside the circles. Age is on Y-axis and occupation on the X-axis.

TABLE I: Duration and Type Of Medical Advice Sought

Allergic patients	Medical advice	Duration of treatment
Case 1	Immunotherapy	Since two years
Case 2	Antihistamine (Allegra) whenever symptoms appear	Since five years (takes tablet whenever symptoms appear)
Case 3	Homeopathy	Since one year
Case 4	Antihistamine (Cetzine)	Since three years
Case 5	Immunotherapy	Immunotherapy for one year (2017). Now taking general antihistamines whenever symptoms appear
Case 6	immunotherapy	Since three years

IV. DISCUSSION

The present study showed that one in every eight respondents surveyed, were sensitive to one or more types of pollens. Of the affected, majority were female which suggests that sex could be a factor in the prevalence of pollen allergies. It is yet unknown if the pollen allergens originate in their locality or if they are seasonally carried to their area from long distances. All the six affected patients are allergic to different plant pollen which could either mean that the patients are being sensitized by something in their immediate environment or that the immune response of the patients is randomly triggered by a certain allergen. To further investigate this, a thorough survey of the identified allergens in the patients' immediate neighbourhood should be performed. This would help the locals be informed and take abundant precautions. The Indian Botanical Society has limited data on the region [13] and currently, a public database of the local flora and fauna is not available. The fact that the patients only started presenting symptoms later in their life raises concerns about the environmental effect on the sensitization of the population. Especially given that the affected population is young, it is important to further evaluate if the trend is consistent among the larger population of the area. For the given population of the town, a sample of 380 people should be surveyed to estimate the prevalence with 5% error at 95% confidence interval. Also, it is of utmost importance to characterize the allergen sensitization pathways to protect paediatric population from the detrimental effects of allergies.

Carbon dioxide, PM10 and PM2.5 values of air quality index are important co-morbidity factors that could severely affect the already afflicted [11], [14]. However, lack of local data of these measures makes it difficult for the local authorities to help take preventative measures to protect the community.

Furthermore, the recommended medications were neither the preventive measures nor the cure against the pollen allergy. The patients complained of sustained symptoms even after strict adherence to the recommended treatment. It is important to note that a long-term use of pharmacotherapy and immunotherapy can incur significant direct and indirect costs to the patients and alternative methods of low-cost and effective treatment are thereby necessary [15].

In conclusion, there is a trend of young individuals, especially women, with no genetic predisposition developing pollen allergies in the rural town of Bhongir in Telangana. The observations of the study indicate the need for future studies with a larger sample size along with local air monitoring data to determine the true effect of environment on pollen allergies in the locality.

This study has its own limitations. Due to the ongoing pandemic the sample size was restricted to 50 participants and the results are completely based on the response elicited from the sample. Hence any conclusion / suggestion / recommendation made will be suggestive and not conclusive in nature.

V. ACKNOWLEDGMENT

Study design: NM, CM; Data collection: NM; Data analysis and interpretation: NM, VK and CM; Drafting of manuscript: VK and NM; Revising manuscript: NM, VK, and CM; CM takes responsibility for the integrity of the data analysis. The authors have no conflict of interest.

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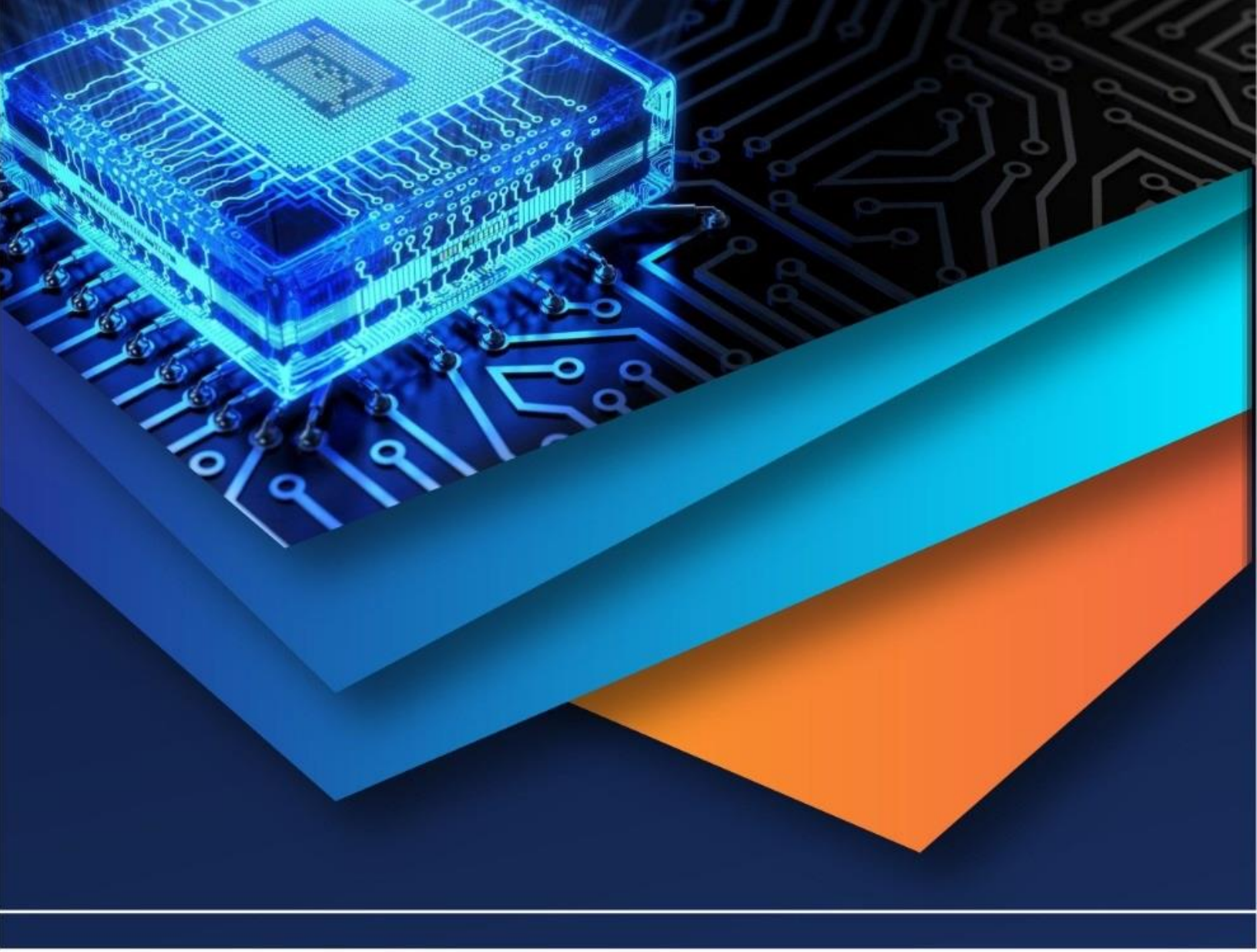

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