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**A Survey of Pollen Allergies in Six
Villages of Islamabad**

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A Survey of Pollen Allergies in Six Villages of Islamabad

Jennifer Bennett♦, Masooma Qazilbash* and Ali A. Qazilbash*

Abstract

This investigative research was carried out in 6 villages within 20 kilometers of central Islamabad to determine the incidence and prevalence of pollen allergy and factors associated with it. Using a cluster sampling method, a survey of 347 households was conducted. Results show that 33% of the total study population was suffering from more than one type of pollen allergy. The highest number of casualties occurred during the months of February and March and the most affected persons were those aged 40 years or above followed by children in the age category of 7-19 years. An important finding was that the prevalence of allergies was higher amongst women compared to men. The symptoms of allergies for more than 39% of the patients last for a minimum of 60 days or more. Results also indicate that the recommended immunotherapy was neither a preventive measure nor a permanent cure against the widespread pollen allergies.

Introduction

Not so long ago, Islamabad, the capital of Pakistan, was considered to be a haven against most health problems, notably respiratory ailments. Often people from other parts of the country, like Karachi would seek health asylum in Islamabad against asthma and other associated bronchial disorders. The situation today, as it stands, witnesses people rushing out of Islamabad to avoid falling prey to what is popularly called 'pollen allergy' during the most sought out spring season of the year.

Since early 1990s, illnesses resulting from pollen allergies have become one of the gravest health problems of Islamabad. Every year, more specifically during the months of January through April, persons, to the order of hundreds, are said to visit hospitals or clinics for treatment against spring allergies alone. The most common symptoms as reported by various medical sources being respiratory ailments including asthma, watery, red and itchy eyes, running, itchy or blocked nose, usually accompanied with sneezing, itchy ears, as well as, itching of the skin on any area of the body leading to redness. According to the information obtained from the Pakistan Institute of Medical Sciences (PIMS), 360 persons suffering from allergy symptoms reported at the hospital on 14th March, 1996 and 6 persons died the same day as a result of acute pollen induced breathing problems¹. A state of emergency was declared in the hospital as over 200 patients, with in a period of one hour, were waiting for their turn to get oxygen masks². Emergency measures were adopted to deal with the crisis as none of the hospitals were equipped to cater for such a large number of incoming patients.

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*. In a closed, sex-segregated society like that in Pakistan, many women observe purdah, in literal terms or in terms of abstaining contact with men. Four out of the 5 interviewers collecting data for this survey were men.

In order to understand the nature of the crises, the researchers of this study investigated the matter, through personal communicate, with various concerned doctors of the Islamabad hospitals. Information obtained from the Federal Government Services Hospital (FGSH) disclosed that the number of pollen allergy patients who visited the hospital in 1996, was as high as 3,462. Whereas, another source at the same hospital contradicted this information and blamed the journalists for misinforming the public. However, to substantiate, further, the claims, the information obtained from the National Institute of Health (NIH) reported that over 200 persons were visiting the Institute daily for vaccination against pollen allergy³. Other sources quoted similar figures of allergy affected casualties.

It is speculated that the problem of pollen allergy has existed in Islamabad for a long time but was not detected until early 1990s when the National Institute of Health carried out research to investigate the root-cause of the pervasive ailments with common symptoms. NIH concluded that a particular kind of pollen from paper mulberry was the cause of the widespread allergy. It sent the finding to Capital Development Authority (CDA) which in turn made its own investigations to reach the same conclusion⁴. Paper mulberry, according to CDA was imported from the Philippines and introduced to the capital in the 1980s while another source suggests that paper mulberry plants existed in the capital since as early as 1960s⁵. The question is, if pollen allergy has continued to exist in Islamabad for a decade or more, what then has triggered the intensity of its symptoms in the last few years to the point of taking lives of the local inhabitants and seriously impairing the health of the living? Another query that comes to mind is if pollen allergy was endemic in Islamabad since the past few decades, affecting the health of the local residents, why was no research conducted on it earlier to control the situation?

Another group of professionals and experts are of the opinion that pollen allergens are not the only cause of the prevalent allergies, rather the ascending rise in morbidity is equally associated with multiple environmental pollutants, such as dust, smoke emissions and other effluents. For example, information obtained from experts at the Allergy Department, Pakistan Institute of Medical Sciences (PIMS) and NIH are of the opinion that the main reason behind its spread is increasing pollution in the environment and various pollen grains⁶. The same opinion was upheld by other doctors at the Federal Government Services Hospital (FGSH) who believed that allergies can be caused by many other environmental factors and not solely by pollens in the air. That these widespread allergies, although generally erupt in spring, can also occur in any other season.

In view of such differing opinions, sparse, and inconclusive investigations made over the origins of the allergens and the present level of associated morbidity, this study was undertaken to obtain first hand and a preliminary form of information directly from a selected number of the local residents. The purpose was to: first, determine the incidence and prevalence of pollen-allergy illnesses. Secondly, to investigate other socio-economic and environmental factors associated with pollen allergies; and thirdly, to ascertain and confirm the information gathered from hospitals and other media.

Materials and Methods

For this study, two sets of data were generated to obtain detailed information on the incidence of pollen allergy and factors associated with it. The sources were: a Household Survey; and a Health Care Survey.

Household Survey

The household survey was carried out in 6 villages within 20 kms of central Islamabad. The selection of the areas was random depending on the number of the population in each village and the accessibility of the area. The villages included in the survey were: Saidpur, Malpur, Kuri, Alipur, Golra and Mehra Jaffar. Using cluster sampling method, the survey was conducted from May 23 to May 30 to gather socio-economic and environmental information from the local residents to determine the incidence and prevalence of the illnesses and its co-variates. An open-ended semi-structured questionnaire was used to collect the information with the purpose to obtain both quantitative and qualitative information. A total of five interviewers visited each village and starting from one end of the area, every household falling within the cluster chosen was approached to obtain the required information.

In each household, the respondent was any adult member of the house who was permanently residing in the village. A total of 400 households formed the universe of the study in the 6 villages. Out of the total, responses were collected from 347 households while in others, the household members either refused the interview, or no adult/male member ♦ was available at the time of the survey or the house was locked. Table 1 below gives the absolute numbers of the households by the type of the response attained in each village.

Although one respondent in each household was interviewed, information was collected for all members of the house to determine the total number of persons who had suffered from any of the specific allergy symptoms listed during the study period of January to April, 1996.

Table 1: Number of households included in the study by village (N=400)

Village Name	Responded	No Response
	Number	Number
Saidpur	89	21
Malpur	48	8
Kuri	59	8
Alipur	59	8
Golra	49	5
Mehra Jaffar	43	3
Total	347	53

Source: Field Research

The questionnaire contained a separate set of specific questions for those who claimed to have had suffered from allergy symptoms. To verify the type of allergies, whether pollen or others, the respondents were asked if they had sought medical advice and if they underwent any skin tests to ascertain the nature of the allergies. This question was asked in view of the availability of the skin tests carried out at the Allergy Center at the National Institute of Health (NIH). Those who could not produce a written medical report, at the time of the survey, which verified symptoms of pollen allergies (as defined by NIH) were not included in the survey.

The test used to ascertain the source of allergies is a standard skin test used at the NIH and involves the placement of a drop of a mixture of 25 pollen antigens, prepared at the NIH, on the skin surface under the forearm. Using a sterile needle the antigen is scratched into the surface of the skin and the excess removed using a tissue paper. The patient is kept under observation for 20 minutes. Those positive for pollen allergies are confirmed by signs of erythema or urticaria in the inoculated area.

Health Care Survey

A separate questionnaire was developed to gather socio-epidemiological and related information from senior medical doctors (who dealt with allergy-related illnesses) of three medical centres in Islamabad. The questionnaire was loosely structured to incorporate qualitative information and to collate the experiences and opinions of these doctors on the major reasons contributing to the prevalence of the illness. The questionnaire was sent to the following medical centers and related institution: Pakistan Institute of Medical Sciences (PIMS); National Institute of Health (NIH); Federal Government Services Hospital (FGSH); and Pakistan Meteorological Department (PMD).

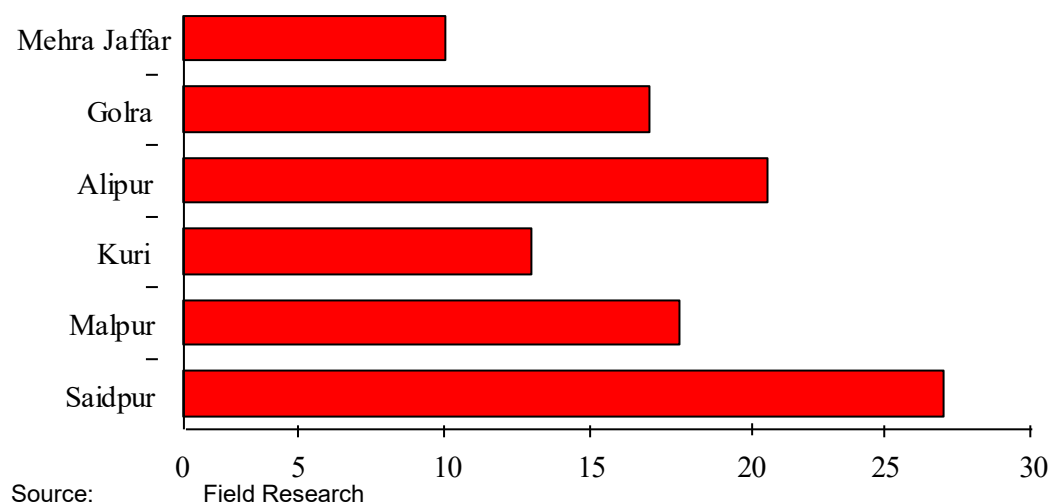
Of these three major hospitals, responses were attained from PIMS and FGSH. Doctors who provided incomplete information or required further elaboration on any particular question were further contacted in person or on telephone. Thus, a spectre of information was obtained on the factors associated with pollen allergies, as well as, possible solutions for its eradication, including both preventive and curative measures. A separate detailed record of the patients who sought medical advice for purposes of allergy treatment could not be obtained. Therefore, information on variables like the sex of the patient, age or place of residents is not available from the data collected from the medical centres. In addition, Pakistan Meteorological Department was contacted to provide any information pertaining to the association between the prevailing environmental conditions and pollen allergies.

Results

Analysis of the data collected from the 6 villages reveal that of the total 347 respondents included in the survey, 113 (33%) informed having suffered from one or more of the symptoms associated with some form of pollen allergy during the months of January to April (Graph 1). Medical report of each respondent, was seen by the interviewer, to confirm that the respondent had suffered from pollen allergy symptoms.

Statistics show that the highest percentage (26%) of respondents suffering from pollen allergies were living in village Saidpur, followed by residents of villages Alipur (20%), Malpur (17%), Golra (16%), Kuri (12%) and Mehra Jaffar (9%), respectively. Although no scientifically proven association could be established, through this survey, between the incidence of illness and the prevailing environmental conditions in each area, the pattern, nonetheless, is reflective of the opinion of some experts who believe that increasing environmental pollution contributes to and aggravates the effects of various allergens⁶. For example, of all these villages, Saidpur, with the highest percentage of the casualties, located at the foot of the Margalla hills, had extreme unhygienic living conditions. The streets, as observed, were filled with stagnant sewerage water, the houses constructed were not only small and congested but were built without any planning considered appropriate for healthy living. Likewise, Alipur, Malpur, and Golra, the three villages, with comparatively higher percentages of allergy patients, were located near the roadsides and were exposed to relatively heavy traffic pollution along with clouds of dust. The hygienic conditions of these three villages, nonetheless, were better than in Saidpur, especially in terms of living space and other environmental conditions. The other three villages, with the lowest incidence of allergies, were located inland, farther from the roadsides and had open, spacious surroundings. However, to establish a statistical correlation between the incidence of illness and environmental pollution, further scientific investigations are required which did not fall within the domain of this study.

Graph 1: Percentage distribution of respondents suffering from allergies by place of residence (N=113)



The percentage distribution of the respondents suffering from allergy symptoms by age shows that persons aged 40 years or above were at the highest risk of contracting the allergies (Table 2). This finding is supported by a senior doctor at the allergy clinic, PIMS, who also found that older persons were more susceptible to contracting pollen allergies compared to young children. However, as is known, allergies are not infectious but a disease of the immune system, implying that the older persons included in this study, who were suffering from allergies, were perhaps those who may have had a weakened immune system. Where this may be true, the question arises from the biological fact that young children do not attain a fully developed immune system until the age of two years⁷. Therefore, if it was only a matter of resistance, children should have been the most affected who according to various national surveys, have the highest rate of morbidity and mortality, are prone to infectious and other diseases, and have low immunity not only by age, but also because of malnourishment and repeated attacks of illnesses, further lowering the body resistance. Figures derived from the National Nutrition Survey, (1985-87), indicate that 48% of all Pakistani children are malnourished, 10% severely malnourished and around 65% anaemic⁸.

Sex-wise, the percentage distribution of morbidity shows that 58% of the allergy patients were females compared to 42% males. Of the total allergy victims identified in this study, 73% had lived in the present place of residence for over 11 years and 7 out of every 8 allergy victims said they had lived in the present place of residence since birth. Many of these respondents, as indicated above, were older and shared the belief that these illnesses were a recent phenomenon. They were of the opinion that the pervasiveness of the illness was increasing by every year regardless of age and sex. On inquiring about what in their opinion were the causes of these illnesses, most perceived unhygienic living conditions, lack of clean water and impure food to be the major contributory factors. A few also spoke of the widely propagated opinion that greenery in Islamabad was spreading the allergies, a claim refuted by older respondents who said Islamabad was always this green without any allergies in the past (Table 2).

Out of the total respondents who experienced allergy symptoms, 49% were housewives and did not work outside the home for economic gains. Fifteen percent of the allergy victims were either students or were not employed while 30% and 6% of the respondents worked in the private and public sectors respectively. Distribution by workplace shows that as many as 73% of the respondents spent most of the time within the village, 21% worked in other areas of Islamabad and only 6% were working outside

Islamabad. These results indicate that women were more prone to spring allergies even though most of them stayed indoors. In depth discussions with a few of these women revealed extreme sensitisation to dust throughout the spring season. Many complaint being unable to do household chores, especially cleaning and dusting, which if undertaken resulted in aggravated and constant sneezing, running and itchy nose, and itchy, watery eyes, and difficulty in breathing (Table 2).

Table 2: Percentage distribution of persons suffering from allergies by various socio-economic and demographic factors (N=113)

Variables	Percent
Age of respondent	
0-6 years	9
7-19 years	18
20-29 years	12
30-39 years	15
40 plus	46
Gender of respondent	
Male	42
Female	58
No. of years lived in present place of residence	
1-5 years	18
6-10 years	9
11 plus	73
Previous place of residence	
Lived in other parts of Islamabad	12
Always lived at present place	88
Occupation	
Private	30
Public	6
Housewife	49
Students/Others	15
Workplace	
Within village	73
Within Islamabad	21
Outside Islamabad	6

Total household income	
Upto 3000	61
3001 to 5000	18
5000 plus	12
Not mentioned	9

Source: Field Research

The results of this study also indicate that most of the allergy patients (61%) belonged to households with a total household income of Rs. 3000 or below (Table 2). Total household income here pertains to the pooled income of all the working household members and not the exclusive income of the working respondent. These incomes are very low considering the inflation rate and the average number of household members in any low income family. No conclusive association between income and risk of allergy can be drawn from this finding as most of the village dwellers were expected to belong to the low income bracket. Information obtained from the hospitals in Islamabad also does not have any reported record of allergy patients belonging to different income brackets. The general opinion is that people from different walks of life, regardless of their income status and area of residence, were affected by the

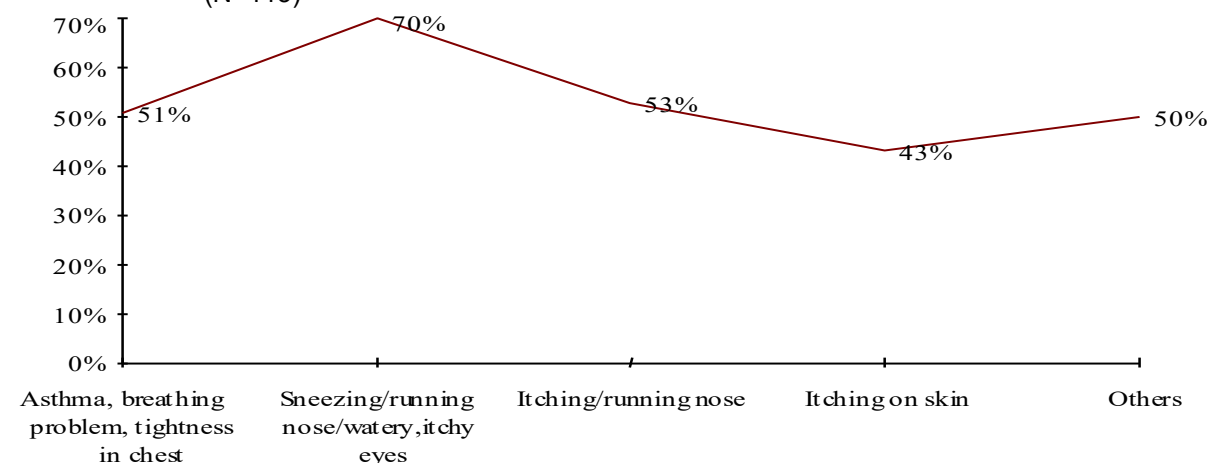
allergies during spring season. The overall findings of this study, however, do indicate that women belonging to the low income families were more susceptible to allergies and other infections and may have been suffering from physical weakness and malnutrition, leading to a weak immune system. This aspect of the finding, however, requires further investigation.

Symptoms of Allergies

Analysis of the data on various symptoms of allergies shows that of the 33% of respondents suffering from one or more allergy symptoms, 70% experienced the common and simultaneous symptoms of sneezing, running nose and watery, red itchy eyes, followed by constant running and itchy nose (53%) (Graph 2).

Amongst the symptoms, the more severe cases were found to be those suffering from asthma, other breathing problems, or congestion in the chest (51%). Two of the respondents in village Saidpur informed having suffered from severe attacks of breathing problems during the months of February to April for the past few years and had sought medical treatment for it. With the recurrence of the illness each year they left their place of residence during these months this year and therefore were able to avoid the illness. The respondents said this was the only way left not to fall ill as a result of the spring allergies (Graph 2).

Graph 2: Percentage distribution of respondents suffering from allergies by symptoms of allergies (N=113)



Source: Field Research

Most of the respondents included in this study had also received allergy vaccination but claimed the preventive treatment to be ineffective. This finding is well supported by the fact that a few doctors had advised patients, especially those suffering from severe breathing problem, to temporarily shift to some other city during the spring season. Follow-up investigations report recovery within hours of evacuation. Some even reported having recovered while on their way to Lahore³.

As the graphical presentation shows, the figures are high for each allergy, indicating that most of the allergy patients suffered from more than one type of allergy symptom. The category 'others' pertains to any other symptom of illness suffered by the respondents other than those already listed. Results show that about 50% of the respondents suffered from other symptoms along with those already mentioned. The most common problems identified in the category of 'others' were headaches, cough and tiredness.

Stratification of the types of illnesses by each of the 6 villages is given in Table 3. Figures show that morbidity level by any of the allergy-related symptoms was the highest in village Saidpur.

Table 3: Percentage redistribution of respondents suffering from allergies by place of residence (N=113)

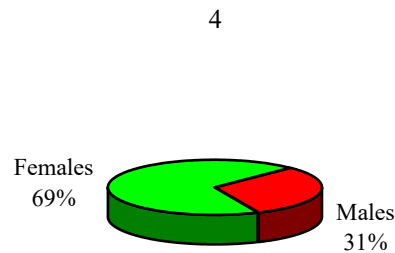
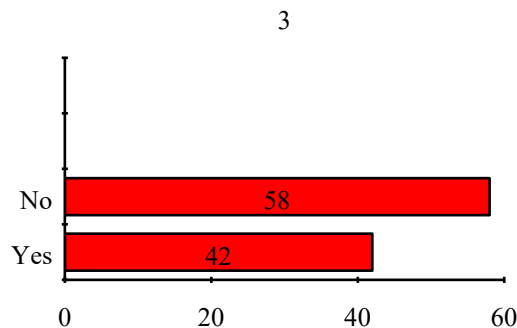
Village Name	Asthma, difficulty in breathing or tightness in chest	Sneezing, running nose or itchy watery eyes	Itching or running nose	Itching on skin
Saidpur	21	21	12	10
Malpur	12	15	9	6
Kuri	6	10	12	8
Alipur	10	15	12	11
Golra	7	13	10	10
Mehra Jaffar	2	5	5	4
Total	58	79	60	49

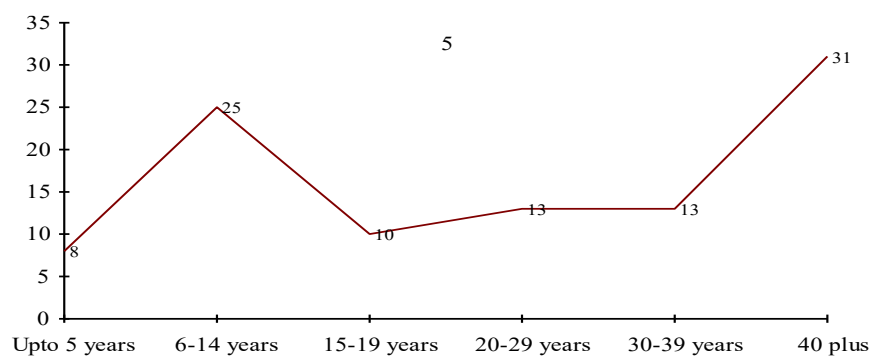
Source: Field Research

In particular, the pattern shows a high incidence of respiratory (21%) and nose/eyes related illnesses (21%) in Saidpur compared to Mehra Jaffar with the lowest incidence of respiratory ailments (2%). A few of the residents of Mehra Jaffar commented that these were the illnesses of the cities and that their village was still safe from such epidemics. Gradation of the incidence of illnesses in other villages shows that the most common allergy symptoms were sneezing/running, itchy, watery nose and eyes. While itching on other parts of the skin ranked the lowest in Mehra Jaffar (4%), its incidence was comparatively high in Alipur (11%) and Golra (10%). Many respondents in Alipur blamed the unhygienic living conditions for the spread of the illness, where as residents of Golra associated it with unclear water supply. Overall, the matrix of the statistics gives mixed results and points to the fact that most of the allergy victims were prone to contract more than one type of allergy.

In order to gauge the extent of the pervasiveness of the allergies, respondents were asked if any other member of the family suffered from allergy symptoms (Graphs 3,4 & 5).

Graphs 3,4,5: Percentage distribution of other family members suffering from allergies by sex and age (N=113)





Source: Field Research

The data show that in 42% of the households one or more family members suffered from some allergy symptom. Out of these as high as 69% were females compared to 31% males. These figures reconfirm the finding of this study that females were at a greater risk of contracting allergies. Studies in the 1920s showed that allergic parents tended to have a higher proportion of allergic children than parents who were not allergic. When large numbers of families were examined, the figures showed that with two allergic parents there was a greater than 50% chance of the children having allergy. Even with one allergic parent the chances were still almost 30%⁹. This finding may offer one explanation for the high incidence of allergies among children in Pakistan, where it is normal tradition and practice that marriages occur between first and second cousins, who may have had some sort of allergy, thereby increasing the chance of hereditary allergies.

A variety of non-genetic factors may also play an important role, such as the quantity of exposure, nutritional status of the individual and the presence of chronic underlying infections or acute viral illnesses⁹. This factor may also be true for our study where the incidence of allergies was reported to be higher among females. Rural girls/women often work for hours in the fields where the quantity of exposure may be high. In addition, the nutritional status, especially among children, in developing countries like Pakistan is rather poor^{8, 10}.

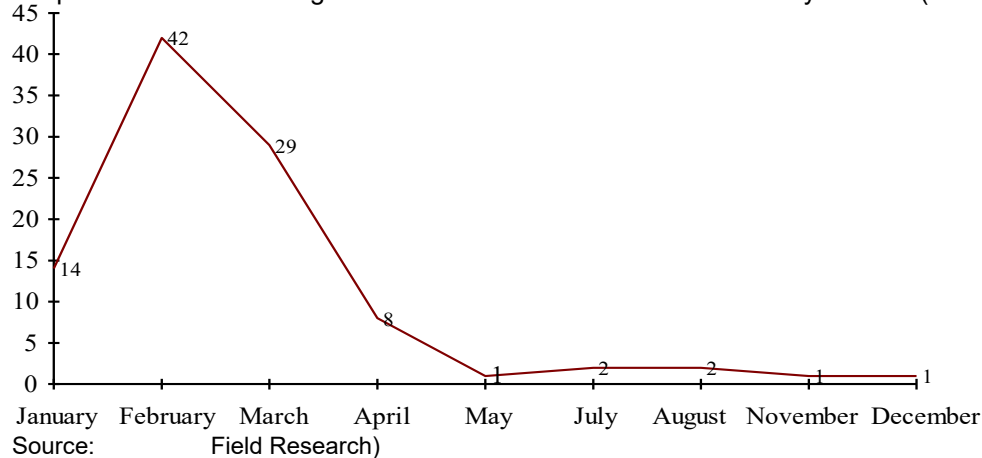
Further analysis of the data on family members, suffering from allergies, by age re-emphasizes the finding that persons aged 40 or above were at the highest risk of contracting allergies. However, interestingly, analysis reveal that the second largest group of persons suffering from allergy problems was children (18%) aged between 7 to 19 years. It is possible that the incidence of allergy may be even higher amongst children aged five years or below, the group which has the highest rate of morbidity and mortality in Pakistan. The fact that not many children (0-6 years) were reported to be allergy positive (9%) could be because the mothers were unable to identify the allergy symptoms from the common flu and other childhood illnesses. In other words, under reporting could be possible because children cannot speak for themselves and any diagnosis of illness is largely dependent on how the mothers perceive the illness contracted.

Duration of illness and medical advice sought

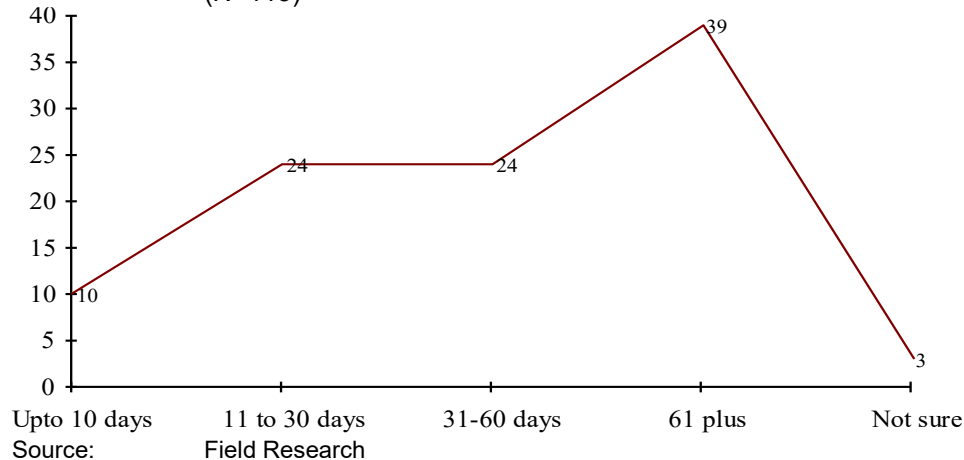
Graph 6 presents the incidence of illness by each month of the year and confirms the finding that allergy-related illnesses are at its peak during the months of February and March. As many as 42% of the respondents reported having contracted one or more spring allergies during the month of February alone. The percentage of the patients declines to a little more than half (29%) during the month of March, followed by a sharp decline in April, leading to negligible cases thereafter.

Further analysis of the data on the duration of illness reveals that about 39% of the patients continued to suffer the symptoms for more than 2 months (Graph 7). An equal percentage of the respondents reported having sustained the allergies ranging from a minimum of 11-30 days (24%) up to as many as 60 days (24%).

Graph 6: Percentage distribution of the incidence of illness by months (N=113)

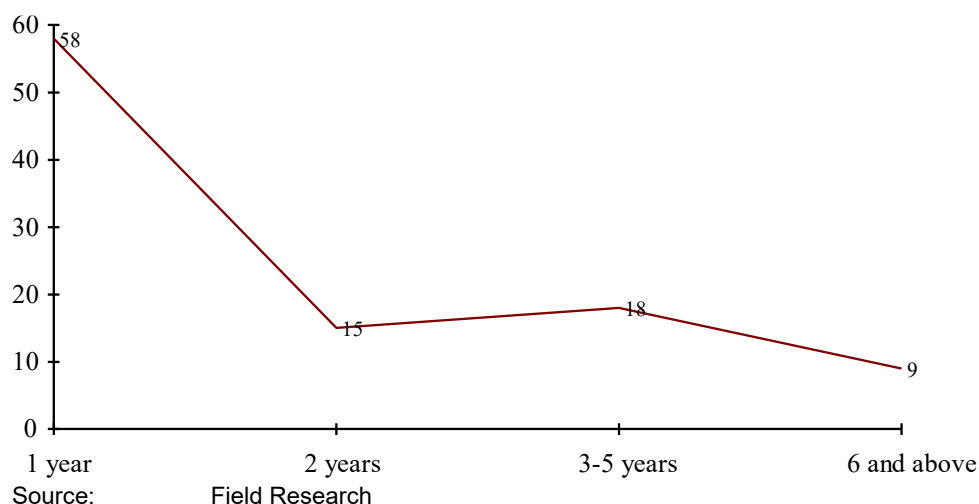


Graph 7: Percentage distribution of respondents suffering from allergies by duration of illness (N=113)



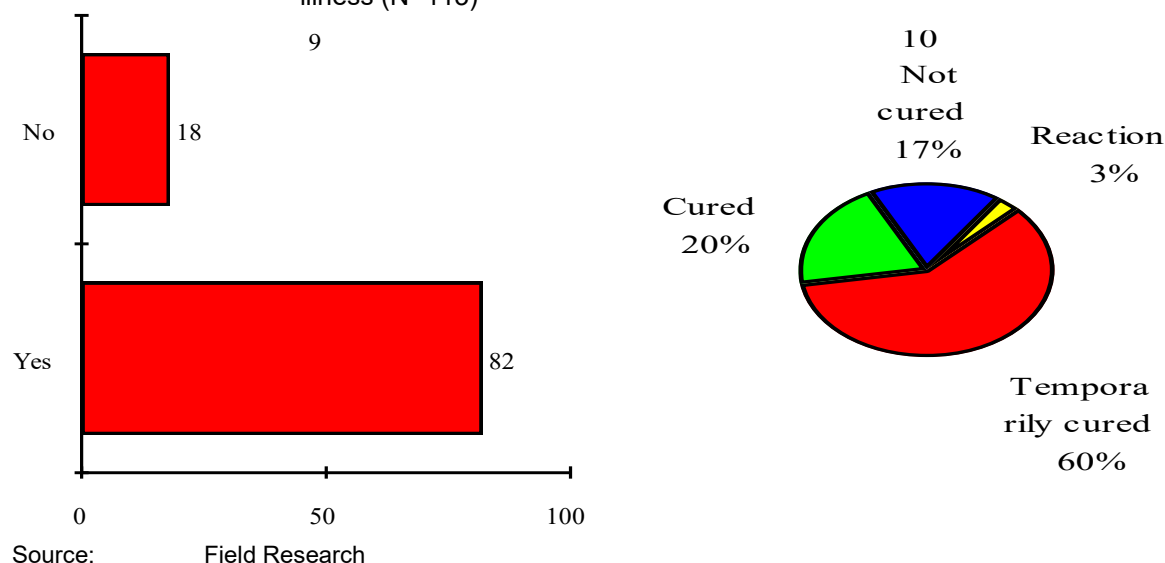
Statistics obtained on allergies in Islamabad indicate a sharp rise in the incidence this year compared to last year. More than half (58%) of the study population suffering from pollen allergies had experienced the symptoms either a season before or the spring this year (Graph 8). Fifteen percent and 18% continued to suffer from allergies, during the spring season, since the past 2 years and between 3 to 5 years, respectively. About 9% claimed that they have had the chronic problem of spring allergies since the past 6 years or more. The sharp rise in the number of allergy victims since the past one year or more suggests aggravation of the problem to alarming proportions and that with every passing year, the number of cases may increase, lest some stringent preventive measures are adopted.

Graph 8: Percentage distribution of respondents suffering from allergies by duration of illness (N=113)



With regard to the medical advice and treatment sought for allergies, more than 82% of the victims sought medical attention. The few who did not (18%) were perhaps those who did not experience severe attacks or the symptoms subsided after a few days. Amongst those who took medical advice, 37% claimed to have received immunotherapy. Out of these, as high as 67% of the respondents immunized were females as opposed to 33% males (Graphs 9 and 10).

Graphs 9,10: Percentage distribution of respondents suffering from allergies by duration of illness (N=113)



One explanation of a greater number of females being inoculated could be the greater number of female allergy-patients. However, it is possible that more of the females underwent severe attacks of the illnesses incurred or a greater number suffered respiratory infections. With regard to the effectiveness of immunotherapy, 60% said immunotherapy provided temporary relief compared to 20% who claimed to have been completely cured of the allergies. Seventeen percent of the respondents who experienced recurrence of symptoms and another 3% who reacted to immunotherapy considered the treatment to be not only expensive but a scam and a source of money-making for the doctors.

Discussion

Results of the study conducted in the six villages of Islamabad, show that of the total 347 respondents, 33% suffered from pollen allergies during the study period of January through April, 1996. The findings indicate that most of the patients contracted more than one symptom of allergy and that, more interestingly, the pattern of the symptoms of allergies varied by place of residence. Analysis show the incidence of pollen allergies to be comparatively more widespread amongst residents of Saidpur village with the highest percentage of patients suffering from asthma, difficult breathing or tightness in the chest. Overall, the most common symptoms of pollen allergies were sneezing/running nose/and itchy, watery eyes, and as high as 70% of the study population suffered from these illnesses. Another important finding of this study reveals that a substantially greater number of females contracted pollen allergies compared to men.

Stratification of the illnesses contracted by age shows that persons at the highest risk of developing allergy-related illnesses belonged to the age bracket of 40 years or above followed by children aged between 7 to 19 years. Most of the patients developed allergies in the months of February and March and 39% of them continued to suffer from the illnesses for more than 2 months. About 58% had developed the allergies for more than a year, while 18% and 9% claimed to have suffered from allergies since the past 3 to 5 years and 6 or more years, respectively, during every successive spring season.

The findings of this study revealed that more than 83% of the patients sought medical advice and treatment against allergies contracted. Amongst these 34% were prescribed immunotherapy which provided temporary relief to 60% of the total allergy patients. On obtaining information from other sources on the treatment of pollen allergies, different responses were collected leading to the conclusion that no known or definite, and permanent cure is available to date. For example, a senior doctor at PIMS believes in immunotherapy as an effective cure for pollen allergies, provided it was done properly and specifically for each and every patient. Information obtained from another source indicates that not enough research has still been conducted to develop specific vaccinations for each and every type of pollen allergy to cater for individual needs. This perhaps is one of the major reasons behind the failure of immunotherapy as a permanent cure. Adding to the controversy of the matter, the doctors at FGSH informed of the unavailability of a satisfactory treatment against pollen allergies. They are of the opinion that vaccinations are not a permanent cure for the treatment of pollen allergies and the only viable preventive measure was to change place of residence. Another doctor suggested preventive measures like face masks, air purifiers, steam inhalations, gargles, eye glasses, and good anti-allergic medication, subject to individual needs. Chairman of the Network Council, Lt. Gen. (Rtd), Mehmood Akhtar issued the following statement, 'allergy vaccines or desensitising injections, are of no proven value and may in fact be risky. This approach has been abandoned in the advanced countries and a number of clinical trials have demonstrated lack of its efficiency'¹¹.

On the causes of this widespread morbidity in Islamabad, very few investigations have been conducted so far, primarily leading to inconclusive identification of the allergens or other factors contributing to the pervasiveness of the illnesses. However, many doctors conclude that specific plants and trees which have been identified to trigger pollen allergies are not the only sources. There can be multiple allergens in the environment leading to a high incidence and that allergies can occur due to other environmental factors. While the research carried out by PIMS and presented at the International Environment Conference in Islamabad, specifically identified 3 major allergens for most allergies, namely, Bermuda/American Grass

(67%), followed by pollens of Bhung (*Cannabis sativa*) and Paper Mulberry pollen, with the severity of the allergy being in the reverse order.

In view of the range of differing opinions on sources of allergies, followed by inconclusive investigations, a greater number of queries rather than solutions have cropped-up. A few questions that come to mind for further investigations follow: are there other environmental pollutants causing multiple allergens other than specific plants and trees which aggravate pollen allergies; has the recent change in the climate, leading to a rise in temperature and associated level of humidity, contributed to the increase in morbidity? A related question is to what extent has climate change affected the pattern and frequency of rain and exacerbated the spread of pollen allergies. These questions are pertinent in the light of the fact that rainfalls further trigger the frequency of water-borne diseases and an increase in humidity aggravates respiratory infections. Hence, in the light of the major findings and the discussion presented in this paper, the need is to carry out extensive research at a much larger scale to identify the causes of the allergies and come up with some concrete recommendations to successfully manage the health problem at hand. In particular, in-depth research needs to be conducted on the following issues: Why are a greater number of women contracting spring allergies compared to men? Why are persons aged 40 years and above more susceptible to contracting allergies. A separate analytical research needs to be carried out on children age 0 to 6 years and 7 to 19 years to be able to determine the incidence of allergy-related illnesses. Laboratory investigations need to be conducted on other environmental pollutants to identify other allergens.

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