RESEARCH ARTICLE

Pollen calendar and aero-allergens of berhampore town, Murshidabad district

Ankush Pal

ABSTRACT

Background: Pollen calendars and allergic pollen studies are crucial in understanding the timing and distribution of allergic pollen in a specific region. By studying pollen calendars and allergenic pollen, researchers can identify peak pollen periods and regions, develop targeted treatment strategies and enhanced public awareness and education. *Methods:* Pollen sampling is done using traps or collectors, and the data is analyzed to create a calendar showing the peak pollen periods. *Results:* To identity the timing and duration of the pollen release, helping allergy sufferers, researchers and healthcare professionals. *Discussion:* Pollen calendars and aero allergence data can inform personalized treatment plans for allergy sufferers. To identify areas for further research, like developing novel treatments or exploring new diagnostic methods. *Interpretation:* by interpreting pollen calendars and aero allergence, we can better understand and address pollen allergies, ultimately improving the lights of those affected.

Keywords: Berhampore town, Aero allergens, Pollen calendar.

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INTRODUCTION

In 1996, the term aero biology come into existence which deals with pollen grains, spores and other microorganisms.[1] The term was described and include the distribution of insect communities, fungal spores, pollen grains, viruses and bacteria. All living things of plants and animals which enhance airborne are transferred partly or wholly into the atmosphere. The statistics was furnished by scientists[2] about aero allergens in different zones of India. The district Murshidabad is located at 24'17° N, 88'28° E latitude and longitude. The town Berhampore is the headquarter of Murshidabad district. Bhagirathi river divides the district into two zones. The western zone is referred to as Rarh and the eastern zone is known as Bagri. Bagri is a low-lying alluvial plain having a relatively humid climate and fertile soil. Rarh belongs to undulating topography and dry climate.

Aims

The aims of the study is to create a comprehensive pollen calendar for a specific region, high lightning peak pollen periods and diversity. To identify and characterize the aero allergence present on pollen grains from various plants species and to understand the relationship between pollen exposure and allergic response.

Objectives

The main objectives are to collect and analyzed pollen data from multiple sources, to identify the most common allergenic pollen source in the region, to develop a predictive model for pollen allergy risk based on pollen calendar data and to raise public awareness about pollen allergies and provide guidance for allergy sufferers.

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MATERIALS AND METHODS

To collect the pollen from dominant allergenic species from different parts of Berhampore town. Later, extract proteins from pollen using solvents and enzymes. Aero-allergens were terminated by rotorod sampler throughout the time between 2020 to 2022. Floristic investigations were prepared in eight different phytogeographical zones of Berhampore town. Plants were identified by their phenological periods and pollination mechanisms were also documented. Identification of aeroallergens was done by reference slides of collected plants during the study periods. The reference acetolysed pollen slides were introduced by acetolysis technique.[3] Sporoderm stratification and pollen ornamentations were authenticated by standard literature of Palynology.[4-6]

RESULTS AND DISCUSSION

Phytogeographically, the town Berhampore is divided into eight sub-zones like Chuapur, Panchanantala, Madhupur, Cossimbazar, Haridasmati, Gorabazar, Khagra and Bank of Ganga (Figure 1). The phytological study of Berhampore town shows the presence of different types of plants like herbs, shrubs and trees. The dominant families of trees

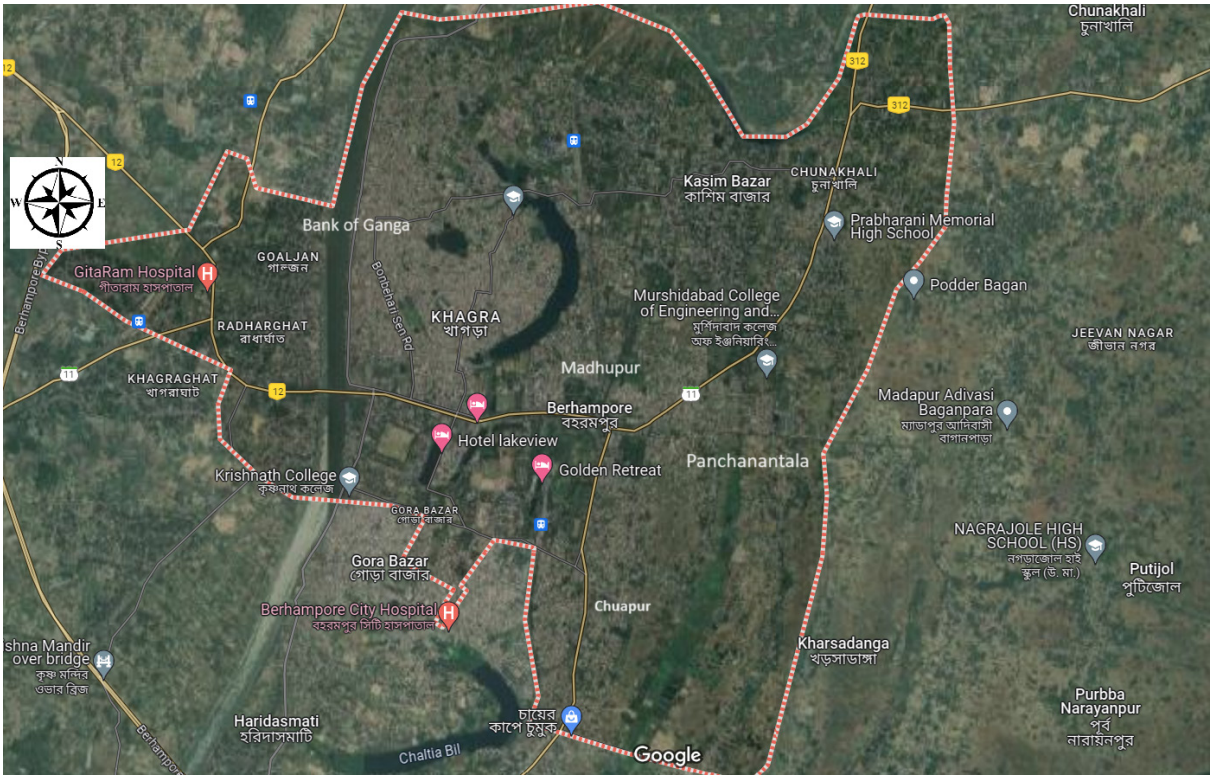

Figure 1: Phytogeographical zones of Berhampore town

are Anacardiaceae, Bignoniaceae, Meliaceae, Myrtaceae and Papilionaceae. Poaceae, Asteraceae, Solanaceae, Amaranthaceae, Brassicaceae and Euphorbiaceae are the dominant families of herbs and shrubs. The phenology of all the plant species has been documented during entire course of forecasting period. A total of 41 different pollen grains belonging to 25 families were investigated during investigation period. The occurrence of aero allergens is high in the family Asteraceae and next to Amaranthaceae, Poaceae, Caesalpinaceae, Verbenaceae, Nyctaginaceae, Brassicaceae, Apocynaceae, Myrtaceae, Bignoniaceae, Balsaminaceae and Solanaceae. All the family belongs to eurypalynous but the family Amaranthaceae and Chenopodiaceae show a stenopalynous nature.[7] Anemophilous plant species are dominated over the entomophilous type. Pollen grains are carried out by winds from one plant to another plant.

Throughout investigation time, 4101 sick persons were analyzed. About 2422 belongs to male and 1679 were female. Bronchial asthma shows the highest frequency of disease in 31 to 40 years age group and 41 to 50, respectively. The lowest frequency of disease occurs in the age group of 1 to 10 and also in 91 to 100 (Table 1). Maximum number of bronchial asthma caused by the pollen grains of the family Amaranthaceae, Poaceae and Asteraceae.[8] For chemical investigation of the skin prick test was terminated with the help of Murshidabad Medical College Hospital, Berhampore, Murshidabad. Skin test result have been checked out against age group of sick persons and co-rrelated allergic symptoms (Table 2 and 3).

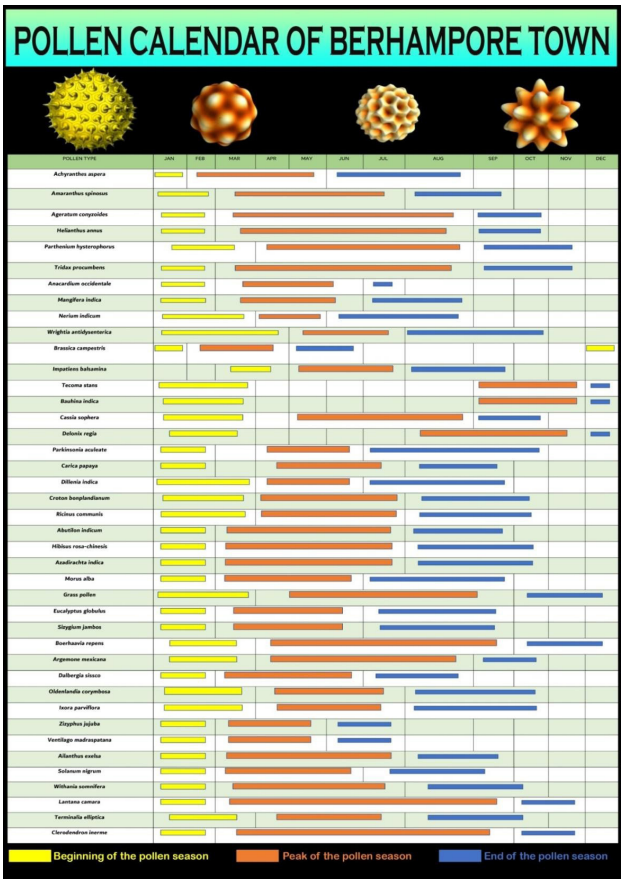

Figure 2: Pollen calendar of Berhampore town

Table 1: Types of allergic symptoms

Age groups	*Bronchialasthma*	*Rhinitis*	*Conjunctivitis*	*Hay fever*	*Total*
1–10	2	0	2	1	5
11–20	39	14	11	2	66
21–30	67	21	08	3	99
31–40	157	56	06	3	222
41–50	116	41	02	1	160
51–60	88	11	01	0	100
61–70	79	04	0	0	83
71–80	65	01	0	0	66
81–90	15	01	0	0	16
91–100	02	0	0	0	02
Percentage (%)	76.9	18.19	3.66	1.22	

Table 2: Skin test result

S. No	*Pollen types*	*Male patients showing positive reaction*	*Percentage*	*Female patients showing positive reaction*	*Percentage*
1	*Abutilon indicum*	57	2.35	14	0.83
2	*Achyranthes aspera*	83	3.42	45	2.68
3	*Ailanthus exelsa*	52	2.14	15	0.89
4	*Amaranthus spinosus*	420	17.34	279	16.61
5	*Argemone mexicana*	121	4.99	97	5.77
6	*Azadirachta indica*	123	5.07	82	4.88
7	*Brassica campestris*	227	9.37	151	8.99
8	*Carica papaya*	89	3.67	64	3.81
9	*Cassia sophera*	120	4.95	86	5.12
10	*Clearodendron inerme*	74	3.05	35	2.08
11	*Croton bonplandianum*	87	3.59	62	3.69
12	*Delonix regia*	44	1.81	27	1.60
13	*Eucalyptus globulus*	71	2.93	60	3.57
14	*Impatiens balsamina*	66	2.72	37	2.20
15	*Lantana camara*	112	4.62	101	6.01
16	*Morus alba*	96	3.96	75	4.46
17	*Parkinsonia aculeata*	23	0.94	19	1.13
18	*Parthenium hysterophorus*	227	9.37	174	10.36
19	*Ricinus communis*	184	7.59	137	8.15
20	*Tridax procumbens*	112	4.62	97	5.57
21	*Zizyphus jujuba*	34	1.40	22	1.30

Table 3: Aero-allergens of Murshidabad district

S. No.	*Name of the plants*	*Monthly pollen count*	*Annual concentration No./m³ of air*	*Total % of pollen*
1	**Amaranthaceae**			
	• *Achyranthes aspera*	32	448	1.84
	• *Amaranthus spinosus*	170	2380	9.82
2	**Asteraceae**			
	• *Ageratum conyzoides*	18	252	1.04
	• *Helianthus annus*	10	140	0.57
	• *Parthenium hysterophorus*	305	4270	17.63
	• *Tridax procumbens*	40	560	2.31
3	**Anacardiaceae**			
	• *Anacardium occidentale*	15	210	0.86
	• *Mangifera indica*	35	490	2.02
4	**Apocynaceae**			
	• *Nerium indicum*	40	560	2.31
	• *Wrightia antidysenterica*	26	364	1.50
5	**Brassicaceae**			
	• *Brassica campestris*	68	952	3.93
6	**Balsaminaceae**			
	• *Impatiens balsamina*	39	546	2.25
7	**Bignoniaceae**			
	• *Tecoma stans*	41	574	2.36
8	**Caesalpinaceae**			
	• *Bauhinia indica*	9	126	0.52
	• *Cassia sophera*	116	1624	6.70
	• *Delonix regia*	32	448	1.84
	• *Parkinsonia aculeate*	8	112	0.46
9	**Caricaceae**			
	• *Carica papaya*	8	112	0.46
10	**Combretaceae**			
	• *Terminalia elliptica*	7	98	0.40
11	**Dilleniaceae**			
	• *Dillenia indica*	15	210	0.86
12	**Euphorbiaceae**			
	• *Croton bonplandianum*	19	266	1.09
	• *Ricinus communis*	3	42	0.17
13	**Malvaceae**			
	• *Abutilon indicum*	17	238	0.98
	• *Hibiscus rosachinensis*	8	112	0.46
14	**Meliaceae**			
	• *Azadirachta indica*	22	308	1.27
15	**Moraceae**			
	• *Morus alba*	21	294	1.21
16	**Myrtaceae**			
	• *Eucalyptus globulus*	38	532	2.19
	• *Sizygium jambos*	26	364	1.50
17	**Nyctaginaceae**			
	• *Boerhaavia repens*	73	1022	4.21
18	**Papaveraceae**			
	• *Argemone mexicana*	23	322	1.32
19	**Papilionaceae**			
	• *Dalbergia sissoo*	24	336	1.38
20	**Poaceae**	176	2464	10.17
21	**Rubiaceae**			
	• *Oldenlandia corymbosa*	17	238	0.98
	• *Ixora parviflora*	26	364	1.50

22	**Rhamnaceae**			
	• *Zizyphus jujuba*	15	210	0.86
	• *Ventilago madraspatana*	17	238	0.98
23	**Simarubaceae**			
	• *Ailanthus exelsa*	18	252	1.04
24	**Solanaceae**			
	• *Solanum nigrum*	23	322	1.32
	• *Withania somnifera*	10	140	0.57
25	**Verbenaceae**			
	• *Lantana camara*	54	756	3.12
	• *Clearodendron inerme*	44	616	2.54
	Unidentified	22	308	1.27
	Total	1730	24220	

Climatic Effect on Pollen Distribution in Different Phytogeographical Zone

The role of climate is very important for pollen distribution. The pollen concentrations were high in the time between February to April due to seasonal variation. Low pollen concentrations were found in May and June because in May to June temperature is very high and relative humidity is very low. Maximum numbers of pollen grains were found in the riverside of Ganga because these areas arecovered with open grassland and different types of wild vegetation. Diversification of pollen concentration in different phytogeographical zones of Berhampore township has also been reported (Pal A, 2023) (Figure 2).[9]

CONCLUSION

This study successfully created a comprehensive pollen calendar for Berhampore town, highlighting the peak pollen periods and diversity of allergenic pollen species. This study provides valuable insights for allergy sufferers and healthcare professionals. This study also informed decisions about pollen forecasting and alert system.

The conclusion that, bronchial asthma in all the 4101 persons was due to allergic reactions to pollen grains, likely based on a combination of clinical and diagnostic evidence including patients medical histories revealed symptoms consistent with allergic asthma, nasal congestion and eye irritation. Skin prick tests with pollen extracts triggered bronchial asthma symptoms. By considering these factors it may be concluded that, pollen grains were the primary allergic trigger for bronchial asthma.

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PEER-REVIEWED CERTIFICATION

During the review of this manuscript, a double-blind peer-review policy has been followed. The author(s) of this manuscript received review comments from a minimum of two peer-reviewers. Author(s) submitted revised manuscript as per the comments of the assigned reviewers. On the basis of revision(s) done by the author(s) and compliance to the Reviewers' comments on the manuscript, Editor(s) has approved the revised manuscript for final publication.