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Characterisation of coalmining area-specific house dust mite bio-allergens in the environment of Jharia coaldields

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ABSTRACT

Atmospheric bio-particulates - alone, and adsorbed on the fine coal dust particles, constitute the airspora of the coalfield region and after coming in contact with human beings, produce various allergic manifestations. Different kinds of bio-allergens *e.g.* pollen grains, fungi, algae, and house dust mites(HDMs), prevalent in coalfield environments, being atypically of different compositions and varying concentrations, are not yet properly identified and investigated upon. The coal mining area-specific house dust mites prevalent in the environments of Jharia coalfields have been characterized and reported in the present paper. While 10 coalfield-specific field- and house dust mites have been definitively identified in the present study, 3 more unidentified mite species too were found , which are also concomitantly prevalent in Jharia coalfields. Of the 3 unidentified HDMs, one is suspected to be *Magnenia sps.* The identified HDMs include:. *Acarus sps., Austroglycyphagus orientalis, Blomia sps., Cheyletus eruditus, Cheyletus sps., Caloglyphus oudemansi, Dermayssus gallinae, Dermatophagoides farinae, Dermatophagoides pterinyssinus, Goheria fusca, Magnenia sps.* All these HDM bio-allergens, being octopod anthropodes of arachinda group and inhalant type, are potential allergens, responsible for causing allergic health hazards manifested by different skin, respiratory and other allergic disorders in humans living in and around coal-mining and coal-based industries' areas. The concentration of the HDMs was found to be maximum during the rainy season. These inhalant mites are potent allergens, responsible for causing hazardous allergic ailments like bronchial asthma, allergic rhinitis, eczema, and other skin diseases.

KEYWORDS

Jharia coalfields;
Environment;
Bio-allergens;
House dust mites;
Characterisation.

INTRODUCTION

Coal mining-both underground and opencast, as well as coal-based industries, in particular, are responsible for the release of abiotic particulate matter (SPM, RSPM, SO_x, and NO_x) and also bio-particulates along

with fine coal dust particles in the environment. The atmospheric bio-particulates-alone, and adsorbed on the fine coal dust particles, constitute the airspora of the coalfield region and, being potentially hazardous allergens, when they come in contact with human beings produce allergic manifestations of different kinds.

Airborne atmospheric bioparticulates, such as pollen grains, fungal spores, algal filaments, insect scales etc., found in specific environments, are now being widely recognised to play a vital role in causing various types of allergic disorders specific to human beings[1-10]. In a tropical country like India, about 30% of the populace is believed to be suffering from major allergic diseases, bronchial asthma, allergic rhinitis, eczema, hay fever etc. to name a few. It is now also being increasingly realised that in a given particular industrial environment, the type and population of the bioparticulates are likely to vary and, in turn, the allergenic disorders may also be quite different. Different industries in general, and coal mining – both underground and opencast, as well as coal-based are responsible for the release of abiotic particulate matter (SPM, RSPM, SO_x, and NO_x) and also bio-particulates along with fine coal dust particles in the environment. The atmospheric bio-particulates-alone, and adsorbed on the fine coal dust particles, constitute the airspora of the coalfield region and, being potentially hazardous allergens, when they come in contact with human beings produce allergic manifestations of different kinds[11-13] The health and the physiological processes of human beings can - and often do, get adversely affected by the impact of these air borne particulates through their release, contact, dissemination and deposition in the human systems/organs, which, in recent years, has been amply demonstrated through several clinical investigations. It is now fairly well understood that a detailed knowledge and characterization of these allergens will provide a useful tool in the treatment and/or preventing the effects of specific aeroallergens in different individuals sensitive to a particular type of allergen.

The biotic allergens prevalent in coalfield environments, such as pollen grains, fungi, algae, and field- and house dust mites, are atypically of different compositions and varying concentrations, are not yet properly identified and investigated upon. These hitherto unknown allergens typically found in coal-based industrial areas are the main culprits for causing a multitude of allergic disorders in a huge number of population living in the coalfields and other coal-based industrial areas. So as to identify, systematically characterize, and understand their role in causing different types of allergic disorders in the populace in coal based environments, it is rather imperative to identify and characterise the specific pollutants including aeroallergens for causing specific allergic disorders in human beings. Also, the manmade and industrial pollutants like RSPM, RAD, smog and other gases are prone to adversely affect the viability of microorganisms in air and soil and other important variants that have to be necessarily included in such aerobiological investigations. Furthermore, there are marked seasonal variations in the density and population of these bio-particulate allergens, necessitating the recording of data season-wise.

A thorough survey of literature reveals that although a great deal of research work has been done during the past 3-4 decades in the area of aerobiology-and bio-allergens in particular, in different parts of the world and under varying climatic conditions[1-10,14-20], yet practically no work has been done on coalmining area-specific bio-allergens. Since the bio-allergens prevalent in coalfield environments, such as pollen grains, fungi, algae, and field- and house dust mites(HDMs) are likely to be of different compositions and varying concentrations, and more so when they have not yet properly studied and investigated, it aroused our curiosity and prompted us to take up systematic investigations on coal mining area-specific bio-allergens[21-22]. In the present paper, we report the results on the identification and characterization of the coal mining area-specific house dust mites prevalent in the environments of coal-mining and coal-based industries' areas of Jharia coalfield in Dhanbad district (Jharkhand, India).

EXPERIMENTAL

Selection of sampling sites

The dust mite samples were collected from both the field and the residences of CFRI colony (situated in the close proximity of Bhowrah colliery and coke plant), North Tisra colliery, and Sindri (situated in the adjoining area of Fertiliser factory and ACC Cement Fac-

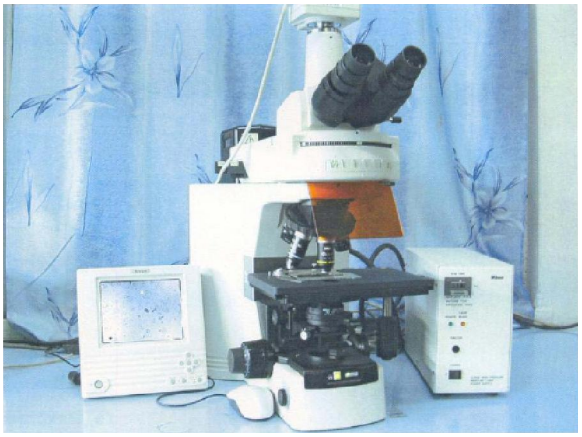


Figure 1 : A view of trinocular microscope (Make: Nikon, Japan) used for examination and identification of house dust mites

tory), all of which typically belong to the coal mining and coal-based indusries' areas of Jharia coalfields.

Collection of samples

House dust mite samples were periodically (every fortnight) collected from the fields and selected houses at all the above mentioned sampling sites. The samples were collected manually, as per the procedure of Tilak[23] by sweeping the floor, especially from the corners and underneath the almirah, sofa sets, show cases, etc. by brushing, dusting and shaking/wiping different articles. Samples from the field were collected by taking appropriate soil samples where mites were prone to inhabit. About 0.5g of each of the collected dust samples from different sites were stored in small, clean (alcohol washed and dried), bottles in such a way that the samples were about half the bottle with good air space inside and then stoppered. Each bottle of the collected sample was properly labelled, mentioning the source of the sample, data, name and type of home. After collection of the dust samples, the dust mites were isolated and identified.

Examination of dust samples

The field- and house dust samples containing the mites were examined following the procedure of Tilak and Jogdand[19]. After separating large particles and fibrous materials from the dust samples by sieving through 300 mesh special brass sieve, each of the sieved dust samples was placed in a petri dish (5.5cm dia) and spread evenly to form a uniform thin layer for examination. The petri dish was then placed under 10x optical lens and computer-controlled Trinocular Research Microscope (Nikon, Japan make) shown in figure 1 and the dust mites were visually examined. Mites were detected by their movement.

Isolation of dust mites for quantification

I.e. estimating the number of live and dead mites in the samples, was done by using the flotation technique, described below.

Flotation technique

The isolation of mites from the collected samples was done following the sieving and flotation method, prescribed by Spieksma, and Spieksma-Boezeman[24,25] which was subsequently modified by Krishna Rao et al.[26]. The step-wise experimental procedure was as follows:

i Firstly, the collected dust mites sample was sieved through 50μm sieve pore size and weighed , and thoroughly mixed with kerosine oil;

ii The mixture was centrifuged at 2000 rpm for 10 minutes;

iii The supernatant was then filtered through a filter paper marked into square inch. Finally, mites in each square inch were counted under the stereo-binocular microscope;

iv The left over sediment from step (ii) was put into a 3:5 mixture of kerosene oil and carbon tetrachloride (CCl_4) and the process was repeated as in step (iii);

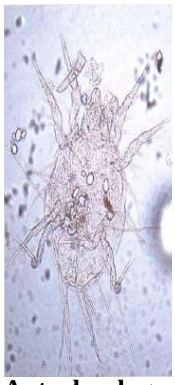
v The left over sediment from step (ii) was mixed with a mixture kerosene oil and carbon tetrachloride (CCl_4) in the ratio of 1:3 and the process was repeated as in step (iii);

vi The sediment from step (v) was put in pure CCl_4 and the process as in step (iii) was repeated.

Preparation of culture of dust mites

Cultures of field- and house dust mites were prepared in small culture bottles (4cm width×4cm length), following the procedure described by Voorhorst[27], which essentially entails putting 200mg of powdered nutrient material, viz., grain dog meal, and yeast (20%) in the bottles and then adding few specimen of a known species of the house dust mites. Next, to avoid the escape of mites, a layer of grease is applied to the lip of each culture bottle, which, then, is tightly closed with a

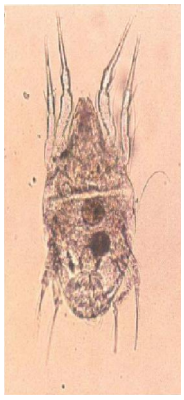
Acarus sps



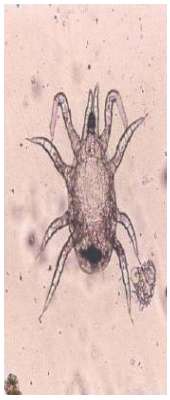
Austroglycyphagus orientals

Blomia sps

Figure 2a : House desk mites in coal mining and coal based industries areas in Jharia coalfields



Cheyletus eruditus

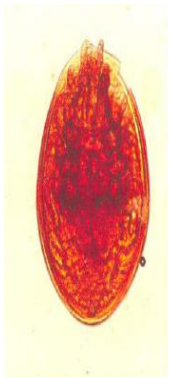


Cheyletus sps

Caloglyphus oudemansi

Figure 2b : House desk mites in coal mining and coal based industries areas in Jharia coalfields

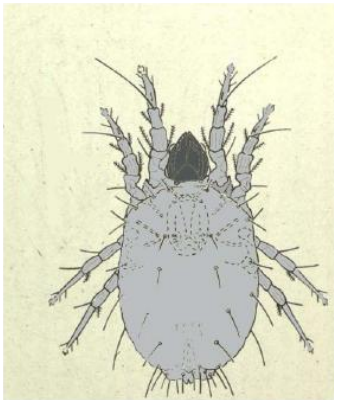
Dermayssus gallinae



Dermatophagoides pterinyssinus

Goheria fusca

Figure 2c : House desk mites in coal mining and coal based industries areas in Jharia coalfields



Megnenia sps

Figure 2d : House desk mites in coal mining and coal based industries areas in Jharia coalfields

lid to prevent any contamination from outside. These bottles are then placed on the perforated disc of a desiccator containing saturated solution of NaCl, so as to maintain a relative humidity of + 80%, then placing the desiccator in an incubator at 25°C, and keeping the cultures under observation regularly twice a week to check proper aeration and any fungal growth. For the isolation of mites, the dense cultures are then sacrificed in order to prepare antigenic extracts, while keeping few of them for maintaining sub-cultures, the latter being maintained by adding one part of old culture containing all stages of development to nine parts culture medium put in a fresh culture bottle. In this manner, from one fully grown culture, several fresh cultures can be inoculated and repeatedly multiplied as per the requirement.

Separation of dust mites from culture media

Separation of mites from the cultures is necessary for the preparation of antigen, for which each culture was shaken with dichloromethane and left standing for minute or two. The top layer was removed and transferred into a petri dish, allowing dichloromethane to evaporate. This process was repeated for three times, until dry and dichloromethane-free mites were obtained. Keeping the dish under a microscope, the mites were removed with a fine needle.

Identifucation/characterisation of dust mites

The mites were identified in accordance with the keys given by Fain[28-30] and also by the criteria mentioned by Huges[31] and Green and Miranda[32].

Preparation of dust mite calendar

Concentration of dust mites was regularly recorded twice (fortnightly) every month for consecutive two years (2007-08 and 2008-09) and a calendar was prepared for each year. Monthly per cent contribution of

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TABLE 1 : Characteristics of the identified house dust mites in coal-mining and coal-based industries' areas of Jharia coalfields

Dust mite species	Color	shape	Size (length in µm)	type
Acarus sps.,	Pale brown	Oval	235	Inhalant
Austroglycyphagus orientalis,	Brownish grey	Oval	345	Inhalant
Blomia sps.,	Brown	Elongated	460	Inhalant
Cheyletus eruditus,	Dull brown	Elongated	385	Inhalant
Cheyletus sps.,	Shining brown	Oval	355	Inhalant
Caloglyphus oudemansi,	Red	Oval	275	Inhalant
Dermaysus gallinae,	Blackish brown	Oval	512	Inhalant
Dermatophagoides farinae,	Brownish red	Oval	320	Inhalant
Dermatophagoides pterinyssinus,	Brown	Oval	420	Inhalant
Goheria fusca,	Grayish white	Oval	435	Inhalant
Unidentified (possibly *Magnenia sps*)				

TABLE 2 : Month- wise % contribution of house dust mites vis-à-vis meteorological parameters in Jharia coalfields during the period April, 2007-March, 2008

2007-08	Monthly % contribution	Maximum temp.(°C)	Minimum temp.(°C)	Rainfall in mm	Average RH (%)
April	1.0	34.3	30.10	0.0	33.34
May	0.0	45.62	34.53	90.0	25.55
June	4.3	41.42	30.12	151.0	58.23
July	27.4	34.85	26.45	213.1	59.63
August	22.9	34.4	25.14	260.0	60.54
September	16.8	33.59	24.64	129.7	62.68
October	11.6	32.49	23.32	112.2	59.37
November	7.5	25.53	20.38	0.0	47.41
December	4.0	21.06	11.25	28.2	45.79
January	3.7	20.73	10.11	52.3	42.74
February	2.4	22.46	14.14	27.1	45.65
March	1.0	24.2	22.6	21.7	54.32

the dust mites in relation to meterological parameters, viz., temperature (maximum and minimum), rainfall, and relative humidity (RF) was also calculated and recorded. For this study, different types of dwellings at different locations, viz., slums comprising (ill ventilated, mud constructed houses, huts) , airy, damp, and well-built modern houses, were selected.

RESULTS AND DISCUSSION

Characterisation of field-and house dust mites

The results on the identification and characterization of field-and house dust mites found in the coal-mining and coal-based industries' area of Jharia coalfields are presented in figure 2a-d The characteristics of the identified each individual house dust mites are included in TABLE 1. Further, from the month-wise data collected on the concentration of the identified mites, their year-wise concentrations for 2 years (viz. from April, 2007 to March, 2008, and April, 2008 to March,2009) in each month were regularly assessed, in order to understand the monthly prevalence of mite fauna in Jharia coalfields. The results are shown in the form of histograms in figure 3. Likewise, an attempt was also made to correlate the month-wise prevalence and % concentration of the identified dust mites in Jharia coalfields with those of meterological parameters (temperature, rainfall, and relative humidity) during the above period of 2 years (2007-08 and 2008-09) and the results are included in TABLE 2 and 3 respectively. From the data on month-wise concentrations of the identified mites, a house dust mite calendar was also prepared and the same is depicted in TABLE 4, from which the presence of the dust mites during a particular period of the year can be readily discerned.

From the pictures of the dust mites (Cf. Figure 2a-d), it is seen that in all 10 house dust mites have been identified and they include : *Acarus sps., Austroglycyphagus orientalis, Blomia sps., Cheyletus eruditus, Cheyletus sps., Caloglyphus oudemansi, Dermayssus gallinae, Dermatophagoides farinae, Dermatophagoides pterinyssinus, Goheria fusca*,. It may also be noted from TABLE 3 that in addition ro these 10 mites, 3 more unidentified mite species too are found in Jharia coalfields which are also concomitantly prevalent during the months July-November. From amongst the 3 unidentified mites, though one is suspected to be *Magnenia sps*, yet to be certain, more rigorous and detailed characterization is still needed.

The identified mites, being the small microscopic animalicules of different colours (dull or shining brown, red, grey), and ranging between 235 and 512µm in size, and oval or egg shaped in general, are the potent intramural allergens, the prevalence of which has been found in the field- and house dust of coal-mining and coal-based industries' areas of Jharia coalfields. These mites are all octopod anthropodes of arachinda group and they have jointed legs and body cover. Their skin,

TABLE 3 : Month- wise % contribution of house dust mites vis-à-vis meteorological parameters in Jharia coalfields during the period April, 2008-March, 2009

2008-09	Monthly % contribution	Maximum temp. °C	Minimum temp. °C	Rainfall in mm	Average RH%
April	1.2	36.4	24.86	16.5	35.25
May	0.0	45.9	25.08	38	26..63
June	6.3	38.4	24.17	195	57.67
July	24.5	35.31	20.52	232.5	55.45
August	20.3	36.01	21.76	174.5	63.46
September	18.5	35.5	20.66	38.5	65.22
October	11.2	34.51	23.18	71.5	59.14
November	5.4	25.24	18.72	20	51.74
December	5.8	21.21	12.38	0	45.67
January	5.4	21.32	10.62	0	41.88
February	2.3	21.64	12.97	0	42.67
March	1.3	22.6	17.35	22.5	54.41

TABLE 4 : House dust mite calendar of Jharia coalfields (Shaded part of the year indicates the presence of house dust mites during the period.)

House dust mite calendar	Months											
House dust mite species	J	F	M	A	M	J	J	A	S	O	N	D
Acarus sps												
Austroglycyphagus orientalis												
Blomia sps												
Cheyletus eruditus												
Cheyletus sps												
Caloglyphus oudemansi												
Dermayssus gallinae												
Dermatophgoides farinue												
Dermatophagoides pterinyssinus												
Goheria fusca												
Magnenia sps												
Unidentified – 1, 2 and 3.												

as seen under the microscope, was typically found to be covered with various types of setations or sculptures-a characteristic indicator which facilitates their identification and classification. These pyroglyphid mites are seen to have atypically globular body with a joined abdomen and cephalothorax, without any visible segmentation (idiosome). Being of arachinda family, these mites have characteristically four pairs of articulated legs with pili or seats, and claws or suckers. In general, these acarine mites are more akin to spiders and scorpions than to insects, as typically and distinctly characterized by their four pairs of legs.

Mites occur on a wide variety of substrates like dried skin, house dust including mattress dust, floor dust, kitchen debris, stored food, poultry and dog meal, cotton seed meal etc.[3,7,8]. Mites grow well in house dust, as it provides a nutrient medium enriched with organic substances like food particles, human or domesticated animal scales, danders etc., desquamated by them in the dust of the dwellings. Mites are potential allergens and these offending allergens, more often than not, cause various allergic disorders and diseases. Mite debris, skin, byproducts, and faecal pellets of mites play important role in causing such allergic disorders in humans as bronchial asthma, allergic rhinitis. The allergic reaction an individual may be due to any component of the mite, to which the individual is sensitive and the allergic reaction may be either due to body contact or through inhalation The dust mite allergens differ in their route and exposure, and are accordingly classified as (i) inhalants, (ii) ingestants, (iii) contactants, and (in) injectants. It is observed from TABLE 1 that all the dust mite allergens identified in the coalfield areas in this study belong to the category of inhalants, i.e. the allergic disorders in humans are prone to be caused by inhalation of the dust in which these mites are present.

Correlation with environmental parameters

A careful examination of the results of TABLE 2 and 3 reveals that the concentration of the mites varied during 2 years of studies (2007-08 and 2008-09), with a variation in meteorological parameters such as room temperature, rainfall, relative humidity (RH) etc. It is observed that the density of the mite population was minimum during summer (April, May). On an average, the maximum number of isolated mites in April was 4000 /g dust in slums having ill-ventilated, damp and poorly constructed houses and huts with no cement floor, compared to well-built, well-lighted and airy, modern and clean houses with better sanitary condition in the dust of which the number of isolated house was 2000/g. This number significantly declined and the number of isolated mites in the month of May was 1500g dust in slum dwellings vis-à-vis 645/g dust in other well-built houses. This clearly suggests that high temperature reaching upto 45°C or more during extremely hot summer experienced in the months of April and May, associated with very low relative humidity (upto 25-26%) and lack of

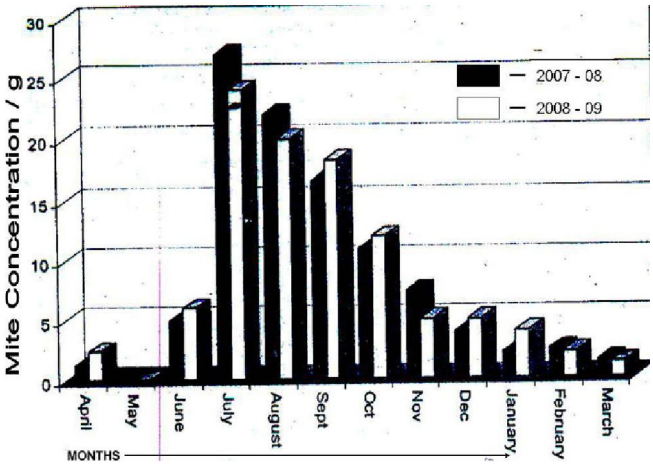

Figure 3 : Month wise concentration of house dust mites in coal mining and coal based industries areas in Jharia coalfields

rains, creates a highly unfavourable environment for the growth and sustenance of mite fauna in the house dust. Quite in contrast to this, during the rainy season, spanning from June to October, there is a gradual increase in the number of mites. In the beginning, usually after the rains, many eggs of the mites were found in the dust samples collected from all types of dwellings. The growth of eggs was tracked from larval through nymphal and eventually to adult stages. Maximum load of the allergens, i.e., concentration of the mites, was recorded in the months of July and August, when the average temperature was 34-35°C , associated with average relative humidity of about 60%. The contribution of the dust mites during this period ranged between 20 and 27%. After this, in the month of September, a slight decline in the allergen load (dust mite concentration) was recorded, which ranged between 16.8 and 18.5%, when the average temperature was 33.5°C and relative humidity 59% during both the years of study. It is thus evident that a temperature range of 34-35°C with humidity around 60% is most favourable for the growth, multiplication, and subsequent increase in the population of house dust mites in the coal mining and coal-based industries' areas of Jharia coal fields, whereas in other parts of the country these house dust mites grow and thrive well even at lower temperatures (24-26°C)and higher RH (70-80%)[5]. This implies that in the environments of coalfields in general, and Jharia coalfields in particular, where usually relatively high temperatures and slightly lower percentage of RH prevail during summer, these house dust mites have accordingly adopted themselves to thrive in such ecological conditions. Thus, in the coalfields, the frequent rains during the rainy season play an important role in maintaining proper RH (60% or more) and required moderate temperature for the mites to grow and survive. It is, however, intriguing to observe further that with the onset of monsoon in the month of June, the density of mite population was much less, being 4.3 and 6.3 % during the period 2007-08 and 2008-09 respectively, even though the environmental factors were quite favourable (temperature in the range 38-41°C, and RH about 58%). This might possibly be attributed to just the onset of the reproductive process of the mites in June when the eggs were just being laid or when the eggs were in the larval stage.

It is further observed from the results of TABLE 2 and 3 that there is a sudden decline in the population of mites in winter, In November, for example, it was 362 and 275 during the period 2007-08 and 2008-09 respectively, when the average temperature was 49.7°C, with RH around 51%. The density of the mites is seen to remain practically the same (a low of 4-5) during the months of December and January for both the years. It is thus evident from these observations that the morphological parameters during winter, with prevailing lower temperature in the range 21-23°C and low RH (41-45%) are not favourable for the increase in the concentration or load of the allergens, which is why there is sudden and significant decline in the population of the allergens during the months of winter (December-February). It is also obvious that rains do play an indirect role in creating and maintaining appropriate conditions of temperature and RH for the reproduction, growth and multiplication of the dust mites in the environment atypical to coalfields.

It is important to mention here that share of house dust mite population was invariably found to be more in bed dust compared to floor dust in all the months and seasons, This might be due to the association of mites with human habitat, which readily offers good substrates or medium, enriched with organic substances like dried skin, human scales, danders (and also food particles in such houses where residents eat meals/snacks on the bed while watching TV), providing nourishment to the mites for their growth and sustenance.

The increase in the concentration (population) of the dust mites is obviously prone to induce higher prevalence of allergenicity in sensitive individuals living in and around the coal-mining and coal-based industries' areas of the coalfields. Since a variety of house dust mites are found to be prevalent in the environment of coal-mining and coal-based industries' areas of Jharia coalfields, and since these intramural inhalant dust mite allergens play significant role in respiratory allergy, they often result in clinical manifestations[33a,b,34]. Systematic clinical study on allergic disorders has been initiated on patients residing in these areas, the results of which shall be reported in our next communication.

Seasonal variation of dust mite concentration

From a critical appraisal of the histograms in figure 3, showing the month-wise concentration of the identified dust mites over 2 years, it is found that the concentration of all the dust mites detected is subject to seasonal variation in that their concentration was minimal during summer (April and May), moderate during winter (November – February/March), and highest during the rainy season i.e. from June to October in both the years. This clearly shows that the climatic conditions have an important bearing on the growth, and sustainability and survival of the house dust mites. These findings are well corroborated from the findings of Tilak and Jogdand[33b], who, while studying the ecological exploration of mites, have also reported significant impact of environment and seasonal variation on the incidence and prevalence of house dust mites. They have also found highest % concentration of house dust mites in the rainy season, viz., July-September, under congenial environmental conditions.

Further, from the month-wise data collected on the concentration of the identified mites, their year-wise concentrations for 2 years (viz. from April, 2007 to March, 2008, and April, 2008 to March,2009) in each month were regularly assessed, in order to understand the monthly prevalence of mite fauna in Jharia coalfields. The results are shown in the form of histograms in figure 3. Likewise, an attempt was also made to correlate the month-wise prevalence and % concentration of the identified dust mites in Jharia coalfields with those of meterological parameters (temperature, rainfall, and relative humidity) during the above period of 2 years (2007-08 and 2008-09) and the results are included in TABLE 2 and 3 respectively. From the data on month-wise concentrations of the identified mites, a house dust mite calendar was also prepared and the same is shown in TABLE 4, from which the presence and concentration of the dust mites during a particular period of the year can be readily discerned.

The presence of *Cheyletus eruditus,* in association with abundant *Ch. Malaccensis* mites in stored food grains has been found in Turkey[35] and Egypt[36]. The ubiquitous presence of the asthma causing mites in the house dust has also been reported in other countriesalso, viz., England, Germany, Switzerland, Finland, Norway, Spain, Iran, Pakistan, Australiam Brazil, Argentenia, Surinam, The Netherlands, USA, Japan, Canada[37]. While the mite *D. pteronyssinus* is the most predominant HDM in Europe and Japan, the mite *D. farenae* is most found in North America and UAR From the present study, it, however, manifests itself that in the environment of Jharia coalfields two HDMs, namely, *D. pteronyssinus* and *D. farenae* are most commonly prevalent, the % concentration of the latter being dominant (ca. 40%) as compared to the former (<20%).

CONCLUSIONS

Aimed to assess and understand the mite fauna specific to the environment of coal mining and coal-based industries' areas of Jhara coalfields, the present study has evinced that a vide variety of dust mites, some of them being uncommon and 2 unidentified, are prevalent in the field dust and house dust which are specific to coalfields. In all 11 types of coalfield-specific dust mites were identified, viz. . *Acarus sps., Austroglycyphagus orientalis, Blomia sps., Cheyletus eruditus, Cheyletus sps., Caloglyphus oudemansi, Dermayssus gallinae, Dermatophagoides farinae, Dermatophagoides pterinyssinus, Goheria fusca, Magnenia sps,* some of which are potential allergens, responsible for causing health hazards manifested by different skin, respiratory and other allergic disorders in humans. Save for the month of April and May, the prevalence of these mites was found throughout all other months of the year, albeit in their varying concentrations, the maximum concentration being during the rainy season (middle of June-September). All These mites are inhalant types and are

potent allergens, responsible for causing such allergic diseases as bronchial asthma, allergic rhinitis, which are most common ailments among the populace, especially the coal miners and other persons working or living in and around the coal mining and coal-based industries' area of Jharia coalfields.

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