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Study the quality of school environment as new habitat for allergenc mites in Cairo, Egypt

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ABSTRACT

The present study was conducted on eight schools representing four different districts in Cairo Governorate from December 2006 till November 2007. The total annual number of school dust mites collected was relatively low (66 individuals). Shobera Al-khama schools embraced the highest population mite density (65.15%) followed by Al- Abassia (16.16%), Al-Salam city (9.09%) and Nasr city recorded the lowest population density (7.58%). The most abundant family collected was Pyroglyphidae representing 27.27% of the total number distributed between two different species of the Genus *Dermatophagoides* (*D.pteronyssinus* and *D. farinae*). This followed by families Cheyletidae and Dermanyssidae, each comprises 25.75% of the total with a single species for each; *Cheyletus malccensis* and *Dermanyssus sp*., respectively. Family Acaridae was represented by (21.21% of the total) and came later in abundance. The average number /5 gm. dust ranged between only one individual during April and July and 20 individuals during November, however completely absent during March and September. dermanyssids and acarids were present in seven months, cheyletids in six months and pyroglyphids in five months. All mite species were recorded with relatively higher rate during cold months reaching its maximum in January for Pyroglyphidae and Acaridae and during October and November for Cheyletidae and Dermanyssidae. The lower rate of these mites obtained during hot months. These results indicate that the lower the temperature, the higher population density of school dust mites.

Keywords: Allergenc, mites, Egypt

INTRODUCTION

Members of family Pyroglyphidae (Astigmata) are shed skin feeders and predominate inside houses. They are of considerable medical importance because they produce allergens, which cause bronchial asthma, perennial rhinitis and some respiratory disorders in sensitive patients (Maunsell *et al*., 1968 and Voorhorst *et al*., 1970). Many studies have been devoted to the active fauna of human habitation, especially those occurring in houses and other institutions dust. In Egypt El-Sherbiny, *et al*., 2010: study the prevalence of house dust mites in Al-Arish city, North Sinai Governorate. Khalifa *et al*. (1974) and Salem (1980) found that children suffering from asthmatic bronchitis comprised 60% of the patients. Those workers were able to prone immune-diagnostically that house was an active factor inducing asthmatic bronchitis among children patients. The nature and source of specific extrinsic allergens present in house dust extract were liable to much confusion. The workers in this field have emphasized that *Dermatophagoides pteronyssinus* and *D. farinae* lie at the top of house dust mites as main source of environment pollutants with house dust mite's allergens (Pauli *et al*., 1972; Arlian *et al*., 1982; Gamal-Eddin *et al*., 1989;

Yassin, 1999 and Yassin *et al*., 1997). Later on, other mites belong to different families have been isolated from house dust and proved as being sources of allergens in different carried now different names according to the habitat of these mites, as house dust mite allergy, storage mite allergy and barn allergy. The intensity of infection is usually a reflection of the microenvironment provided for the mites by the life ways and habits of man, as well as the climate of the region in which they are found (Mitchell *et al*., 1969). The organic components originate from many sources such as: molds, bacteria, pollen, food particles, and human and animal dander. They represented the source of nourishment for a variety of mites and other arthropod-vectors of diseases are quite abundant in this habitat (Richard *et al*., 2006). The prevalence of asthma, rhinitis, contact dermatitis and/or allergy individuals susceptible or sensitive to house dust mites has increased worldwide, especially among pre-school and school aged children (National Academy Press, 2000). Many causes have been proposed for this increase including changes in the standard of living, fever infections during early childhood, exposure to cigarette smoking and other irritants and outdoors and indoors allergens, damp housing and the presence of moulds in the home (Smedje *et al*., 1997). There is a sufficient evidence of a causal relationship between exposures to house dust mite allergen and the development of asthma in susceptible children, the feasibility and effectiveness of physical interventions to the house dust mite allergens in low-income, urban homes environments remain elusive (Patrick *et al*., 2001). The indoor air exposures are more strongly linked to the increase of asthma prevalence than either outdoor air exposures or violence. Specifically, dust mite and tobacco smoke exposure are identified as both risk factors for the development of asthma, as well as factors that may exacerbate existing asthma (Ruth, 2003). Nadchatram, (2005) found that house dust mites lived in human contact from time immemorial. Human dander or dead skin constitutes the major organic component of the house dust ecosystem. They feed on dander, dust mites and human association will continue to co-exist as part of our environment. Efficient house-keeping practice reduces infestation.

Because the children attended school for a major part of their time, the present study was conducted to study the quality of the school environment. This is the great of importance and may affect asthmatic symptoms as stated by (Smedje *et al*., 1997).

MATERIAL AND METHODS

Twenty four school dust samples (monthly) from eight school classrooms of the four different districts in Cairo governorate were selected for this study as new habitats for allergenic mites. These are Shobra Al- Khaima, Al-Abassia, Al- Salam city and Nasr city. Two schools from each district were chosen covering the whole district. These districts represent variable socioeconomic standards, age, cleanliness and using of electrical cleaners. Collection of dust samples were carried out once monthly for a year from December 2006 till November 2007 using electrical vacuum cleaner Usfesa (Mod.Mam-101/Mam-202-306VM). The first and second districts are crowded, with low socioeconomic standard and do not use any electrical cleaners in their schools, while the third and fourth are not crowded , with relatively high socioeconomic standard and use electrical cleaners. Samples in bags were kept separately and labeled with its information sheet including date of collection, temperature and relative humidity and all are enclosed in a plastic bag, tied and taken to the laboratory. The mite fauna in the samples (5 gm fine dust for each) were

isolated and mounted on microscopic slides in Hoyer's medium for examination, identification and counting.

RESULTS

The present study revealed that the total annual number of school dust mites collected was 66 individuals, distributed between the four districts are Shobra Al-Khaima (43 individual representing 65.15%), Al-Abassia (12 individuals representing 18.18%) Al-Salam city (6 individuals representing 9.09%) and Nasr city (5 individuals representing 7.5%). The analysis of variance of these data indicated that the four districts are very highly significant source of variation in mite number (P >0.01). This means that the number of mites collected from school dust depend greatly on the location of school and the stander of living in the district (Table 1 and Fig.1).

Table 1: Monthly variations of school dust-mites in the four districts in Cairo governorate, Egypt.

Months	Districts				Totals
	Shobra Al Khama	Al Abassia	Al Salam City	Nasr City	
December 2006	2	----	1	3	6
January 2007	12	2	----	----	14
February	2	2	1	----	5
March	----	----	----	----	----
April	1	----	----	----	1
May	2	----	----	----	2
June	----	----	1	1	2
July	1	----	----	-----	1
August	2	2	----	----	4
September	----	----	----	----	----
October	3	4	3	1	11
November	18	2	----	-----	20
Totals	43	12	6	5	66
Percentage %	65.15	18.18	9.09	7.58	

Analysis of variance

Source of Variation	D.F.	SS	MS	F-value
Month	11	7.194	0.654	1.725
County	3	5.232	1.744	4.601**
Error	33	12.509	0.379	
Total	47	24.935		

D.F. = Degree of freedom. MS = Mean square. SS = Sum squares. ** = Significant at 0.01

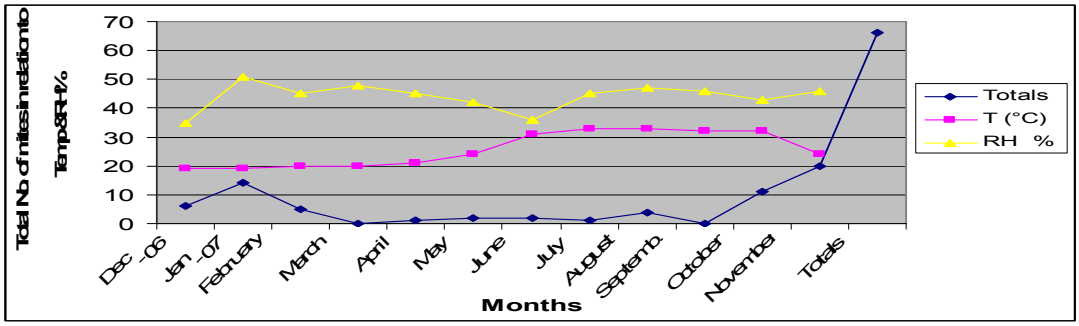

Fig. 1: Monthly total numbers of school dust-mites in relation to relative humidity (RH%) and temperature (°C) in Cairo governorate from December 2006 till November 2007.

Five different species of mites of different families were encountered during the present investigation. The most abundant family was Pyroglyphidae (18

individuals representing 27.27% of the total number) distributed between two different species of the genus *Dermatophagoides* (10 of *D. pteronyssinus* and 8 of *D. farinae*).This followed by families Cheyletidae and Dermanyssidae, each comprises 26.75 % of the total with 17 individuals of a single species for each, *Cheyletus malaccensis* and *Dermanyssus sp*., respectively. Family Acaridae was represented by 14 individuals (21.21% of the total) and came later in abundance (Table 2 and Fig. 2).

The statistical analysis of the data indicated that the variation in number between different species was statistically non- significant and months were highly significant (P>0.01). This indicate that these mites are not permanent inhibitors of the school but they are occasional invaders comes to the schools by the bodies of the pupils.

Table 2: Monthly variations of school dust-mites in Cairo governorate from December 2006 till November 2007.

Months	Pyroglyphidae		Cheyletidae.	Acaridae	Dermanyssidae.	Totals	Ambiant ° C(Mean	humidity R.H. %
	D.sp1	Dsp2						
December 2006	1	1	1	2	1	6	19	35
January 2007	4	1	4	4	1	14	19	51
February ,	1	1	---	2	1	5	20	45
March	---	---	---	---	---	---	20	48
April	---	---	---	---	1	1	21	45
May	2	---	---	---	---	2	24	42
June	---		1	1	---	2	31	36
July	---	1	---	---	---	1	33	45
August	---	---	2	1	1	4	33	47
September	---	---	---	---	---	---	32	46
October	---	---	7	2	2	11	32	43
November	---	---	2	2	10	20		
Totals	10	8	17	14	17			
Percentage %	27.27		25.76	21.21	25.76			

Analysis of variance

Source of Variation	D.F.	SS	MS	F-value
Months	11	6.955	0.632	3.002**
Species	4	1.198	0.299	1.422
Error	44	9.267	0.211	
Total	59	17.421		

D. sp1 = *Dermatophagoides pteronyssinus* D. sp2 = *Dermatophagoides farinae* MS =Mean square
** = Significant at 0.01

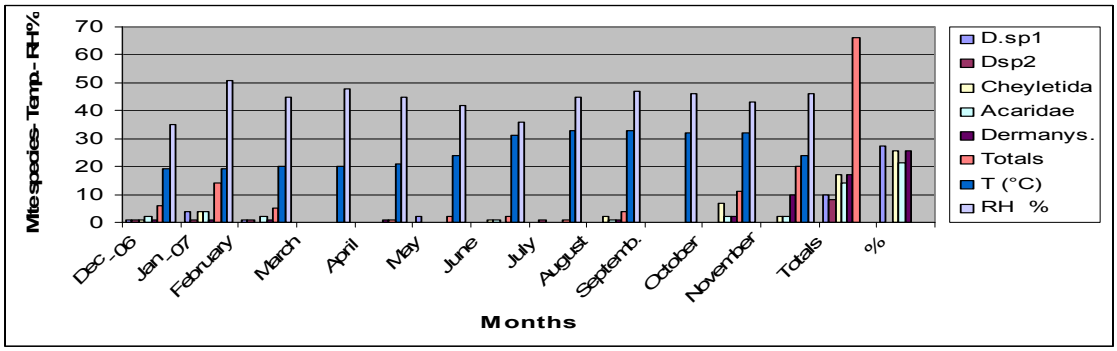

Fig. 2: Monthly variations of school dust-mites in Cairo governorate from December 2006 till November 2007.

From Tables (3 to 8) it was noticed that the incidence of the five species mites varied greatly between the four districts. The five species of families Pyroglyphidae, Dermanyssidae, Acaridae and Cheyletidae were all collected from Shobra AL-khaima representing the highest abundance (12, 13, 10, and 8 individuals, respectively). On the other hand, *D. farinae* is completely absent from school of Nasr

city. The other species were represented by very few numbering at Al-Slam city and Nasr city (Tabs.3 & Fig3).

Regarding the distribution of mites between the four seasons of the year at Shobra Al-Khaima district, autumn yields the highest number 23 individuals representing 53.49 % of the total mite number (43 individuals) followed by winter (32.56 %) and then come spring and summer with the lowest mite density (3 individuals for each representing 6.97 % of the total number) (Table 4 &Fig.4).

Table 3: Seasonal variations of school dust mites / 5 gm fine dust at four different districts in Cairo Governorate.

Species	Autumn					Winter					Spring					Summer					Totals				Grand Totals	Percentage
	Shobra Al-Khaima	Abassia	Al-Salam City	Nasr City	Total	Shobra Al-Khaima	Abassia	Al-Salam City	Nasr City	Total	Shobra Al-Khaima	Abassia	Al-Salam City	Nasr City	Total	Shobra Al-Khaima	Abassia	Al-Salam City	Nasr City	Total	Shobra Al-Khaima	Abassia	Al-Salam City	Nasr City		
1- *D. pteronyssinus*	2	---	---	1	3	3	---	1	---	4	---	---	---	---	---	2	1	---	---	3	7	1	1	1	10	15.15
2- *D. farinae*	3	2	1	---	6	2	---	---	---	2	---	---	---	---	---	---	---	---	---	---	5	2	1	---	8	12.12
3- *T. putrescentiae*	8	2	1	1	12	1	---	---	---	1	1	---	---	---	1	---	---	---	---	---	10	2	1	1	14	21.21
4- *C. malaccensis*	6	1	1	1	9	2	4	---	---	6	---	---	1	1	2	---	---	---	---	---	8	5	2	2	17	25.76
5- *Dermanyssus sp.*	4	1	1	1	7	6	---	---	---	6	2	---	---	---	2	1	1	---	---	2	13	2	1	1	17	25.76
Total	23	6	4	4	37	14	4	1	---	19	3	---	1	1	5	3	2	---	---	5	43	12	6	5	66	
Percentage %	56.0					28.8					7.6					7.6										

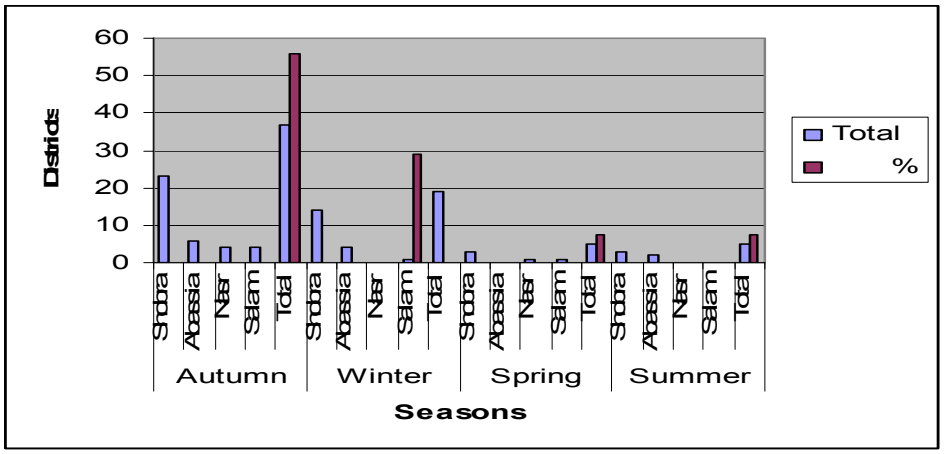

Fig. 3: Seasonal variations of school dust mites / 5 gm fine dust at four different districts in Cairo Governorate.

The statistical analysis of the data of seasonal variation in mite fauna collected from schools from Shobra Al-Khaima indicates that species is not significant while season is highly significant source of variation in mite density at Shobra Al-Khaima, this indicates that the mites density is highly affected by season but species composition is not affected.

On conclusion, the school mite fauna collected during the course of the present work (Tables, 2 and 3) can be divided into the following two groups according to their population densities:

Group A: includes the highly prevalent mite species that occurs at relatively higher densities and these can be arranged descending according to their population as follows:

1- Species belonging to family Pyroglyphidae (*Dermatophagoides pteronyssinus* Trouessart, 1897 and *Dermatophagoides farinae* Hughes, 1961)

and their total population together constitute 27.27 % of the total mite population collected (Table 3 and Fig. 2).

2- Species belonging to family Cheyletidae (*Cheyletus malaccensis* Oudemans, 1903), its population represents 25.75 % of the total population of school mites collected.

3- Species belonging to family Dermanyssidae (*Dermanyssus sp.* De Geer, 1834), its population density reached the same percentage mentioned above 25.75 % of the total population of the mites collected.

Group B: includes mite species that occurs at relatively low population densities as compared with the first group and includes one species belonging to family Acaridae (*Tyrophagus patrescentiae* Shrank, 1781), its population density constitutes 21.21 % of the total population of school dust mites collected.

Table 4: Seasonal variations of school dust-mites collected from four districts in Cano Governorate, Egypt (from December 2006 to November 2007).

Seasons	Districts				Totals	%
	Shobra Al-Khaima	Al-Abassia	Al-Salam City	Nasr City		
Autumn	23	6	4	4	37	56.0
Winter	14	4	1	---	19	28.8
Spring	3	0	1	1	5	7.6
Summer	3	2	0	0	5	7.6
Totals	43	12	6	5	66	
%	65.15	18.18	9.09	7.58		

Analysis of variance

Source of Variation	D.F.	SS	MS	F-value
Season	3	7.557	2.519	6.903**
Districts	3	9.157	3.052	8.365**
Error	9	3.284	0.365	
Total	15	19.998		

D.F. = Degree of freedom SS= Sum squares MS = Mean square ** = Significant at 0.01

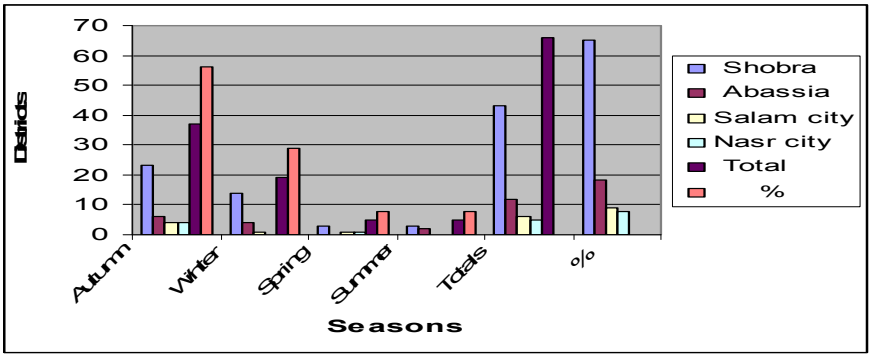

Fig. 4: Seasonal variations of school dust-mites collected from four districts in Cano

As shown in Table (5) the following species of school dust mites were encountered from Shobra Al-Khaima schools:

i- *D. pteronyssinus* and *D. farinae* (Family: Pyroglyphidae) representing (27.90%) of the total number of mites collected from this county (43 individuals). *D. pteronyssinus* representing (16.28 %) and *D. farinae (*11.62 %).

ii- *Tyrophagus putrescentiae* (Acaridae) representing (23.25 %) from the total number of mites collected from Shobra Al-Khaima.

iii- *Cheyletus malaccensis* (Family: Cheyletidae) representing 18.60 % of the total number of mites recorded from Shobra Al-Khaima.

iv- *Dermanyssus sp.* (Family: Dermanyssidae) representing 30.24 % of the total number of mites collected from Shobra Al-Khaima. Dermanyssidae ranks first in abundance being 30.26 % followed by Pyroglyphidae 27.90 % then Acaridae 23.25 %and Cheyletidae 18.60 %. The population densities of these mites were presented in Table (5) and illustrated in Figure (5).

Table 5: Seasonal variations of school dust-mites individuals/5 gm dust at Shobra Al Khaima district Cairo, Egypt.

Species	Season				Totals	%
	Autumn	Winter	Spring	Summer		
D. pteron..	2	3	----	2	7 (16.28)	27.90
D. farinae	3	2	----	----	5 (11.62)	
Acaridae (Ty. Put.)	8	1	1	----	10	32.26
Cheyl. Malac.	6	2	-------	----	8	18.60
Dermany. Sp.	4	6	2	1	13	30.23
Totals	23	14	3	3	43	
%	53.49	32.56	6.97	6.97		
Seasonal average R.H. %	41.3	48	41	46		
Seasonal average T(°C)	25	19.6	25.3	32.6		

Analysis of variance

Source of variation	D.F.	SS	MS	F-value
Species	4	0.932	0.233	1.130
Season	3	5.489	1.830	8.873**

D.F. = Degree of freedom SS = Sum squares MS = Mean square ** = Significant at 0.01

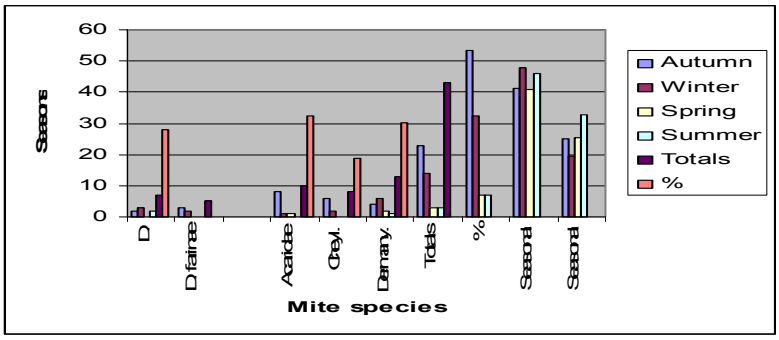

Fig. 5: Seasonal variations of school dust-mites individuals /5 gm dust at Shobra Al Khaima district Cairo, Egypt**.**

Regarding the distribution of mites between the four seasons of the year at Shobra Al-Khaima district, autumn yields the highest number 23 individuals representing 53.49 % of the total mite number (43 individuals) followed by winter (32.56 %) and then come spring and summer with the lowest mite density (3 individuals for each representing 6.97 % of the total number). The statistical analysis of the data of seasonal variation in mite fauna collected from schools from Shobra Al-Khaima indicates that species is not significant while season is highly significant source of variation in mite density at Shobra Al-Khaima, this indicates that the mites density is highly affected by season but species composition is not affected.

The mite fauna of school dust collected from Al-Abassia district are shown in Table (6) and illustrated in Figure (8). It can be noticed from Table (6) that the mixed population of family Pyroglyphidae *(D. pteronyssinus* and *D. farinae)* represents 25 % and comes second to family Cheyletidae that represents the highest density among other families (41.66 % of the total number of mites encountered from this district). This followed by those of Acaridae and Dermanyssidae 16.66 % for each.

The mite's number varied greatly from one season to other. autumn as in schools of Shobra Al-Khaima gave the highest number of individuals (50 %)

followed by winter (33.33 %) and summer (16.67 %). Numbers of mites were collected during spring from Al-Abassia schools. Moreover, few species were collected during autumn; *D. farinae, Tyrophagus putrescentiae, Cheyletiis malaccensis* and *Dermanyssus sp.,* one during winter, *Cheyletus malaccensis* and two species during summer; *D. pteronyssinus* and *Dermanyssus sp.* (Table 6 and Fig. 6).

Table: (6). Seasonal variations of school dust-mites individuals /5 gm dust at Abassia district Cairo, Egypt**.**

Species	Season				Totals	%
	Autumn	Winter	Spring	Summer		
D. pteron.	---	----	----	1	1	25.00
D. farinae	2	----	----	----	2	
Acaridae (Ty. Put.)	2	----	----	----	2	16.66
Cheyl. Malac.	1	4	----	----	5	41.66
Dermany.sp.	1	----	----	1	2	16.66
Totals	6	4	----	2	1 2	
Seasonal average R.H.%	41.3	48	41	46		
Seasonal average T(°C)	25	19.6	25.3	32.6		

Analysis of variance

Source of Variation	D.F.	SS	MS	F-value
Species	4	0.281	0.070	0.391
Season	3	0.795	0.265	1.475
Error	12	2.155	0.180	
Total	19	3.231		

D.F. = Degree of freedom SS = Sum squares MS = Mean square ** = Significant at 0.01

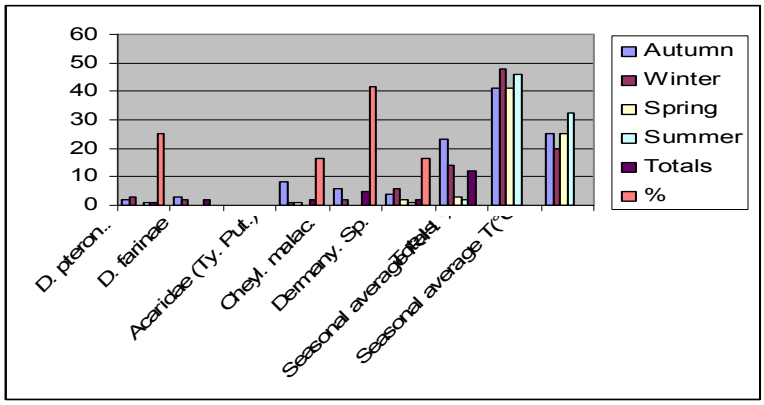

Fig. 6: Seasonal variations of school dust-mites individuals /5 gm dust at Abassia district Cairo, Egypt**.**

The statistical analysis of the data indicates that both species and seasons are not significant. This indicates that both mite density and species composition are not affected by seasons or species at this district and this confirm the previous finding that the mites are not inhibitors of those schools.

The mite fauna of school dust collected from schools at Al-Salam City (Table, 7 and Fig. 7) include the same four mite families recorded at both Shobra Al-Khaima and Al-Abassia districts (Pyroglyphidae, Acaridae, Cheyletidae and Dermanyssidae) but with lower population densities; 2 individuals from each of Pyroglyphidae and Cheyletidae representing 33.33 % for each, flowed by only one individual from each of Acaridae and Dermanyssidae representing 16.66 % for each from the total.

The mites were completely absent from school dust at this district during summer months. autumn yields 4 individuals of four different species; *D. farinae, Tyrophagusputrescentiae, Cheyletus* sp. and *Dermanyssus sp.* On the other

hand, only one specimen of *D. pteronyssinus* was collected during winter months and one *Cheyletus sp.* during spring (Table, 7 and Fig. 7).

Table 7: Seasonal variations of school dust-mites individuals /5 gm dust at Al Salam City, Cairo

Species	Season				Totals	%
	Autumn	Winter	Spring	Summer		
D. pteron	----	1	----	----	1	33.33
D farinae	1	---	----	----	1	
Acaridae (Ty. Put.)	1	----	----	----	1	16.66
Cheyl. malac	1	----	1	----	2	33.33
Dermany.sp.	1	----	---	----	1	16.66
Totals	4	1	1	----	6	
Seasonal average R.H. %	41.3	48	41	46		
Seasonal average T(°C)	25	19.6	25.3	32.6		

Analysis of variance

Source of variation	D.F.	SS	MS	F-value
Specie	4	0.054	0.013	0.273
Season	3	0.482	0.161	3.273*
Error	12	0.589	0.049	
Total	19	1.125		

D.F. = Degree of freedom SS = Sum squares MS = Mean square ** = Significant at 0.01

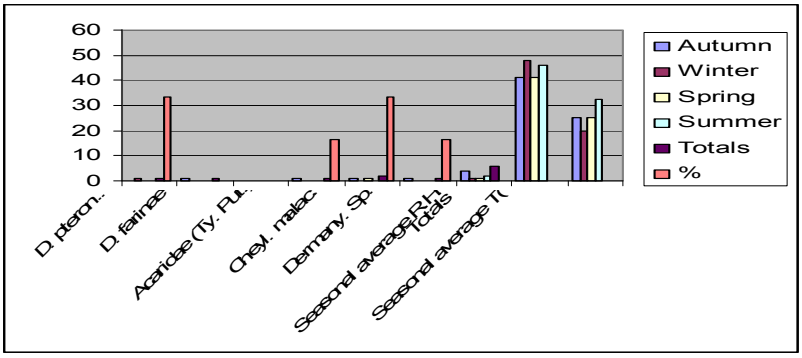

Fig. 7: Seasonal variations of school dust-mites individuals /5 gm dust at Al Salam City, Cairo

The lowest mite density was collected from schools in Nasr City. The mite fauna of school dust collected from Nasr City includes the same species mentioned before. Data concerning population density and seasonal variation are presented and illustrated in Table (8) and (Fig. 8).

Table 8: Seasonal variations of school dust-mites individuals /5 gm dust at Nasr City, Cairo

Species	Season				Totals	%
	Autumn	Winter	Spring	Summer		
D. pteron	1	---	----	----	1	20
D. farinae	---	---	----	----	---	----
Acaridae (Ty. Put.)	1	---	----	----	1	20
Cheyl. Malac	1	---	1	----	2	40
Dermany.sp.	1	---	----	----	1	20
Totals	4	---	1	----	5	
Seasonal average R.H. %	41.3	48	41	46		
Seasonal average T(°C)	25	19.6	25.3	32.6		

Analysis of variance

Source of Variation	D.F.	SS	MS	F-value
Species	4	0.134	0.033	1.364
Season	3	0.576	0.192	7.818**
Error	12	0.295	0.025	
Total	19	1.005		

D.F. = Degree of freedom SS = Sum squares MS = Mean square ** = Significant at 0.01

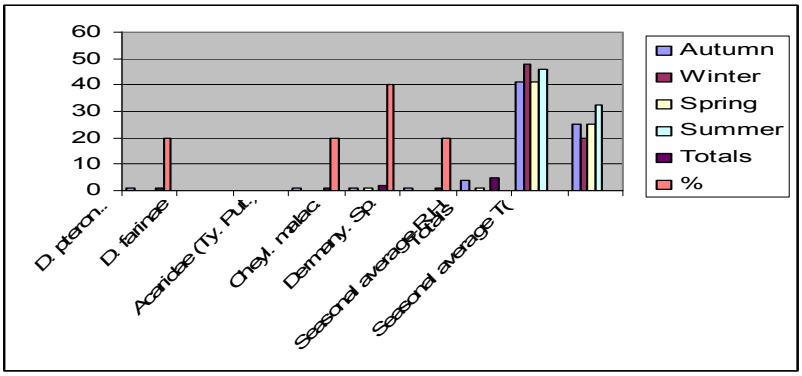

Fig. 8: variations of school dust-mites individuals /5 gm dust at Nasr City, Cairo

As shown in the table, the species of family Cheyletidae represents 40 % of the number of mites collected from this county, followed by those of families Pyroglyphidae, Acaridae and Dermanyssidae 20 % for each. However, *D. farinae* was not recorded in this county during the whole year round, and family Pyroglyphidae was represented only by one species, *D. pteronyssinus*. Autumn gave the largest number of mites 4 individuals one from each species except *D. Farinae*, which is not recorded followed by one individual mite *of Cheyletus sp.* in spring while, samples collected during winter and summer are empty and did not gave any mites.

The statistical analysis of data of seasonal variation of this district indicates that species is not significant while season is highly significant source of variation of mites this means that mite density is highly affected by seasons and is not affected by species variation.

DISCUSSION

The results obtained during the present work suggest that the habitat of schools infestation by dust mites in Cairo governorate is more or less similar to those recorded by other workers in different geographical zones. The number of species distinguished from schools dust, at four different districts (Shobra Al-Khaima, Al-Abassia, Al-Salam City and Nasr City), are five species. These in order of abundance are *Dermatophagoides pteronyssinus* and *D. farinae* (family Pyroglyphidae), *Cheyletus malaccensis* (family Cheyletidae), *Dermanyssus sp*. (family Dermanyssidae) and *Tyrophagus putrescentiae* (family Acaridae).

However, it seems that Gamal Eddin *et al*. (1982) were the first author's initiating lie recent interest of house dust mites in Egypt. In their first paper, they recorded five of house dust mites from Nile Delta (Tanta Town). These are *D. farinae, D. pteronyssinus, T. putrescentiae, Cheyletus malaccensis, Blomia kulagini* and *Acheles gracilis* which is considered as new record for house dust mite fauna. Yassin (1990) recorded eight species of house dust mites from Cairo houses. These may be considered as reference of medically important house dust mites in this locality.

Only, few works were conducted in order to investigate mites in schools; Oshima (1964) and Nakada and Yoshikawa (1976) in Japan; Lang and Mulla (1978) in USA; and Abou Senna *et al*. (1996c) in Jeddah City, Saudi Arabia. All these works agreed with the present work in that the infestation of schools by mites is carried out by mechanical transmission. People and small mammals are probably the most important carriers of these mites from one locality to other. This is in complete agreement with Bronswijk (1974), who stated that house dust mites did not become established in new

places until they become inhabited. On the other hand, Hewitt *et al*. (1973) have been found that mites are common on human clothing.

The low mite numbers found in school classrooms dust as compared by houses may be due to that schools classrooms are cleaned daily after school day. This is in agreement with Abou Senna *et al*. (1996c) who stated that this hygienic practice would probably remove mites as well as reduce human skin scales and other food detritus they feed on. Also, these results coincides with the observation of Lang and Mulla, (1978) working on Dermatophagoides spp. collected from Orange County elementary schools, California. On the other hand, the high mite counts in house dust collected from houses in Shobra Al-Khaima and Al-Abassia may due to the constant occupation of these houses by man which can add the required food (by his shed skin scales) and moisture to the physical habitat supporting mite population of dust.. These observations coincide with Arlian (1978) and Lang and Mulla (1978) who stated that mite counts are usually higher in articles of furniture that are used most frequently and are rare or absent in those articles not in use.

In the present work, two pyroglyphid mites are the most abundant (*D. pteronyssimts and D. farinae*) representing 27.27 % of the total number, followed by *Cheyletus malaccensis* and *Dermanyssus sp*. each comprises 25.75 % of the total, then come *Tyrophagus putrescentiae* which represented 21.21 % of the total. These results coincide with other investigations that dealt with the occurrence of mites in schools and institutions other than houses; Oshima (1964) found *Dermatophagoides spp*. to be dominant on floors of elementary and high schools in Japan; Nakada and Yoshikawa (1976) recorded only 3 Dermatophagoides spp. from seats and floors of 12 Tokyo Theaters, while Lang *et al*. (1978) found that 6 out of 9 elementary schools samples yielded mites of which 62 % of specimens were *D. pteronyssinus* and the remaining being *D. farinae*. Abou Senna *et al*. (1996 c) in study of the abundance of mites in institutions other than houses in Jeddah City, Saudi Arabia, including six factories, five hotels, seven mosques and five elementary schools found mites in all samples, *D. farinae* and *D. pteronyssinus* were the most abundant. Factories dust gave the highest number of mites followed by hotels, mosques and schools come later with the lowest mites count.

The population density of mites was relatively higher in dust collected from schools of both Shobra Al-Khaima and Al-Abassia as compared by the other two districts (Al-Salam City and Nasr City) which gave a relatively lower numbers of mites. This may be attributed to the differences in the socioeconomic level between these districts, which are reflected on the cleaning level. This agreed with Smedje *et al*. (1997) who stated that the quality of the environment is of importance and may affect asthmatic symptoms. Also, these coincided with Charlet *et al*. (1977) who stated that accumulation of food deposits on which mites develop and reproduce leading to build up of mite population.

Concerning the seasonal variation in mite numbers, the data indicate that, the highest population was recorded during winter and autumn, while the lowest populations were recorded during summer. Correlating these results with the recorded temperatures and relative humidities, it is observed that mite populations were high when temperature was 25°C or below and the relative humidity was 45 % or more. This finding is in complete agreement with Gamal Eddin *et al*. (1982) who stated that the 25°C may considered as the most favorable temperature (at 75 % R.H.) for reproduction and breeding of both *D. farinae* and *D. pteronyssinus*. Also, Bronswijk and Sinha (1971) reported that under optimum or near optimum conditions the life cycle from egg to egg requires about a month for both *D. farin*ae and *D.*

pteronyssinus. Other workers reported the same findings (Dobson, 1972; Furmizo, 1973; Gamal Eddin *et al.*, 1982 and Abou Senna *et al*., 1996 a & b).

The scarce number of mites in school dust collected during the course of present work in some months clearly indicate that these schools are not a suitable site for living, reproduction and building up of mite populations and mites are not a permanent inhibitors of schools but it come as occasional invaders on the bodies and cloths of pupils from their houses. However, Gamal Eddin *et al*. (1982) discussed the factors affecting on the attraction of mites towards beds reaching to conclusion that mite reaction towards human being microhabitat may not be absolutely a response to only one factor and they believed that the reaction of mite to bed is a primarily an odoriferous response. Namely, the dominant factor, which affects the behavior of the mites, may be smell stimulus of the human sweat gland secretion and sebaceous gland secretion which permanently contaminate the surface of mattresses, lines, blankets and pillows. They were inclined to believe that the predilection and more congregation of pyroglyphid mites in bed rooms seem to be likely a main chemotatic response, depending on the degree of contamination which is greatly affected by the frequency of bathing, then comes the food, temperature and relative humidity, as regulating factors for distribution of mites inside houses and their Perpetuation of life and by breeding. This agrees completely with the present work since schools classrooms with its wooden desks and naked floors are not represent suitable ecological niches for attraction, or building up a high population of mites. And this confirms the present author view that schools are not a permanent habitat for these mites and the mites are occasional invaders.

As a final conclusion, the low numbers of mites collected from schools in Cairo City would probably thus plays an insignificant role in contributing to allergic disorders present in these schools. So the present author recommended that schools must by repeatedly vacuumed with a powerful electric sweeper every day after the school day in order to keep the mite density at the lowest value and minimize the chance of building up high population and this in turn reduce the probability of asthma attack to pupils in these schools.

RECOMMENDATIONS

According to the results obtained during the present work, the author can recommend that measures to prevent asthma in school children should include minimizing the amount of fittings and fixtures which attract and retain dust and school must be maintained dry by vacuum sweeper daily after the school day in addition to the personal factor. All the above mentioned measures constitute the quality of school environment which is importance and may affect asthmatic symptoms.

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ARABIC SUMMARY

دراسة نوعية بيئة المدرسة كبيئة جديدة للحلم المسبب للحساسية في القاهرة

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اهتم هذا البحث بدراسة نوعية بيئة المدارس ومدى احتوائها على الحلم المسبب للحساسية في غبار المدارس وكثافته العددية ، وتوزيعه في عدد من المدارس في أربعة أحياء مختلفة في القاهرة الكبرى والعوامل التي تؤثر على تواجده وذلك لأن دراسة فونة حلم غبار المدارس له أهمية كبيرة لأنه من الممكن أن يؤثر على ظهور أعراض الأزمات التنفسية عند التلاميذ المصابين بالحساسية لحلم غبار المنازل حيث أنهم يمضون وقتا كبيرا في مدارسهم خلال اليوم الدراسي .

من أجل هذا تم اختيار ثمانية مدارس – مدرستين من كل حي في أربعة أحياء مختلفة هي حي شبرا الخيمة ، العباسية ، مدينة السلام ومدينة نصر – وتمثل هذه الأحياء والمدارس مستويات اجتماعية مختلفة وأيضا اختلاف في المستوى الصحي ، وعمر المدرسة وكثافتها والأسلوب المتبع في نظافتها من حيث استخدام المكانس الكهربائية من عدمه .

تم جمع ٢٤عينة غبار مدارس شهريا لمدة عام كامل بدءا من ديسمبر ٢٠٠٦ حتى نوفمبر ٢٠٠٧ باستخدام مكنسة كهربائية وتم إعداد العينات للفحص بالمعمل وفصل وتعريف وعد ما تحتويه من أنواع الحلم المختلفة.

و أسفرت النتائج على ما يلي:

١- مثل العدد السنوي للحلم المجمع من غبار مدارس شبرا الخيمة أعلى معدلات الكثافة العددية بنسبة ٦٥,١٥٪ من العدد الكلى، تلي ذلك مدارس العباسية بنسبة (١٨,١٨٪) ثم مدينة السلام بنسبة (٩,٠٩٪) وأخيرا مدينة نصر ممثلة أقل المعدلات (٧,٥٥٪) .

٢- جاءت عائلة بيروجليفيدى الأولى من حيث أعداد الأفراد المجمعة بنسبة ٢٧,٢٧٪من العدد الكلى ومثلها نوعين ينتميان إلى جنس *درماتوفاجويدس* هما *درماتوفاجويدس بتيرونيسنس* و *درماتوفاجويدس فارينى*. يليها عائلتى كيليتدى ودرمانسيدى بنسبة ٢٥,٧٥٪ لكل منها على حده من العدد الكلى ومثل كل عائلة منهم نوع واحد هو كبليتس مالاسينسس للأولى ونوع من جنس *درمانيساس* للثانية أما عائلة أكاريدى فكانت نسبتها ٢١,٢١٪ وجاءت أخيرة من حيث العدد .

٣- جمعت عائلات الحلم الأربعة من حي شبرا الخيمة وكان النوعان *بتيرونيسنس وفارينى* هما الأكثر كثافة في هذه المنطقة – بينما اختفى النوع *فارينى* من حي مدينة نصر تماما . أما باقي الأحياء فقد جمعت منها بعض الأنواع بنسب قليلة عن شبرا الخيمة .

٤- اختلفت الكثافة العددية للحلم بين شهور السنة المختلفة فصول المدارس في المناطق الأربعة وكان فصل الخريف هو الأنسب لهذه الكائنات وقد كان ذروة معدل كثافته العددية خلال شهر نوفمبر في حي شبرا الخيمة ، و أكتوبر في حي العباسية ومدينة السلام وفي شهر ديسمبر في حي مدينة نصر . بينما سجلت أدنى معدلات الكثافة العددية للحلم في الشهور الحارة أبريل ويوليو في شبرا الخيمة واختفى الحلم تماما خلال هذه الشهور في باقي الأحياء.

٥- كان حجم العشيرة لحلم غبار المدارس صغيرا نسبيا (٦٦ فردا) وقد تراوح متوسط العدد في العينات المجمعة شهريا في ٥ جم غبار بين فرد واحد خلال شهري أبريل ويوليو و ٢٠ فردا خلال شهر نوفمبر. وقد لوحظ اختفاء جميع انواع الحلم في شهر مارس وسبتمبر وتواجدت أفراد من عائلات الدرمانسييدى و الأكاريدى في سبعة أشهر أما عائلة الكيليتدى فتواجدت في ٦ أشهر فقط وتواجدت عائلة البيروجليفيدى فى خمس أشهر فقط .

٦- كانت أعداد أفراد عائلات بيروجليفيدى ، كيليتدى ، أكاريدى و درمانسيدى عاليه نسبيا خلال الشهور الباردة ووصلت هذه الأعداد إلى ذروتها في شهر يناير بالنسبة لليروجليفيدى والأكاريدى وأكتوبر ونوفمبر بالنسبة للكيليتدى والديرمانسيدى . وسجلت أقل أعداد في خلال أشهر الصيف الحارة . وقد تبين أنه كلما قلت درجة حرارة الوسط المحيط إزدادت كثافة أعداد الحلم في غبار المدارس.

٧- بمقارنة النتائج المتحصل عليها بدرجات الحرارة والرطوبة النسبية المسجلة داخل فصول المدارس خلال وقت جمع العينات لوحظ أن أعداد الحلم تزداد عندما تكون نسبة الرطوبة النسبية تتراوح بين ٤٥ ، ٥٪ وتحت هذا المعدل تقل أعداد الحلم بدرجة ملحوظة .كما تزداد أعداد الحلم عندما تكون درجة الحرارة بين ١٨ و ٢٢ مْ في الشهور الباردة في شهر يناير ونوفمبر .

الخلاصة: أثبتت هذه النتائج أن الحلم المتواجد في غبار المدارس لا يعتبر من السكان الدائمين الأصليين لهذه البيئة ولكنه يعتبر من الزائرين أو النازحين عرضيا لهذا المكان يأتي إليها عبر أجسام وملابس التلاميذ من منازلهم التي تعتبر البيئة الأساسية والمناسبة لتكاثر هذه الأنواع من الحلم ، وان قلة الأعداد توضح أن هذه الكائنات لا تتكاثر في بيئة المدارس وهذا يؤكد أن المدارس ليست مكان مناسب لتكاثر وازدهار هذه الأنواع من الحلم ويؤكد أيضا أن تواجدها بالمدارس كان عرضيا .

التوصيات: بناء على النتائج التي توصلت إليها هذه الدراسة فان هناك بعض التوصيات من اجل الحصول على مقاييس لمنع حدوث الأزمات التنفسية (الربوية) بين التلاميذ وهذه تشمل ما يلي:

- تقليل الأثاث والمواد التي تجذب الأتربة والغبار في فصول المدارس أو انشاء كردون من الأشجار حول المدارس تعمل كمصدات للأتربة لمنع دخولها للفصول .
- يجب أن تظل الفصول جافة باستمرار وذلك بالتهوية الجيدة ويجب أن تنظف باستخدام المكانس الكهربائية يوميا بعد خروج التلاميذ من المدرسة.
- مراعاة العوامل الشخصية من نظافة عامة للتلاميذ حتى لا تصبح مدارسنا بؤرة لتكاثر هذه الأنواع من الحلم المسبب للحساسية ومنع زيادتها العددية وبذلك نحمى الأطفال المصابين بالحساسية من خطر التعرض لها وظهور الأعراض المرضية والأزمات التنفسية.