

House dust mites associated with the asthmatic patients in some houses of Cairo, A.R. Egypt

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ABSTRACT

The study examines the species composition of the house dust mites in houses of patients suffering from bronchial asthma in Cairo. Six mite species belonging to 4 families were identified of which *Dermatophagoides farinae* and *D. pteronyssinus* (*Pyroglyphidae*) were the common species, *Blomia tropicalis* (*Glycyphagidae*) was first detected in Cairo houses and *Cheyletus trouessarti* (*Cheyletidae*) may represent a new report in houses of allergic patients in Egypt. The two other species were: *Tyrophagus putrescentiae* (*Acaridae*) and *Acarus siro* (*Acaridae*). Based on this study and of the other workers, a list of 16 species belonging to 7 families associated with house dust in Egypt was presented.

Keywords: House dust mites, Species composition, *Dermatophagoides pteronyssinus*, *Dermatophagoides farinae*, Bronchial asthma.

INTRODUCTION

The house dust mites (HDM's) are microscopic arthropods of class *Arachnidae* (subclass: *Acari*, order: *Acariformis*) present in most of the indoor environments living associated with man in mattresses, pillows, overstuffed furniture and other places where human rests (Yassin, 2011). They feed on organic matter in the house dust (HD) which consists mainly of human shed skin scales, fungi and food or waste particles. HDM's are of great medical importance as responsible for causing asthma, rhinitis and atopic dermatitis (Gamal-Eddin *et al.*, 1982; Milian and Diaz, 2004; Nadchatram, 2005; El-Shazly *et al.*, 2006 and O' Neil *et al.*, 2006).

Different HDM forms are present of which *Dermatophagoides farinae* Hughes "the American HDM" and *D. pteronyssinus* (Trouessart) "the European HDM" of family *Pyroglyphidae* are the most common and important as causative of asthmatic bronchitis (Adham *et al.*, 2011; Adham and Tawfik, 2012 and Yassin, 2011)

Under the Egyptian environmental conditions, mite induced allergy especially

bronchial asthma forms a problem (Frankland and El Hefny, 1971). It was suggested (Gamal-Eddin *et al.*, 1982) that the geographical situation of Egypt and its favorable climatic conditions together with other factors may play a major role in the abundance of HDM's and consequently HDM allergy occurs more common than to any other allergen in the Egyptian asthmatic patients (Gamal-Eddin *et al.*, 1985).

This work was planned for and objected at further examining and updating the species composition of HDM's in houses of patients suffering from bronchial asthma in Cairo.

MATERIALS AND METHODS

Dust samples were collected using a portable vacuum cleaner off carpets, sofas and furniture in houses of five asthmatic patients in Cairo. After collection, samples were brought to the laboratory where live mites were isolated from the dust samples using a modified Berlese funnel with copper wire sieve. The method was essentially the same as that of Sinha (1964) and adopted by Gamal-Eddin and Hamad (1992) and Morsy

et al. (1994). A total of 100 mites were picked up randomly from each dust sample and microscopically identified according to the keys given by Bronswijk and Sinha (1971).

RESULTS

Mites were isolated from dust samples collected in houses of five asthmatic patients in Cairo. The reported species and their relative abundance are in Table (1). Six mite species belonging to four families were found of which, *Dermatophagoides farinae* Hughes (Pyroglyphidae) was the

predominant species detected in 4 (80%) houses. *Dermatophagoides pteronyssinus* (Trouessart) (Pyroglyphidae) and *Tyrophagus putrescentiae* (Schrank) (Acaridae) were found in 3 (60%) houses each, however the former species was in larger number than the second one. *Acarus siro* Linnaeus (Acaridae) was observed in 2 (40%) houses. Both *Blomia tropicalis* (Bronswijk, Cock and Oshima) (Glycyphagidae) and *Cheyletus trouessarti* Oudemans (Cheyletidae) were detected in 1 (20%) house.

Table 1: House dust mite species and their abundance in houses of five asthmatic patients in Cairo.

House		Case			Mite species					
No	District	Age (Yr.)	Sex	Asthma attack	<i>D. pteronyssinus</i>	<i>D. farinae</i>	<i>T. putrescentiae</i>	<i>A. siro</i>	<i>B. tropicalis</i>	<i>C. trouessarti</i>
1	Nasr City	11	♂	Moderate	•				•	
2	Heliopolis	07	♀	Moderate		•	•	•		
3	Shoubra	06	♂	Severe		•	•	•		•
4	Abbassia	12	♂	Moderate	•	•				
5	Hadai El-Kobba	04	♀	Moderate	•	•	•			
% positive houses					60	80	60	40	20	20

From the results of the present and previous studies, irrespective to the variable distribution (geographically and locally), the

mite fauna associated with house dust in Egypt comprises 16 species belonging to 7 families (Table 2).

Table 2: Reported fauna of house dust mites (*Arachnida: Acariformes*) in Egypt

Family	Genus, species
<i>Pyroglyphidae</i>	<i>Dermatophagoides farinae</i> Hughes <i>Dermatophagoides pteronyssinus</i> (Trouessart)
<i>Raphignathidae</i>	<i>Raphignathus</i> (=Acheles) <i>gracilis</i> (Rack)
<i>Glycyphagidae</i>	<i>Glycyphagus domesticus</i> (De Geer) <i>Glycyphagus aegyptiacus</i> <i>Blomia kulagini</i> Zachvatkin <i>Blomia tropicalis</i> (Bronswijk, Cock and Oshima) <i>Lepidoglyphus destructor</i> (Schrank)
<i>Acaridae</i>	<i>Acarus siro</i> Linnaeus <i>Tyrophagus putrescentiae</i> (Schrank) <i>Rhizoglyphus robini</i> Claparede
<i>Cheyletidae</i>	<i>Cheyletus hendersoni</i> Baker <i>Cheyletus malaccensis</i> Oudemans
<i>Macronyssidae</i>	<i>Ornithonyssus bacoti</i> (Hirst)
<i>Laclapidae</i>	<i>Haemogamasus pontiger</i> (Berlese)

DISCUSSION

The HDMs are of great medical importance due to their incrimination in

causing allergic manifestations in human being (Morsy *et al.*, 1994). The common syndromes associated with HDM allergy

as considered by Gamal-Eddin *et al.* (1982) are the bronchial asthma and perennial rhinitis. They are generally found in most houses (Yassin and Rifaat, 1997) and mainly in bed rooms. According to Manusell *et al.* (1971) the degree of mite infestation tends to be related to severity of allergic symptoms of patients.

In the present work, six mite species belonging to 4 families were isolated from the house dust collected in houses of 5 asthmatic patients in Cairo. The collected mites in a descending order of abundance (% +ve houses) were *Dermatophagoides farinae* (80%), *D. pteronyssinus* (60%), *Tyrophagus putrescentiae* (60%), *Acarus siro* (40%), *Blomia tropicalis* (20%) and *Cheyletus trouessarti* (20%).

The identified species except *Cheyletus trouessarti* have been reported (along with other species) by several workers from some Governorates in Egypt: Gharbiya (Gamal-Eddin *et al.*, 1982 & 1985), El-Menia (Gamal-Eddin and Shoker, 1989a), Sharquiya (Gamal-Eddin and El-Besheir, 1990), Cairo (Morsy *et al.*, 1995 and Yassin, 2011), Kena, Esna City (Yassin and Rifaat, 1997), Alexandria (Sadaka *et al.*, 2000), Dakahlia (El-Shazly *et al.*, 2006) and North Sinai, Al-Arish city (El-Sherbiny *et al.*, 2010).

Although the present collection was very limited (included only five houses of asthmatic patients), the 1st four of the reported species were also recovered indoors by Koraiem and Fahmy (1999) in a survey of eight different areas in Greater Cairo. The reported *Blomia tropicalis* was also collected in El-Menia Governorate (Gamal-Eddin and Shoker, 1989a) although it was not detected by Koraiem and Fahmy (1999) in Cairo houses. The finding of *Cheyletus trouessarti* may represent a new report in houses of allergic patients in Egypt or may be the *Cheyletus sp.* collected in Gharbiya (Gamal-Eddin *et al.*, 1982) and

El-Menia (Gamal-Eddin and Shoker, 1989a & b).

The two pyroglyphid mites, *D. farinae* and *D. pteronyssinus* were common in agreement with the observations of several authors. The role of these two mites as causative of inhalant allergic problem is well established (Gamal-Eddin *et al.*, 1982) and they are known to produce the most potent allergens (Gamal-Eddin and Hamad, 1992 and Morsy *et al.*, 1995). The living mites, their dead bodies and their excretory products (glandular secretions and faecal droplets) are considered as sources of active HD allergens by several authors (Mitchell *et al.*, 1969; Spieksma and Spieksma-Boezemans, 1969; Wharton, 1976; Gamal-Eddin *et al.*, 1982 and Morsy *et al.*, 1994). The inhalation of such materials can cause the clinical syndromes of the disease.

From the present study and previous ones, it can be concluded that sixteen species of HDM's are present in Egypt of which the two pyroglyphid mites, *D. farinae* and *D. pteronyssinus* are the most common species associated with asthmatic cases

REFERENCES

- Adham, T.M. and Tawfik, S.A. (2012). *Dermatophagoides* in childhood asthma. Allergy to dermatophagoides associates more severe childhood asthma with a potential role for acaricides. *Saudi Med. J.*, 33:292-297.
- Adham, T.M.; Tawfik, S.A. and Abdo, N.M. (2011). House dust mites in pediatric atopic dermatitis. *Saudi Med. J.*, 32:177-182.
- Bronswijk, J.E.M.H. Van and Sinha, R.N. (1971). Pyroglyphid mites (Acari) and house dust allergy. *J. Allergy*, 47: 31-52.
- El-Shazly, A.M.; El-Beshbishi, S.N.; Azab, M.S.; El-Nahas, H.A.; Soliman, M.E.; Fouad, M.A. and

- Monib, Mel-S. (2006). Present situation of house dust mites in Dakahlia Governorate, Egypt. *J. Egypt. Soc. Parasitol.*, 36:113-126.
- El-Sherbiny, G.T.; El-Sherbini, E.T.; Saled, N.M.; Haridy, F.M. and Morsy, A.T. (2010). A study on the prevalence of house dust mites in Al-Arish city, North Sinai Governorate, Egypt. *J. Egypt. Soc. Parasitol.*, 40:57-70.
- Frankland, A. W. and El-Hefny, A. (1971). House dust mites and causes of inhalant allergic problems in the United Arab Republic. *Clin. Allergy*, 1: 257-260.
- Gamal-Eddin, F. M. and El-Besheir, Z. (1990). Surveillance and ecology of house dust mites in some rural and urban areas of Sharquiya Governorate (South-Eastern of the Nile Delta) as guidelines for preparation of the diagnostic antigens and vaccines in addition to avoidance measures. *J. Egypt. Soc. Parasitol.*, 20: 28-43.
- Gamal Eddin, F.M. and Hamad, M. G. M. (1992). Present situation of house dust mites and its relation to currently recorded allergy in Kuwait State. *J. Egypt. Soc. Parasitol.*, 22: 1-101.
- Gamal-Eddin, F. M. and Shoker, N. I. (1989a). The present status and ecology of house dust mites in El-Minia Governorate (Upper Egypt), as basis for future studies on environment pollution with house dust mite allergens or on vaccination with specific mite antigens. *J. Egypt. Soc. Parasitol.*, 19: 332-341.
- Gamal-Eddin, F. M. and Shoker, N. I. (1989b). Surveillance and ecology of house dust mites in some urban and rural areas of El-Minia Governorate (Middle Egypt), as basis for preparation of diagnostic antigens and vaccines in addition to avoidance measures. *J. Egypt. Soc. Parasitol.*, 19: 342-351.
- Gamal-Eddin, F.M., Tayel, S.E., Aboul-Atta, A.M. and Abou-Sinna, F.M. (1985). House dust mite sensitive asthma: preliminary study on its incidence and seasonal prevalence under the Egyptian environmental conditions. *J. Egypt. Soc. Parasitol.*, 15: 71-95.
- Gamal-Eddin, F.M.; Tayel, S.E.; Abou-Sinaa, F.M. and Shehata, K.K. (1982). Present status and ecology of house dust mites in Egypt as approaches to environmental control of mites and preparation of specific diagnostic antigen before resort to any desensitizing vaccine. *J. Egypt. Soc. Parasitol.*, 12: 253-282.
- Koraiem, M.K. and Fahmy, I.A. (1999). Studies on house dust mites in Great Cairo, Egypt. *J. Egypt Soc. Parasitol.*, 29:131-138.
- Milian, E. and Diaz, A.M. (2004). Allergy to house-dust mites and asthma. *PR Health Sci. J.*, 23: 47-57.
- Mitchell, W.F.; Wharton, G.W.; Larson, D.G. and Modic, R. (1969). House dust mites and insects. *Am. Allergy*, 27:93-99.
- Morsy, T.A.; El-Said, A.M.; Salama, M.M.; Arafa, M.A.; Younis, T.A.; Ragheb, D.A. and Abdel Rahman, M.M. (1995). Four species of house dust mites recovered from houses of patients with allergic respiratory diseases. *J. Egypt Soc. Parasitol.*, 25: 195-206.
- Morsy, T.A.; Zohdi, H.W.; Abdalla, K.F.; El-Fakahani, A.F.; Ibrahim, A.A. and Khalil, H.T. (1994). Isolation of three species of mites from house dust of atopic dermatitis patients in Qalyobia Governorate, Egypt. *J. Egypt Soc. Parasitol.*, 24: 323-331.
- Nadchatram, M. (2005). House-dust mites, our intimate associates. *Tropical Biomedicine*, 22: 23-37.
- O'Neil, S.E.; Heinrich, T.K.; Hales, B.J.; Hazell, L.A.; Holt, D.C.; Fischer, K. and Thomas, W.R. (2006). The

- chitinase allergens Der p 15 and Der p 18 from *Dermatophagoides pteronyssinus*. Clin. Exp. Allergy, 36:831-839
- Sadaka, H.A.; Allam, S.R.; Rezk, H.A.; Abo-el-Nazar, S.Y. and Shola, A.Y. (2000). Isolation of dust mites from houses of Egyptian allergic patients and induction of experimental sensitivity by *Dermatophagoides pteronyssinus*. J. Egypt Soc. Parasitol., 30:263-76.
- Sinha, R.N. (1964). Mites of stored grain in Western Canada. Ecology and methods of surveys. Proc. Entomol. Soc. Manitoba, 20: 19-33.
- Spieksma, F.Th.M. and Spieksma-Boezemans, M.T.A. (1969). The mite fauna of house dust with particular reference to the HDM *D. pteronyssinus*. Acarologia, 9: 226-241.
- Wharton, G.W. (1976). House dust mites (Review article). J. Med. Entomol., 12: 577-621.
- Yassin, M.K. (2011). Allergenic *Dermatophagoides* mites causing asthma among schoolchildren at Ain-Shams District, Cairo, Egypt. J. Egypt. Soc. Parasitol., 41:47-54
- Yasin, M.K. and Rifaat, M.M. (1997). Distribution and abundance of house dust mites, *Dermatophagoides* spp. In different ecological localities in Esna City, Kena Governorate, Egypt. J. Egypt. Soc. Parasitol., 27:431-437.

RABIC SUMMARY

حلم الغبار المنزلي المرتبط بمرضى حساسية الصدر في بعض منازل القاهرة، جمهورية مصر العربية

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تتناول الدراسة التركيب النوعى للحلم فى غبار المنازل لمرضى يعانون من ازمانت ربوية بسبب حلم غبار المنازل. تم تشخيص 6 أنواع من الحلم تتبع أربع عائلات مختلفة وهى: *درماتوفاجويدس فارينى* و *درماتوفاجويدس بيترونسينس* (*بيروجانيفيدى*) و *تيروفاجس بوتريسنتشى* (*أكاريدى*)، و *أكاروس سيرو* (*أكاريدى*)، و *بلوميا تروبيكالييس* (*جليسيفاجويدى*) و *كيليتس تروسارتى* (*كيليتيدى*). تبين من النتائج أن كل من حلم الغبار الاوروبى *د. بيترونسينس* وحلم الغبار الامريكى *د. فارينى* هما الأكثر شيوعاً وتواجد *ب. تروبيكالييس* لأول مره بمنزل القاهرة كما وان *ك. تروسارتى* يمكن ان يمثل تسجلاً جديداً لهذا النوع فى منازل مرضى الحساسيه بمصر. من نتائج هذه الدراسه والدراسات السابقه، تضمن البحث قائمه تشمل 16 نوعاً من الحلم تتبع 7 عائلات والتي تتواجد فى غبار المنازل بمصر.