

THE ABUNDANCE OF THE HOUSE DUST MITES AT HAIL LOCALITY, KINGDOM OF SAUDI ARABIA

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ABSTRACT: *House dust samples were collected from floors and mattresses of 16 houses at Hail locality, Saudi Arabia. The members of Family Pyroglyphidae were the most common in samples constituting over 95% of the total examined mites. Two pyroglyphid species were recovered from the house dust: Dermatophagoides farinae (DF) representing about 86% and D. pteronyssinus (DP) represented only 14% of the total pyroglyphid mites. The average number of mites in dust samples was higher in the mattresses than in floors. Moreover, older houses were more infested with dust mites than newer ones. Mite population densities in the collected samples were higher on carpeted than non-carpeted floors. In addition, house dust mite population was high in houses with pets than in those without pets.*

Key words: *House dust mites, allergens, Dermatophagoides farinae, D. pteronyssinus*

INTRODUCTION

Dust, bacteria, moulds, endotoxin and ammonia are considered central elements in daily exposure of agricultural workers. These substances are known to cause allergic and non-allergic rhinitis, asthma, extrinsic alveolitis, organic dust toxic Syndrome and can also induce chronic bronchitis (Frankland, 1972, Denmark and Cromroy 1989, Yubao *et al.*, 2010).

The most common mites in house dust are members of the family pyroglyphidae (Bronswijk *et al.*, 1971, Arlian 1993). Species of genus *Dermatophagoides*, especially *D. pteronyssinus*, have been shown to produce house dust allergens causing atopic rhinitis and asthma in man (Voorhost *et al.*, 1967, Frankland, 1972). *D. farinae* is the most common species in Czechoslovakia, Egypt, Saudi Arabia, and China (Frankland and El-Hefny 1971, Wharton 1976, Abdulrahman *et al.*, 1997, Meng *et al.*, 2009). House dust mites are more common in dust of mattresses and bedroom floors than in dust from the other areas of the house (Maunsell *et al.*, 1968, Bronswijk and Van, 1973, Cieślak *et al.*, 2007). Human and animal dander and other organic detritus in the dust constitute a major source of food for these mites (Spieksma and Spieksma, 1967, Mulla and Medina, 1980).

The purpose of this study was to correlate the occurrence and abundance of the house dust mites, *Dermatophagoides* spp with the age , type of furnishings and the presence of pets in houses at Hail city.

MATERIALS AND METHODS

Hail city situated at the north eastern locality of the Kingdom of Saudi Arabia. Its climate is cold, mean air temperature during January to March 2010 was 18.6 C° during the day and 10.6 C° at night with humidity between 10–30 %.

Sampled houses were mostly clean, with old furnishings. Four houses were carpeting ; the others were bare, occasionally with small rugs. Houses sampled were from 1 - 20 years of age with one or more stores. The bedrooms were usually with 2 or more occupants per room. Beds with 1 or 2 cotton or sponges - filled mattresses. House dust samples were collected during January to March 2010, from 16 houses. A portable electric vacuum cleaner was used in collecting the house dust. The house dust was recovered in disposable bags. Two samples were taken per house one from mattresses and the other from floors under or near beds (Bronswijk ,1973), each location was vacuumed for 2-3 min and the vacuum bags were labeled and placed inside a plastic bag, which were carried to the laboratory. Each bag was emptied into a one liter jar, a wire screen cylinder was placed inside and 60% ethanol was added to a point level with the top of the wire. After replacing the lid, the jar was manually shaken for 1 min., the dust suspension poured through a stack of two sieves (420 and 75 μ micron openings) and rinsing under a stream of water, the top sieve (420μ) was removed and the bottom sieve (75μ) was placed under the stream of water to concentrate the accumulated dust particles and mites to one side, then washed and transferred into a graduated cylinder with a stream of alcohol from a wash bottle, the particles were allowed to settle for approximately 5 hr. measured to the nearest 0.1 ml. The dust suspension was examined under a dissecting microscope and the total number of mites was determined. A series of all mite families was cleared in Nesbitt's solution mounted in Hoyer's medium and identified. The mean number of mites per one ml of dust particles was statistically analyzed by Duncan's test.

RESULTS AND DISCUSSION

All 16 houses sampled were infested with pyroglyphid mites with over 95% of the total mite numbers. *Dermatophagoides farinae* (DF) was collected in all samples with about 86% of the total pyroglyphid examined mites, while *D. pteronyssines* (DP) representing only about 14% of the total collected pyroglyphids. The families Acaridae, Glycyphagidae, Cheyletidae, and some Oribatei were presented in samples.

The abundance of the house dust mites at hail locality, kingdom

Data presented in Table (1) show that there is a significant difference between the density of mites collected from floors and mattresses where the mean number was higher in the mattress dust than floor dust, (about 86 % of pyroglyphid mites were *D. farinae*). Similar findings have been reported by many workers from different parts of the world (Cornere 1972, Samsinak et al., 1972, Bronswijk and Van ,1973, and Charlet et al., 1977).

Table (1): Occurrence of pyroglyphid mites in house dust samples collected from floors and mattresses in 16 houses at Hail locality, Saudi Arabia.

Substrate	Average no. of mites /ml dust solution	
	Mean *	Range
Floor	39.4 a	15 - 87
Mattress	147.8 b	39 - 382

* Column means followed by different letter are significantly different at 5% level.

The pyroglyphid mite populations as related to the age of the houses, is presented in Table (2). The dust of mattresses of both house ages contained higher density of mites than the others from floor without significant difference between the mite densities of both house ages in mattresses substrate, while there are significant differences between the mites densities collected from floor of both house ages. Samples from newer houses showed lighter mite population densities than the older houses, this might be expected, since older houses would have greater accumulations of food materials for the development of mites.

Table (2): Occurrence of pyroglyphid mites in different samples of old and new houses in Hail locality.

Age of houses (year)	Substrate	No. of houses	Average no. mites / ml dust solution	
			Mean*	Range
Less than 10 years	Floor	6	25 a	5-59
	Mattress	6	99 b	39-136
From 10 to 20 years	Floor	10	49 ab	15-87
	Mattress	10	177 c	107-382

*Column means followed by different letter(s) are significantly different at 5% level.

The density of pyroglyphid mite populations in dust of carpeted and non carpeted floors is presented in Table (3). It is apparent here, as elsewhere, that the dust of mattresses of both groups contains higher density of mites than the dust from floor, while there is no significant difference between the densities of mite in both situations but the mean number of mites in both substrates was higher in carpeted houses than non carpeted houses.

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The findings of this study are agree with the results obtained by Sharp and Haramoto (1970) and Mulla and Medina (1980) Barbara *et al.*, 2009, while these findings are contrary to the results obtained by Charlet *et al.*, (1977). As pointed by Sharp and Haramoto (1970), the carpets provide a protective niche for mites and accumulate large amounts of materials suitable as a food source for the mites which imbedded in the rug and difficult to remove completely, even with vacuuming.

Table (3): Occurrence of pyroglyphid mites in the samples of house dust bedrooms with and without carpeted floors at Hail locality.

Floor surface	Substrate	No. of houses	Average no. mites / ml dust solution	
			Mean*	Range
Carpeted	Floor	4	44	22 - 76
	Mattress	4	179	111 - 382
Non-Carpeted	Floor	12	34	5 - 59
	Mattress	12	1 16	39 - 190

* No significant differences were recorded.

Assessment of pyroglyphid mites in house dust from houses with and without pets is presented in Table (4). Results indicated that houses with pets (dogs, cats, birds) showed higher numbers of mites than houses without pets without significant differences and the mattresses dust again supported higher numbers of mites. It has been suggested that animal dander and skin scales in dust constitute a major source of food for house dust mites.

Table (4): Occurrence of pyroglyphid mites at dust samples from houses with and without pets at Hail locality.

Pets	Substrate	No. of houses	Average no. mites / ml dust solution	
			Mean*	Range
Present	Floor	9	56	11-77
	Mattress	9	160	83 – 382
Absent	Floor	7	27	5 - 87
	Mattress	7	132	39 – 211

* No significant differences were recorded.

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تواجد اكاروسات غبار المنازل في منطقة حائل بالمملكة العربية السعودية

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الملخص العربي

الهدف من هذا البحث هو معرفه تواجد اكاروسات غبار المنازل في منطقه حائل بشمال المملكة العربية السعودية من عدمه لما لهذه الاكاروسات من أهمية طبية كبيرة حيث أنها تعتبر المسبب الرئيسي لكثير من أمراض الحساسية للإنسان سواء جلدية أو تنفسية، حيث تم جمع عينات من مخلفات تنظيف المنازل باستخدام المكنسة الكهربائية وذلك من ١٦ منزل بمدينة حائل بالمملكة العربية السعودية في الفترة من يناير إلى مارس ٢٠١٠، تراوحت أعمار المنازل من ١-٢٠ سنة مكونة من طابقين، حجرات النوم تشغل بشخصين أو أكثر، يوجد على أماكن النوم (الأسره) مرتبة أو اثنان إما من القطن الطبيعي أو الإسفنج الصناعي ومغطاة بطبقة من الأقمشة القطنية، معظم المنازل أرضيتها مكونه من البلاط الاسمنتي وبعضها كان مغطى بالموكيت الصناعي فوق البلاط الاسمنتي. تم استخلاص الاكاروسات من العينات وفحصت بواسطة الميكروسكوب الضوئي وتم عدّها وتصنيفها.

أظهرت النتائج تواجد كثير من العائلات الأكاروسية وسجلت عائلة **Pyroglyphidae** أكثر العائلات تواجدا بنسبه قدرت ب ٩٥% من العدد الكلى للأكاروسات وتم تسجيل النوع **Dermatophagoides farinae** الذي تواجد بنسبة ٨٦% من مجموع أفراد العائلة السابق ذكرها والنوع **Dermatophagoide pteronyssinus** فقد تواجد بنسبة ١٤% ، سجلت الاكاروسات بأعداد كبيرة على مراتب الاسره مقارنة بتعدادها أسفل وحول الأسرة ، كما كانت أعداد الاكاروسات كبيرة في البيوت القديمة مقارنة بمثلتها في البيوت الحديثة ، كما كانت أعداد الأكاروسات كبيرة في الحجرات ذات الأرض المغطاة بالموكيت مقارنة بتلك التي لا يوجد عليها غطاء ، كما أوضحت النتائج أن وجود الفط أو الكلاب أو الطيور الأليفة في المنازل تؤدي إلى زيادة في تعداد الاكاروسات مقارنة بتلك المنازل الخالية من الحيوانات الأليفة .