Study of Prevalence of House Dust-Mite Allergy Among Allergic Rhinitis Patients in Egypt.

Thesis

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List of abbreviations.

AD	Atopic dermatitis
AR	Allergic rhinitis
ARIA	Allergic rhinitis and its impact in asthma
BA	Bronchial Asthma
CARRAD	China alliance of research on respiratory allergic disease
CD	Cluster of differentiation
DC	Dendritic cell
DER.F	Dermatophagoid farina
DER.P	Dermatophagoid pteronyssinus
DNA	Deoxyribonucleic acid
e.NOS	Endothelial nitric oxide synthtase
EAACI	European academy of allergy and clinical immunology
EAST	Enzyme allegro-sorbent test
ECHRS	European Community Respiratory Health Survey
ELISA	Enzyme linked immune sorbent assay
FLG	Filaggrin
GA^2LEN	Global Allergy and Asthma European Network
GERD	Gastro-esophageal reflux disease
GM-CSF	Granulocyte macrophage-colony stimulating factor
h-PGD2	Hematopoietic-type prostaglandin D2
HAS	Human serum albumin
HDM	House dust mite
HEPA	High efficiency particulate air
IgE	Immuno-globulin E
ICAM	Intercellular adhesion molecule

ICT	Intra-cutaneous test
IFN	Interferon
IL	Interleukin
INCS	Intra nasal corticosteroid
i.NOS	Inducible nitric oxide synthase
ISAAC	International Study of Asthma and Allergies in Childhood
IUIS	International union of immunological societies
LFA	Lymphocyte function antigen
LTRA	Leukotriene receptor antagonist
mRNA	Messenger ribonucleic acid
n.NOS	Neuronal nitric oxide synthase
PAR	Perennial allergic rhinitis
PBMC	Peripheral blood mononuclear cell
PGD2	Prostaglandin D2
PRR	Pathogenic regulatory receptor
QOL	Quality of life
RH	Relative humidity
RNA	Ribonucleic acid
S.IgE	Specific immunoglobulin E
SAR	Seasonal allergic rhinitis
SD	Standard deviation
SIT	Sub cutaneous immunotherapy
SLIT	Sub lingual immunotherapy
SPT	Skin prick test
STAT	Signal transducer and activation of transcription
TEWL	Trans epithelial water loss
TH	T-helper

TLR	Toll like receptor
TNF	Tumor necrosis factor
TRP	Transient receptor potential
TSLP	Thymic stromal lympho protein
WB	Water buffer
VCAM	Vascular cellular adhesion molecule
WHO	World health organization

Aim of the work

This study aimed to describe the prevalence of house dust mite allergy among allergic rhinitis Egyptian patients.

Introduction

Allergic rhinitis **(AR)** is a worldwide problem that continues to remain a common and agonizing illness to patients and their families. It is estimated that in developed countries approximately 30% of the general population suffer from one or more allergic disorders, of which allergic rhinitis is particularly common **(Douwes and Pearce, 2002)**.

AR results from a complex allergen-driven mucosal inflammation occurring from a vicious cycle between resident and infiltrating inflammatory cells, a number of inflammatory mediators including cytokines and neurotransmitters leading to sensory nerve activation, plasma leakage, and congestion of venous sinusoids ***(Dykewicz et al., 1998)***.

Although AR may have its onset at any age, it is greatest at childhood and adolescence, with a decrease in incidence seen in advancing age **(Ohshima et al., 2002).**

Seasonal allergic rhinitis **(SAR)** occurs in temporal relationship to the presence of seasonal allergens such as grass and tree pollens in individuals sensitized to these allergens. SAR manifests as combination of all or some of

the following symptoms: rhino rhea, repetitive sneezing, itching (purities) of the eyes, nose, ears, and throat, tearing, and nasal congestion, with predominance of nasal congestion and post-nasal drainage **(Bielory and Ambrosio, 2002)**.

Perennial allergic rhinitis **(PAR)** presents round the year and is related to the presence of non-seasonal allergens such as house dust mite, animal dander, and mold. Patients with perennial AR are at more risk of developing bronchial symptom and airway inflammation, the likely risk factors for asthma **(*Downie et al., 2004).***

Often treatment of AR is initiated on initial diagnosis of symptoms and/or allergen-specific test (***Douglass and O'Hehir, 2006).*** The most common diagnostic tests for identifying atopy and the particular allergen(s) involved are skin test and allergen-specific immunoglobulin E **(IgE)** antibody test. There is a close relationship between skin test positivity and symptoms of AR (***Droste et al., 1996)***.

There are four general principles for clinical management of allergy: avoidance of allergens/triggering factors, use of appropriate pharmacotherapy, evaluation of need for immunotherapy and its use where appropriate, patient education and follow-up **(*Willsi, 2002).***

House-dust contains most of the indoor allergens. Mites are the most egregious allergen in house dust. House dust mites **(HDM)** live off human skin scales and thrive in a warm and humid environment. It is therefore found in abundance in bed linen, mattresses, pillows, carpets, and upholstered fabric. Not uncommonly patients note that their symptoms improve when they go abroad to a hot or dry climate ***(Terreehorst et al., 2003).***

There is increasing evidence that mite allergens are important in the etiology and perhaps the pathogenesis of perennial rhinitis **(Arlian et al., 2001).** HDM allergens may be more potent than other allergens because they are ubiquitous or because the airborne particles are small and are easily respired **(Wook et al., 2005).**

CHAPTER TWO

HOUSE DUST MITES

Introduction

House-dust contains most of the indoor allergens. Mites are the most egregious allergen in house dust. HDM live off human skin scales and thrive in a warm and humid environment. It is therefore found in abundance in bed linen, mattresses, pillows, carpets, and upholstered fabric. Not uncommonly patients note that their symptoms improve when they go abroad to a hot or dry climate **(Terreehorst et al., 2003).**

Several studies show that the concentration of house dust mites is lower in dry environments. This has also been studied experimentally and it is generally believed that house dust mites cannot live at relative humidity below 50%. Studies also show that allergic persons have fewer symptoms during the dry winter period **(Mauseth, 2000).** The physiology and morphology of house dust mites are completely different from insects. For example, house dust mites excrete primarily guanine while insects excrete uric

acid that is why many insecticides and growth regulators used to control insect population are ineffective for controlling house dust mites **(Arlian and Mills, 2001).** So, the family of mites can be basically described as belonging to the phylum Arthropoda, class Arachnida and order Acari **(Kim and Kim, 2002).** Among this family there are two major sub-categories called Astigmata (house-dust mite and storage mites) and Prostigmata (spider mites) Fig. A. Spider mites are outdoor phytophagous mites that colonize leaves of fruit trees, herbaceous plants and green house crops causing damage to fruit leaves and in some cases defoliation **(Kim and Kim, 2002).**

HDM Morphology

The Astigmatic mites are unusual organisms; they have no distinct head, the body appears as an oval structure with legs and mouth parts extruding. Mites have neither eyes, nor ears, as we know them. Some parts of the body are light sensitive to distinguish between day and night. Sense organs for hearing, tasting and heat perception are located in special hairs (called solenidia) present on legs and mouth parts **(Levin, 2004).**

HDMs are 70 % to 75 % water by weight. They obtain and maintain their water balance by absorbing water from the water vapor in air **(Eggleston and Bush, 2001).**

They obtain water from the air by secreting a hyper osmotic solution from the supra coxal glands that open just above the first pair of legs, this hygroscopic solution absorbs water as it flows from the gland opening to the pre-oral cavity **(Eggleston and Bush, 2001).**

There are no special structures for gas exchange. Oxygen, carbon dioxide and water vapor pass through the chitinous skin, which also serves as mite skeleton. They partly regulate water vapor loss by secreting an oily liquid and spreading it over the skin **(Levin, 2004).**

Within the mite, the free-flowing blood transports gases, nutrients and waste products. Mites excrete nitrogenous waste in the form of guanine in feces and under the skin to be removed during molting together with the old skin **(Levin, 2004).**

The effect of humidity and temperature

Moisture is vitally important for house dust mites and they cannot survive in cold or hot-dry climates **(Gehring et al., 2005).** Mite population has a higher

proliferation rate during spring, summer and in the beginning of autumn, due to highest temperature and humidity **(Franzolin and Baggio, 2000).**

It is practical to maintain an indoor relative humidity **(RH)** of less than 51%during the humid summer season in a temperate climate, and this result in significant reductions in mite and allergen levels **(Arlian et al., 2001).** Increasing temperature is associated with decreasing mite allergen concentrations, independently from season **(Strien et al., 2004).**

Classification & types of mites

Fig A Classification of phylum Arthropoda **(Levin, 2004).**