

Study of validation of a questionnaire by skin testing in house dust mite allergy

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Summary

In all aspects of medicine, questioning is a key element of diagnosis, and it is particularly true in allergies. We undertook a study to try to establish its importance as a simple and costless way to orientate the practitioner in the diagnosis of mite allergy. For this purpose, we studied the correlation of a questionnaire to positive skin tests to mite. In this prospective study, 89 patients suffering from asthma and/or rhinitis and/or conjunctivitis were handed a questionnaire before being skin-tested and examined by the allergist. The questions asked concerned the quality of dwellings, the nature of bedding, and the circumstances and areas of occurrence of symptoms. Out of 81 patients entered in the study, 49 had positive skin tests to mites (60.5%) and 32 had negative skin tests to mites (39.5%). The items of the questionnaire that proved to correlate well with positive skin tests were respectively areas of occurrence of symptoms such as the bedroom, question number 1 ($P < 0.001$); short and episodic stays in 'weekend houses', question number 4 ($P < 0.005$); and activities provoking symptoms, namely 'making beds', question number 2 ($P < 0.001$) and 'turning mattresses', question number 3 ($P < 0.005$). Conversely, questions regarding 'dust allergy' were not pertinent ($P > 0.05$). Combining these four items, we obtained a sensitivity of 83%. These items were subsequently tested on a second population of 145 patients. Sixty-five had positive prick-tests to mites and 80 negative tests to mites. Three out of four items singled out by the first questionnaire proved to be significant. The most significant of them was the episodic stay in a 'weekend house' ($P < 0.001$). As for the others, 'turning mattresses' had a P -value of 0.008, the bedroom of 0.02. 'Making beds' was just below the significant range, with a P -value of 0.06. We therefore recommend such questions to be asked when seeing a patient presenting asthma and/or rhinitis and/or conjunctivitis. A positive answer should orientate the diagnosis towards mite allergy and lead to referral to an allergist. © 2001 Éditions scientifiques et médicales Elsevier SAS

house dust mite allergy / questionnaire / diagnosis

Résumé – Étude pour valider une questionnaire par les tests cutanés dans les allergies aux acariens.

En médecine, et surtout en allergologie, l'interrogatoire est capital pour le diagnostic. Le but de notre étude prospective était de définir la pertinence d'un questionnaire standardisé pour les malades ayant une allergie aux acariens. Ce questionnaire a été rempli par 89 nouveaux patients dès leur arrivée à la consultation du centre d'allergie pour rhinite et/ou conjonctivite et/ou asthme. Ils avaient ensuite l'examen clinique et les tests cutanés aux acariens. Les questions posées portaient sur les circonstances et les lieux où les symptômes apparaissaient et sur l'aménagement de leur domicile et de leur

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literie. Sur les 81 patients qui ont complété le questionnaire, 49 (60,5 %) avaient des tests cutanés positifs aux acariens de la poussière de maison et 32 (39,5 %) des tests négatifs. Les items du questionnaire pour lesquels une concordance était observée avec la positivité des tests cutanés étaient respectivement : les lieux de survenue des symptômes, la « chambre à coucher » ($p < 0,001$) ; les séjours épisodiques dans des habitations peu habitées (par exemple, « résidence secondaire ») ($p < 0,005$) ; les activités provoquant les symptômes (« faire le lit », $p < 0,001$) et « retourner le matelas », $p < 0,005$). En revanche, les questions concernant « l'exposition à la poussière » (ménage, passer le balai, l'aspirateur) ou la présence d'une moquette n'étaient pas pertinentes ($p > 0,05$).

En combinant ces quatre items, la sensibilité était de 83 %. Après cette étude préliminaire, ces quatre questions ont ensuite été proposées à 145 nouveaux malades (mêmes critères d'inclusion) : 65 (45 %) avaient des tests cutanés positifs aux acariens et 80 (55 %) des tests négatifs. Trois des quatre questions restaient pertinentes : la plus significative portait sur la « résidence secondaire » ($p < 0,001$), suivie de la question « retourner le matelas » ($p < 0,008$), puis « la chambre à coucher » ($p < 0,02$). La question « faire le lit » n'était pas significative ($p < 0,06$). En conclusion, trois questions orientent de façon significative l'enquête vers la responsabilité d'une allergie aux acariens. Elles devraient figurer dans des études épidémiologiques et servir de base à un questionnaire simplifié pour des médecins n'ayant pas de formation allergologique. © 2001 Éditions scientifiques et médicales Elsevier SAS

allergie aux acariens / questionnaire

Questioning has always been an important step in the diagnosis of allergic diseases. House dust mite is a frequent allergen and plays an important role in asthma and rhinitis [1-3]. Detecting this allergy is very important, as it leads to mite control measures, which have proven their effectiveness [4, 5]. In mite allergy, traditionally in France, questions concerning dust exposure or presence of carpets at home are regarded as relevant. However, it is interesting to transcribe five lines of a general review published 15 years ago by Pollart et al. [6]: "It is important to recognize that histories of house dust allergy are not as reliable as histories of seasonal pollenosis. In particular, asthmatic patients who are highly allergic to either mites or cockroaches are often unaware that house dust is contributing to their asthma and may not be aware that they are allergic at all."

The aim of this study was to evaluate the pertinence of the usual questions asked of patients suffering from mite allergy, and their eventual concordance to positive skin tests to mite. The results of the first questionnaire were then used on a second data sheet and presented to a second population.

METHODS

Patients

In a prospective study, all patients with annual asthma and/or rhinitis and/or conjunctivitis were examined

in our allergy department from February to April 1991, and from May 1996 to February 1997; they were handed a questionnaire before being skin-tested and before being examined by the allergist. Informed consent for this study was obtained from all patients. For the second study, only the four items that proved significant were presented to patients on a second sheet, under the same conditions.

Questionnaire

It was presented to all the patients. The different parameters studied were as follows: characteristics of the patients; quality of their dwellings and bedding; presence of domestic pets; time of occurrence of symptoms; particular areas of occurrence of symptoms; activities provoking symptoms.

For the following study, only the significant questions were asked.

Skin-testing

Prick tests were chosen for their sensitivity, specificity and ease of use. Besides, numerous studies have proven their good correlation to positive RAST to mite [7, 8].

They were carried out, as routinely, on the underside of both forearms with a standardized system (Stallerpoint R), each delivering 5 nmol of extract at 1 mm depth. The allergenic extracts were provided

by Stallergènes Laboratories (France), and were diluted with 50% glycerol. A positive control with codein phosphate 9%, and a negative control with the diluting solution was performed on each patient. Several allergens were tested, including house dust mite, animal dander and pollens. The test was considered to be positive when its wheal and/or flare diameter was greater than or at least equal to the one of the positive control after 20 minutes.

Statistical analysis

All results were analyzed by χ^2 test.

RESULTS

The first study included 89 patients which had been given the questionnaire and skin-tested. Patients with a positive test to animal dander and who had this animal at home were not excluded. Sufficient data could not be obtained from seven patients (7.8%), due to the lack of completion of the questionnaire. One patient had not interpretable skin-testing (all tests negative including the positive control).

The remaining population of 81 consisted of 37 men (45.68%) and 44 women (54.32%), aged 13 to 67 years (mean = 32.01), presenting asthma, 43 (53%) and/or rhinitis, 61 (75.3%) and/or conjunctivitis, 20 (24.6%). The skin tests to house dust mite were positive in 49 patients (60.5%) and negative in 32 patients (39.5%).

There was a statistic difference between the two age groups, i.e., under 40 and over 40 years

($P < 0.005$). This confirms the known fact that type I hypersensitivity is more common amongst younger people. We did not observe any difference between the sexes. We did not observe any difference concerning 'domestic environment' or 'time occurrence of symptoms'.

The main questions that proved to be significant concerned the areas of occurrence of symptoms and activities provoking symptoms (*tables I, II and III*).

A much more precise response was obtained from the activities provoking symptoms (*table I*). The questionnaire singled out two activities statistically correlated to positive skin tests to house dust mite, namely 'making beds' ($P < 0.01$), and 'turning mattresses' ($P < 0.005$). One could assume that similar activities such as shaking bed linen or general housecleaning should give the same results, but surprisingly, this was not the case.

When it came to the areas of occurrence of symptoms (*table II*), it was quite evident that the one high risk area in any sort of accommodation was the bedroom ($P < 0.001$). Another location that correlated well with positive skin tests to house dust mite was the periodically occupied house ($P < 0.005$). It was either a week-end house, or a parent's house in which the patients only stayed once in a while.

We then selected the four significant items and produced a second questionnaire containing exclusively these questions which we presented to a second population. The questionnaire was not fully answered in 21 cases and these were not included in the study. One patient had dermatographism and one had a nega

Table I. Activities provoking symptoms.

		Number of patients	Positive skin test to mite	Negative skin test to mite	χ^2	P
Housecleaning	Yes	44	30	14	2.40	NS
	No	37	19	18		
Vacuum cleaner emptying	Yes	48	32	16	1.92	NS
	No	33	17	16		
Attic or cellar cleaning	Yes	38	26	12	1.87	NS
	No	43	23	20		
Making beds	Yes	18	15	3	5.56	< 0.01
	No	63	33	30		
Turning mattress	Yes	21	18	3	7.53	< 0.005
	No	60	31	29		
Shaking bed linen, quilts, blankets	Yes	23	17	6	2.85	NS
	No	58	32	25		
Book dusting	Yes	34	24	10	2.17	NS
	No	47	25	22		

Table II. Areas of occurrence of symptoms.

		<i>Number of patients</i>	<i>Positive skin test to mite</i>	<i>Negative skin test to mite</i>	χ^2	<i>P</i>
Bedroom	Yes	36	29	7	10.91	< 0.001
	No	45	20	25	—	—
Bathroom	Yes	10	7	3	0.24	NS
	No	45	20	25	—	—
Living-room	Unknown	26	—	—	—	—
	Yes	23	16	7	3.00	NS
	No	48	23	25	—	—
Armchair	Unknown	10	—	—	—	—
	Yes	7	4	3	0.025	NS
Episodic stay in old, periodically occupied house	No	74	45	29	—	—
	Yes	30	24	6	7.59	< 0.005
Anywhere	No	51	25	26	—	—
	Yes	57	32	25	1.55	NS
	No	24	17	7	—	—

Table III. Sensitivity and specificity of the four significant items.

<i>Item</i>	<i>P</i>	<i>Specificity</i>	<i>Sensitivity</i>	<i>Positive predictive value</i>	<i>Negative predictive value</i>
		(%)	(%)		
1. symptoms while making beds	< 0.01	90	31	0.83	0.48
2. symptoms while turning mattress	< 0.005	90	37	0.86	0.48
3. symptoms in the bedroom	< 0.001	78	41	0.80	0.56
4. episodic stays in periodically occupied house	< 0.005	81	48.9	0.80	0.51

tive control test. We could therefore study 145 patients with a completed questionnaire, 72 men (49.66%) and 73 women (50.34%), aged 7 to 71 years (mean = 32.94), presenting asthma, 65 (44.83%) and/or rhinitis, 126 (86.9%) and/or conjunctivitis 91, (62.76%). The skin tests to house dust mite were positive in 65 patients (44.83%) and negative in 80 patients (55.17%).

Out of the four preselected items, one was not significant ('making beds', χ^2 : 3.52, $P = 0.06$). Three proved to be significant: 'bedroom', χ^2 : 5.36, $P = 0.02$; 'turning mattresses', χ^2 : 7.11, $P = 0.008$; and 'short stay in unoccupied houses', χ^2 : 15.7, $P = 0.001$.

DISCUSSION

House dust mite allergy is one of the most commonly observed and a great deal is known about its symptomatology and the agents responsible [9, 10]. But it would appear that there is no established question-

naire to guide the practitioner in the diagnosis of mite allergy [6]. Indeed, the two main questions crucial to the allergist, 'when' and 'where', are not as well-defined in mite allergy as they are in other allergies, i.e. pollen allergies, occupational allergies. Reviewing the literature, we could not find many studies about questioning in mite allergy.

Numerous patients complain of 'dust allergy', evoking symptoms whilst executing different general housecleaning activities. The aim of this questionnaire was to discriminate between the different activities to singularize the patients more likely to be really allergic to house dust mite, even if they have pets at home, as is frequent in France.

We could not establish a concise profile of the domestic environment of the patients who had positive skin tests to house dust mite. But a source of bias could arise from the fact that some patients, already aware of or suspecting their condition, had

already modified their environment beforehand (like removing feather-filled quilts or pillows, for example).

The time of occurrence of symptoms did not prove to be a discriminative factor in distinguishing the patients with positive skin test to house dust mite, although classically, mite allergy is annual and symptoms usually occur in bed at night or early in the morning.

However, the one high-risk area in any accommodation was clearly the bedroom, even more so in a periodically occupied house. This finding supports what is known about the dwellings of house dust mite inside houses [11].

This study stresses again the importance of not referring to common beliefs, frequent amongst patients and practitioners, at least in France, when it comes to 'dust allergy'. General housecleaning activities, such as sweeping, vacuum cleaning and dusting were not discriminative. More so, emptying the vacuum cleaner, when one would expect to be fully exposed to the allergen, was not associated with positive skin tests to house dust mite. In some patients, the possible irritating effect of dust particles on mucosa must not be overlooked.

CONCLUSION

Medical history plays an important part in the diagnosis of allergic diseases. In nearly all cases, a meticulous questioning will give an orientation to skin-testing, therefore saving a lot of useless and costly biological tests.

House dust mite allergy is very common, and the number of patients complaining of 'dust allergy' is very high.

In this study, we tried through a questionnaire to establish a few guidelines which could be useful in orientating the diagnosis towards mite allergy. These questionnaires singled out three items well correlated to positive skin tests to house dust mite.

Therefore, when questioning patients complaining of rhinitis, asthma or conjunctivitis, we recommend inquiring about the areas of occurrence of symptoms and the activities provoking them. Symptoms occurring in the bedroom, and especially in a 'weekend house', should direct the physician towards house dust mite allergy, and these patients should be referred to an allergist for skin-testing, particularly in older patients (more than 40 years), with rhinitis and/or asthma, who are generally considered at poor risk of house dust mite allergy.

Appendix

Questionnaire 1.		
NAME		
Christian name		
Age		
Profession		
YOUR HOUSE		
Is it recent (less than 30 years)	yes	no
Is it old (more than 30 years)	yes	no
Is it damp	yes	no
Type of heating		
central	yes	no
under-floor	yes	no
other	yes	no
Are there any areas which accumulate dust, such as		
old mats	yes	no
old armchairs	yes	no
books	yes	no
Is your house carpeted	yes	no
Have you mats	yes	no
Have you tissue wall-covering	yes	no
Have you fabric upholstery	yes	no

Is your mattress		
old	yes	no
filled with wool	yes	no
synthetic	yes	no
Is your quilt feather-filled	yes	no
Are your pillows feather-filled	yes	no
Do you, or one of your close contacts, own		
a dog	yes	no
a cat	yes	no
a guinea pig	yes	no
a rabbit	yes	no
other	yes	no
Does it come into your house	yes	no
Does it come into your bedroom	yes	no
Does it come onto your bed	yes	no
FAMILY HISTORY		
Is there in your family, anyone suffering from:		
conjunctivitis (eye redness and itchiness)	yes	no
rhinitis (sneezing, blocked or runny nose)	yes	no
asthma (difficult breathing and wheezing in the chest)	yes	no
recurrent urticaria (red wheals which look like nettles stings)	yes	no
eczema	yes	no
MEDICAL HISTORY		
Have you ever suffered from		
rhinitis	yes	no
eczema	yes	no
asthma	yes	no
urticaria	yes	no
sinusitis	yes	no
bronchitis	yes	no
recurrent tonsillitis	yes	no
Have you ever had nasal surgery (polyps, etc.)	yes	no
What are your symptoms:		
difficult breathing with wheezing in the chest	yes	no
asthma attack	yes	no
rhinitis :		
sneezing, runny and/or blocked nose	yes	no
yellow nasal secretions	yes	no
green nasal secretions	yes	no
red and itchy eyes	yes	no
Age of the onset of asthma (if applicable)		
Frequency of asthma attacks or of episodes of		
difficult breathing	yes	no
daily	yes	no
several times a week	yes	no
once a week	yes	no
once a month	yes	no
less than once a month	yes	no
Have you ever been		
in hospital for asthma	yes	no
in intensive care for asthma	yes	no
Age of onset of rhinitis (if applicable)		
Do you have symptoms all year round or during particular periods		
all year around	yes	no
if yes, any particular worse period ? Please specify which month		
rather at the beginning of summer (specify the month)	yes	no
rather in the autumn or winter (specify the months)	yes	no
only from May to July	yes	no

Questionnaire 1.

When do the symptoms occur more often specify which one (s) by ticking the appropriate letter(s) corresponding to your case, A for asthma, R for rhinitis and C for conjunctivitis

at work	yes	no	A	R	C
in your house	yes	No	A	R	C
elsewhere	yes	No	A	R	C
(if yes, specify)					
At what time					
rather in the daytime	yes	no	A	R	C
rather at night	yes	no	A	R	C
in the beginning	yes	no	A	R	C
in the middle	yes	no	A	R	C
in the end	yes	no	A	R	C
rather in the morning	yes	no	A	R	C
in bed	yes	no	A	R	C
after getting up	yes	no	A	R	C
anywhere	yes	no	A	R	C
during contact with animals (specify)	yes	no	A	R	C
after taking medication (if yes, specify)	yes	no	A	R	C
during contact with certain products (perfumes, etc.)	yes	no	A	R	C
when wearing fur	yes	no	A	R	C

Where do the symptoms occur more often (specify which one(s) by ticking the appropriate letter corresponding to your case)

in the bedroom	yes	no	A	R	C
in the bathroom	yes	no	A	R	C
in the living-room	yes	no	A	R	C
in armchairs	yes	no	A	R	C
sleeping in a periodically occupied house	yes	no	A	R	C
in the garage	yes	no	A	R	C

Are you disturbed by the following activities, when you do them yourself or when they are done in front of you

house-cleaning	yes	no	A	R	C
emptying the vacuum-cleaner	yes	no	A	R	C
attic or cellar cleaning	yes	no	A	R	C
making beds	yes	no	A	R	C
turning mattresses	yes	no	A	R	C
shaking quilts, blankets or sheets	yes	no	A	R	C
book dusting	yes	no	A	R	C

Are your symptoms provoked and/or aggravated by

cold weather	yes	no	A	R	C
damp weather	yes	no	A	R	C
temperature changes	yes	no	A	R	C
drafts	yes	no	A	R	C
tobacco smoke	yes	no	A	R	C
strong odors	yes	no	A	R	C
exercise	yes	no	A	R	C
excessive laughter	yes	no	A	R	C
Do your symptoms decrease during stays in the mountains (above 1300–1500 m altitude)	yes	no	A	R	C
Are there any places where you are free from symptoms	yes	no	A	R	C
Do some medicines provoke your symptoms					
aspirin	yes	no	A	R	C
other	yes	no	A	R	C
if yes, specify					

Appendix

Questionnaire 2.			
Age:			
Sex:			
Your symptoms:			
Asthma (difficulty in breathing, wheezing)	Yes	No	
Rhinitis (sneezing, blocked or runny nose)	Yes	No	
Conjunctivitis (watery, red or itchy eyes)	Yes	No	
All year ?	Yes	No	
If no, specify the season :			
Age of onset of symptoms :			
Is there in your family anyone presenting the symptoms mentioned above	Yes	No	
Do your symptoms appear:			
In the bedroom	Don't know	Yes	No
When making beds ?	Don't know	Yes	No
When turning mattresses ?	Don't know	Yes	No
When sleeping in a rarely occupied house (holiday home, guest bedroom, rented accommodation)?	Don't know	Yes	No
Tests			
positive			
negative			

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