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## INTERRELATION OF VASOMOTOR RHINITIS AND ASTHMA, OCCURRING IN PATIENTS WITH HOUSEDUST-ATOPY

### II. *Influence of houses lived in*

By

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As a result of an investigation on the importance of their houses to patients with asthma and rhinitis vasomotoria, we came to the conclusion (Varekamp & Voorhorst in press) that patients with atopic *rhinitis*, in spite of being exposed to the same allergens which are important in asthma, are not more numerous in the old part of Leiden than we had expected from our experiences with *asthma* patients. The figures important for this paper are to be found in Table 1.

While it was found statistically significant that asthma patients with positive skin-reactions to house-dust lived more frequently in the old part of Leiden than the control group did, it appeared that in the old part of the town there were far fewer rhinitis patients (29) than asthma patients (61); in the new part the opposite was found, (37 asthma to 48 rhinitis). Still more pronounced are the figures for the age-group 0-19 years in which the atopic syndrome is most manifest (Table 2).

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TABLE 1

| Age-group | Asthma        |          |                  |          | Rhinitis      |          |                  |          |
|-----------|---------------|----------|------------------|----------|---------------|----------|------------------|----------|
|           | Numbers found |          | Expected numbers |          | Numbers found |          | Expected numbers |          |
|           | Old part      | New part | Old part         | New part | Old part      | New part | Old part         | New part |
| 0-19      | 32            | 18       | 18               | 32       | 12            | 25       | 14               | 23       |
| 20-39     | 29            | 19       | 20               | 28       | 17            | 23       | 17               | 23       |
| 0-39      | 61            | 37       | 38               | 60       | 29            | 48       | 31               | 46       |

*Old part:* Leiden within the canals ("singels") and expansion up to 1918.

*New part:* Expansion after 1918.

*Expected number:* Calculated from the distribution over the different parts of Leiden of the addresses of control patients (myopes, hypermetropes, presbyopes) visiting the eye-clinic of the Academic Hospital.

TABLE 2

*Comparison of the numbers of asthma- and rhinitis patients (0-19 years) living in the two parts of Leiden.*

|                         | Asthma | Rhinitis |
|-------------------------|--------|----------|
| Built before 1918 ..... | 32     | 12       |
| Built after 1918 .....  | 18     | 25       |

In order to explain this remarkable fact we must realize:

- that the degree of exposure to allergens may differ considerably just as the strength of house-dust extracts prepared from the different houses differs substantially (v. Dishoeck & Voorhorst 1959).
- that the liability of patients to atopic reactions may also vary considerably, which may be concluded from the differences in strength of skin-reactions to a standard house-dust extract.
- that, as demonstrated elsewhere (Voorhorst & Vermey-Scheltema 1960) rhinitis is a weaker form of atopic reaction than asthma.

It may be expected that people with an atopic disposition would be distributed equally over the town.

It is further to be expected that people with a slight degree of atopy and an average amount of exposure to the house-dust allergen will suffer only from rhinitis, while those with a severe degree of atopy and the same amount of exposure will have asthma as well.

If there is no exposure, or a very small one, neither people with a slight atopic disposition nor people with a severe degree of atopy will have any complaint: they are latently atopic to house-dust allergen.

There is a large number of possible combinations of the different degrees of atopic disposition and the different amounts of exposure.

Table 3 indicates the consequences of the different combinations of the two factors.

TABLE 3  
*Theoretical combinations of different degrees of atopic disposition with different degrees of exposure.*

| Atopic disposition | Degree of exposure |     |    |   |   |
|--------------------|--------------------|-----|----|---|---|
|                    | +++                | ++  | +  | ± | — |
| Severe .....       | ++++               | +++ | ++ | + | — |
| Medium .....       | +++                | ++  | +  | ± | — |
| Slight .....       | ++                 | +   | ±  | — | — |

If we agree that—shows latent atopy,  $\pm$  and  $+$  a more or less severe form of rhinitis and  $++$ ,  $+++$ ,  $++++$  a more or less severe form of asthma, than it is possible, starting from this scheme, to calculate the percentages of asthma and rhinitis and latent atopy, for any hypothetical value of atopic disposition and degree of exposure.

It is to be expected that with the decrease of exposure the total number of manifest atopic cases (rhinitis + asthma), which in an extreme exposure would be 100 %, decreases gradually till, with the complete disappearance of house-dust allergen, the value 0 is reached.

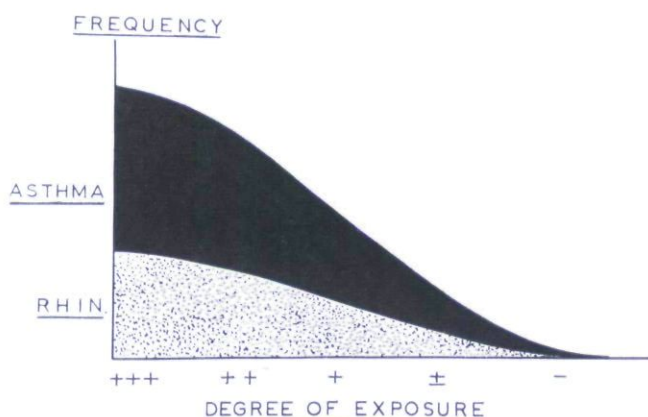


Fig. 1.

Expected decrease of the frequency of asthma- and rhinitis-patients when the degree of exposure diminishes.

This decrease would apply as much to asthma as to rhinitis and the expected graph would have the form as in Fig. 1.

After working with the data of our investigation it appeared that the decrease of the number of asthma cases indeed corresponded with our expectations, but that the decrease of the number of rhinitis cases did not correspond with the decrease in exposure. Compared with the asthma cases the number of rhinitis patients certainly increases (Table 2).

When we made calculations from Table 3 with different hypothetical values for atopic disposition and degree of exposure, we got graphs, of course differing considerably but nevertheless showing all the same type (Fig. 2).

The total number of manifest atopic cases (rhinitis + asthma) as well as the total number of asthma cases decreases gradually with the decrease in exposure, but with the rhinitis there is first an increase, which only with a very much slighter degree of exposure at last also changes into a decrease.

In order to compare the data of our investigation with those hypothetical curves we took the patients with asthma and rhinitis of the age-group 0-19 and divided them according to their addresses in "the old part" (built before 1918)

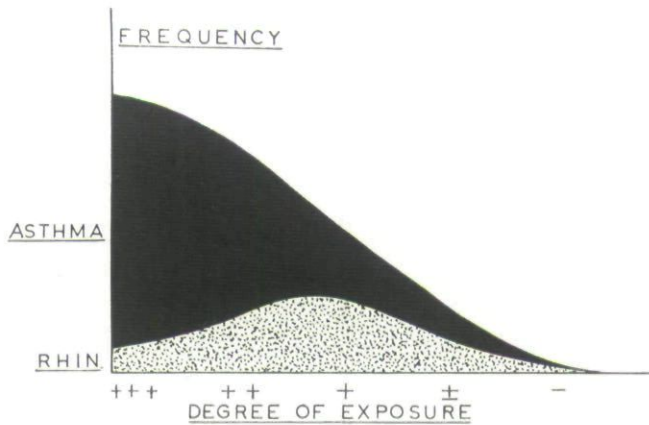


Fig. 2.

Calculated decrease of asthma frequency and changes in the frequency of rhinitis patients when the degree of exposure diminishes (according to Table 3).

the "fairly new part" (built 1918–1935) and the "new part" (built after 1935). Elsewhere we have demonstrated that with the age of the quarters of the town (as a consequence of bad building) the humidity increases, which amongst other things is to be seen in the higher percentage of woodrot in the ground-floors (Varekamp 1958).

The figures relating to this are to be found in Table 4.

TABLE 4  
*Distribution of asthma and rhinitis-patients over 3 parts of Leiden.*

|                                 | Built<br>before 1918 | Built<br>1918-1935 | Built<br>after 1935 |
|---------------------------------|----------------------|--------------------|---------------------|
| Asthma .....                    | 32                   | 10                 | 8                   |
| Rhinitis .....                  | 12                   | 16                 | 9                   |
| Manifest atopy .....            | 44                   | 26                 | 17                  |
| Percentage of inhabitants ..... | 36 %                 | 35 %               | 29 %                |

Also the number of people living in the different parts of Leiden is mentioned and expressed in percentages of the total population.

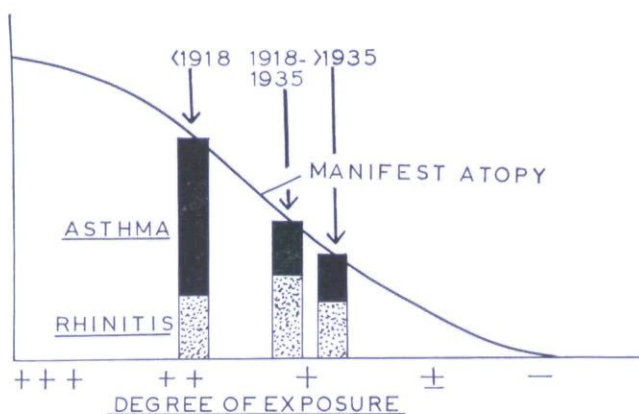


Fig. 3.

Frequency of patients with manifest atopy, asthma and rhinitis arranged according to the age of the quarters lived in.

In Fig. 3 the results, corrected according to the percentages of inhabitants of the three parts of the town, are plotted in columns. Furthermore it must be understood that if there is a lack of exposure, there can be no manifest atopic patients. If the columns are arranged in an age-sequence than it is possible to draw a gently curving line though the points indicating the values of total manifest atopy and the zero point.

In the columns also, the ratio of asthma to rhinitis is indicated. It appears that in that part of the town built before 1918 a high asthma- and a low rhinitis-frequency is found while on the contrary in the part of the town built between 1918 and 1935 a fairly low asthma frequency is found and a high rhinitis.

From these observed frequencies it appears that Fig. 2, calculated purely theoretically, corresponds more closely to the reality than Fig. 1.

Fig. 4 expresses schematically authors' view of how asthma changes via rhinitis into a latent form of atopy when the degree of exposure diminishes.

Whether a patient with a house-dust atopy gets rhinitis or asthma depends, according to this view, for the greater part

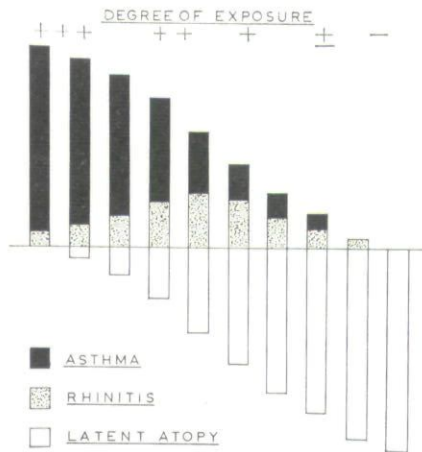


Fig. 4.

Scheme of authors' view of how asthma changes via rhinitis into latent atopy.

on the degree of exposure and on the degree of his atopic disposition.

To those, who are not altogether convinced by the figures given in this article and cannot be in accord with us in our hypothesis about the interrelation of atopic rhinitis and atopic asthma as expressed in Fig. 4, we can already mention here that the same interrelation between both diseases has been found in respect to the influence of the age-factor which causes a decrease of the atopic disposition.

Finally the seasonal variation of the allergencontent of housedust is another factor, which afforded us figures in support of our views. Both studies about the interrelation of atopic rhinitis and asthma will be published in extenso at a later date.

#### SUMMARY

As a result of an investigation on the importance of their houses to patients with asthma and rhinitis vasomotoria we came to the conclusion that atopic asthma patients are more numerous in the old part of Leiden, atopic rhinitis patients however in that part, which has been built between 1918-

1935. The authors attempt to explain this remarkable fact starting from their view that atopic rhinitis is a weaker form of atopic reaction than asthma.

## REFERENCES

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