ORIGINAL ARTICLE

The Influence of Desensitization on The Recovery of Allergy, In Particular Asthma

by

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Abstract.

An evaluation was carried out to determine the effect of desensitization on 62 asthmatic patients under the age of 14 years.
Preceeding the evaluation, an intracutaneous skin test was conducted of which all patients produced positive reactions to one or more allergen types.

Desensitization was carried out for at least 5 months (up to the 30th injection), with the following results : good, 45 (72,57%); decreased symptoms 12 (19.03%), and constant (no change), 5 (8,4%).
All patients reached the maximum dosage (1 cc), except 2 patients whom, given the maximum dosage, become worse, therefore suitable dosages were maintained (0.5 – 0.7 cc).

Therapy for one type of allergen was also proven as follows : house dust, good 1 (100%); mite, good 1 (100%); bacteria, good 14 (87.5%), fungi, good 1 (100%). Result of therapy for 2 types of allergen : house dust + splinter of human dunder in 31 patients was : good 24 (77.4%); constant 7 (22.59%). Whilst therapy for 3 types of allergen : house dust + splinter of human dunder + mite revealed : good, 4 (33.4%); decreased symptoms, 3 (25%); and constant, 5 (41.6%).

It may therefore be concluded that the greater the number of allergens, the less effective the desensitization becomes.

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Introduction.

The method of therapy with proven success for allergic patients frequently used nowadays is desensibilisation or desensitization, of which the purpose is to decrease sensibility to a particular allergen.

Desensitization therapy was first carried out by Freeman (1911), who injected extract of grass pollen to 18 allergen sensitive patients showing that 16 of the obtained benefit from the therapy.

Coca and Cooke (1923) divided allergy into two groups namely atopic and non atopic allergy. Bronchial asthma can also be divided into "extrinsic asthma", "extrinsic no-atopic asthma", and "intrinsic asthma".

Desensitization therapy is beneficial only in patients with allergic or atopic bronchial asthma (= extrinsic atopic asthma), specific characteristic being that it is only necessary to give injection of the allergen extract suitable for the reagin (IgE) circulating in the blood system of the patient.

The diagnosis of allergic asthma is made on the basis of :

- The presence of specific symptoms such as "wheezing", breathing difficulty, cough and cold at each asthma attack.
- Anamnesis leading to the presence of heredity factor in the family (Bellanti, 1971), or the existence of allergic diseases such as allergic rhinitis, and allergy to medicinal substance.
- On radiologic examination, 90% of bronchial asthma patients appear to be normal. Subsequently, a positive skin test to a specific allergen (a reddish swelling occuring 15 minutes after the allergen extract was injected) was considered to be the manifestation of hypersensitivity reaction to that particular allergen.
- Other examination such as : increased blood IgE concentration during the asthma attack, etc.

The purpose of this study was to determine the effect of desensitization as therapy of allergic diseases, in particular asthma.

Material and method.

The material for this study of patients under the age of 14 years visiting the Subsection of Allergy Diseases and Immunology of the Pulmonology Section of Gajah Mada University Hospital during the period of May 1979 to November 1980.

After the patient was clinically diagnosed as having allergic asthma by way of a positive skin test, a desensitization therapy was carried out by injecting the sensitive allergen extract. Injection started with a low dosage gradually raised in stages to the maximum dosage.

The injection was applied subcutaneously in the distal area of the upper arm, between the shoulder area and the elbow. The time table and dosage applied were as follow :

1. Laprin 1 : containing house dust extract at a concentration of 50 N.Eq.U/ml, with an initial injection of 0,1 ml, then raised gradually by 0,1 ml, until a maximum dosage of 1 ml was reached. The injection was carried out twice a week therefore the maximum dosage was reached in 5 weeks.
   Subsequently, Laprin L2 (house dust extract at a concentration of 500 N.Eq. U/ml) was given in a similar way, to reach a maximum dosage of 1 ml in 5 weeks. Afterwards, L2 was continued with the injection of 1 ml dosage once a week for 10 weeks, followed by fortnightly injections (10 times), three weekly injections (10 times), and four weekly injection (20 times), using the same injection method.
2. House dust extract mixed with extract of human dunder, at concentrations of 50 N.Eq.U/ml (i.e. LaprinL5), and at maximum concentrations of 500 N. Eq. U/ml and 50 N. Eq.U/ml (i.e. Laprin L6), respectively, using the same injection method as described above.
3. Extract of fungi mixture consisting of Aspergillus, Peniccilium, Curvularia, Fresaria, Candida and mixed fungi A; this extract was applied at concentrations of 0,1% (F1) and 1% (F2) with the same method as described above.
4. Extract of mite originating from Dermatophagoides pteronyssinus, prepared at concentrations of 10 N. Eq.U/ml (M1) and 100 N. Eq.U/ml (M2).
   Method of application was as described previously.
5. Extract of grass pollen at concentrations of 10 Noon unit/ml (Laprin P1) and 100 unit/ml (Laprin P II).

The allergen used was prepared by Dr. Tjahja Indrayana from Jakarta.

The desensitization therapy was carried out at the Subsection of Allergy Diseases and Immunology of the Pulmonology Section of Gajah Mada University Pugeran Hospital, and in the Child Health Section of the Hospital, and in some cases by the general practitioners or pediatrician who sent the patient in for the skin test. The evaluation was conducted for at least 5 months (until the 30th injection) after desensitization therapy was applied by sending out questionnaires (for patients living outside the Province of Yogyakarta) or by home visits (for patients living in the Province of Yogyakarta).

Results.

The total number of patients was 110 children. The number of patients that could be evaluated was 62 children (56.5%), consisting of 26 females (41.9% of the all females) and 36 males (58.1% of all males).

Changes in the clinical and physical diagnostic symptoms were evaluated using the following criteria :

- good : if the child did not complain of coughing, breathing difficulty, and cold, and upon examination lung ronchi were not observed.
- decreasing : if the frequencies of coughing, breathing difficulty, and cold decreased from the usual frequencies, and occasionally lung rales were observed upon examination.
- constant (no change) : there was no change at all.

The effect of desensitization based on age was shown in table 1. The relationship between the first appearance of asthma and the effect of desensitization was presented in table 2 and the relationship between the

history of asthmatic or allergic families and the effect of desensitization was shown in table 3.

The effect of desensitization based on the kinds of allergen could and the relationship between time of evaluation and the effect of desensitization was presented in table 4 and 5 respectively. Fig 1 showed the effect of desensitization at the time of evaluation.

The overall result revealed that 72,57% was good, 19.03% decreasing and 5% constant.

TABLE 1 : *The affect of desensitization based on age.*

No.	Age (year)	number of children			Total
		Good	Decreasing	Constant	
1.	0 – 3	3	1		4
2.	3 – 6	17	3	1	21
3.	6 – 9	11	2	3	16
4.	9 – 12	12	5	1	18
5.	12 – 15	2	1		3
Total number		45 (72,6%)	12 (19,03%)	5 (8,4%)	62

TABLE 2 : *The relationship between the first appearance of asthma and the effect of desensitization.*

	Age				
	1 year	1 – 3 years	3 – 6 years	> 6 years	Total
Good	4	18	15	8	45
Decreasing	1	6	1	4	12
Constant	1	–	2	2	5
Total	6	24	18	14	62

TABLE 3 : *The relationship between the history of asthmatic/allergic families and the effect of the desensitization.*

	Good	Decreasing	Constant	Total %
The history of asthma in families:	31	6	3	63,5
The history allergy of children :	9	5	1	23,18
The asthma and allergy :	8	4	1	20,83

TABLE 4 : *The effect of desensitization based on the kinds of allergen.*

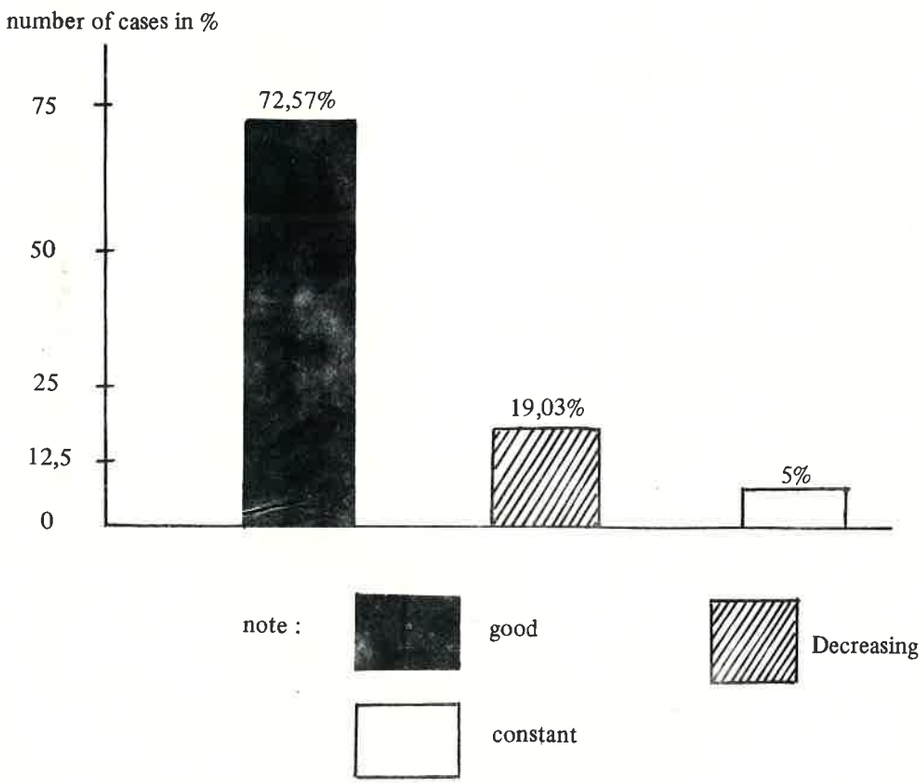
Kind of allergen	number of children			Total
	Good	Decreasing	Constant	
House dust	1	–	–	1
House dust + Splinters of human dunder	24	7	–	31
"Mite"	1	–	–	1
House dust + Splinters of human dunder + "Mite"	4	3	5	12
Fungi	1	–	–	1
Vaccine of bacteria	14	2	–	16
Total	45	12	5	62

Note : With double dosage of allergen, desensitization was less effective.

TABLE 5 : *The relationship between time of evaluation and the effect of desensitization.*

Month (weeks)	number of children			Total
	Good	Decreasing	Constant	
fifth month (20 weeks)	8	5	1	14
tenth month (40 weeks)	34	5	4	43
eighteenth month (70 weeks)	3	2	–	5
Total	45	12	5	62

FIGURE 1 : *The effect of desensitization at the time of evaluation.*



Discussion.

The desensitization therapy must be carried out with patience, both of the patient and the doctor since this method requires a long period of time and the injections must be given repeatedly from twice a week up to once a month, until clinical recovery is obtained.

Previous experiments showed, that of the many allergic diseases treated by the desensitization method, the treatment of polynosis diseases had shown the best results, i.e. 80 – 90% recovered (Bruun, 1971); while in bronchial asthma thus differ somewhat, i.e. 80% (Bruun, 1949), 83% (John Stone and Crump 1961), and even 100% (Kline and Waite, 1960).

The benefit of desensitization may be felt by the patients at different times. There are patients showing rapid and clear progress, but there are others who show gradual progress, and there are still others in whom the atopic symptoms may frequently recur.

To determine the result of desensitization therapy, a thorough observation for approximately 5 months of the condition of the patient during the application of the therapy is requires. Basic mechanism of desensitization are as follow : The application of allergen extract is conducted in a fairly long period of time, starting from a relatively small dosage, gradually increased until a maximum dosage in order to lower sensitivity to the particular allergen.

The dosage given is sufficiently small so as not to evoke the development of the disease, yet large enough to induce new immunity response by the formation of "blocking antibody" (of the IgE type). After therapy has been conducted for some time, the "blocking antibody" produced becomes progressively more numerous. Therefore when an appropriate allergen enters the body, it will be "inactivated" by the "blocking antibody" so that the allergen would not be capable of reacting with IgE present in the blood of the patient. Hence, the basic mechanism of desensitization is actually a form of competition between reagin and "blocking antibody". For the reason during the therapy program, allergic reaction might sometimes be observed in the patient, particularly when he has contracted the particular allergen in sufficient large amounts.

In this study, evaluation was carried out when desensitization has proceeded for 5 to 18 months, and the patients had reached the maximum dosage of 1 cc, with the exception of 2 children in whom the maximum dosage caused worsening of symptoms and who were therefore then maintained at a suitable dosage range (0,5 – 0,7 cc). Clinical improvement observed after desensitization was in agreement with the results reported by previous workers.

Failure in therapy was defined after the therapy had been applied regularly for 3 months, the patient did not show any progress. Causes of failure in desensitization (Deamer, 1969; Melan, 1972) may include error in diagnosis (defining non-atopic diagnosis as atopic); error in the determination of allergen when reading the skin test, and inconsistency of the patient during the period of therapy.

Considering the development of bronchial asthma in children without desensitization therapy, it was found that 70% of sufferers will grow out of the condition at the age of 10 years. In this context Godfrey (1974) presented a case evidence as follows : 35% at the age of 4 – 7 years; 39% at the age of 8 – 11 years; 15% at the age of 12 – 15 years. These results show that, in general, the condition of the bronchial asthmatic child can improve with age. Therefore the patients in the present study, whose clinical symptoms had decreased, may still have the possibility of spontaneous recovery.

Conclusion.

1. The prospect and effect of desensitization therapy in children suffering from allergic asthma was studied and evaluated.
2. Results were : good, 72,5% (45/62), decreased symptoms, 19,03% (12/62), and constant, 8,4% (5/62). All patients reached the maximum dose (1 cc), with the exception of 2 children in whom the maximum dosage caused worsening of symptoms, and thus had to be maintained at lower dosages (0,5 – 0,7 cc).
3. The greater the number of hypersensitive allergens, the less effective the desensitization therapy became.

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