Effect of Self-Hypnosis on Hay Fever Symptoms – A Randomised Controlled Intervention Study

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Abstract

Background: Many people suffer from hay fever symptoms. Hypnosis has proved to be a useful adjunct in the treatment of conditions where allergic phenomena have an important role. **Methods:** Randomised parallel group study over an observation period of two consecutive pollen seasons. Outcome data include nasal flow under hypnosis, pollinosis symptoms from diaries and retrospective assessments, restrictions in well-being and use of anti-allergic medication. We investigated 79 patients with a mean age of 34 years (range 19–54 years; 41 males), with moderate to severe allergic rhinitis to grass or birch pollen of at least 2 years duration and mild allergic asthma. The intervention consisted of teaching self-hypnosis during a mean of 2.4 sessions (SD 1.7; range 2–5 sessions) and continuation of standard anti-allergic pharmacological treatment. **Results:** Of 79 randomised patients, 66 completed one, and 52 completed two seasons. Retrospective VAS scores yielded significant improvements in year 1 in patients who had learned self-hypnosis: pollinosis symptoms –29.2 (VAS score, range 0–100; SD 25.4; p < 0.001), restriction of well-being –26.2 (VAS score, range 0–100; SD 28.7; p < 0.001. In year 2, the control group improved significantly having learned self-hypnosis as well: pollinosis symptoms –24.8 (SD 29.1; p < 0.001), restriction of well-being –23.7 (SD 30.0; p < 0.001). Daily self-reports of subjects who learnt self-hypnosis do not show a significant improvement. The hazard ratio of reaching a critical flow of 70% in nasal provocation tests was 0.333 (95% CI 0.157–0.741) after having learnt and applied self-hypnosis.

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Introduction

Hay fever is a common condition affecting 10–15% of adults in industrialised countries [1, 2]. To relieve symptoms, topical corticosteroids, mast cell stabilisers and topical and systemic anti-histaminics are used. These drugs alleviate pollinotic manifestations like itching, tearing, swelling, sneezing, rhinorrhea, nasal obstruction and reduce nasopharyngeal itching. In severe cases, immuno-

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therapy may offer a valuable but time-consuming and expensive intervention [3]. For milder symptoms, however, many patients are not willing to undergo long-term injection therapy or take medicine. Many patients in Switzerland use over-the-counter drugs and homeopathic treatment. In Switzerland, almost two thirds of physicians who see allergy patients are either interested in or using alternative modes of therapy [4]. An easy to perform and acceptable therapeutic alternative would be desirable for patients and physicians alike.

Hypnosis has been shown to be effective in various disorders in which an allergic reaction significantly contributes to the disease process, e.g. in atopic dermatitis [5] and bronchial asthma [6, 7]. An uncontrolled observational study has demonstrated a substantial benefit of hypnosis in the treatment of children with pulmonary problems, including asthma [8]. However, a recent review on the use of complementary medicine in asthma arrives at a more cautious conclusion: 'Psychotherapy-related methods such as relaxation, hypnosis, autogenic training (...) might have a small effect in selected cases, but have not proven to be superior to placebo. Nevertheless, more randomised controlled trials of good methodological quality are required to allow firm conclusions' [9].

The most probable mechanism of action of hypnosis in these examples includes a response of the vasculature to specific suggestions [10, 11].

The possibility of a similar influence of some pharmacological agents and the alleged mechanisms of hypnosis on rhinitis led to the current study investigating whether self-hypnosis in addition to standard medical therapy alleviates subjective symptoms, reduces the use of anti-allergic medication and improves quality of life in patients with hay fever. We furthermore investigated whether self-hypnosis has an effect on allergen-provocation-induced subjective symptoms and nasal obstruction as measured by rhinomanometry [12].

Patients and Methods

Study Protocol

Individuals with hay fever were recruited among patients of the Allergy Outpatient Clinic of the University of Basle Hospital and through advertisement in a local health insurance magazine. The research protocol was approved by the local ethical committee of the Department of Medicine, University Hospital of Basle, Switzerland.

Inclusion criteria were age 16–55 years, sensitisation to grass and/ or birch pollen and moderate to severe allergic rhinoconjunctivitis of at least 2 years duration. Exclusion criteria were pregnancy, severe diseases including more than mild allergic asthma, psychiatric disorders, drug abuse, concurrent therapy with other non-conventional

Table 1. Description of study groups A and B

	Group A	Group B
Pollen season 1	learning self-hypnosis	standard anti-allergic treatment
Pollen season 2	continuing self-hypnosis	learning self-hypnosis

treatments, other drug treatments (beta-blockers, psychoactive drugs, hypnotics, systemic corticosteroids and astemizol) and pollen immunotherapy up to 2 years before the study. The hypnotic intervention took place in the private practice of J.W., the control intervention and all assessments took place in the Outpatient Department of the Dermatology Clinic, University Hospital Basle.

The study was conducted over the course of two pollen seasons. Individual hypnotisability was evaluated by the Stanford Hypnotic Clinical Scale for Adults form C [13–16] before randomisation.

Stratified randomisation in combination with the method of minimisation was used to allocate subjects to the treatment and the control group. The primary stratification was based on the type of sensitivity (i.e., grass vs. birch). Secondary stratification factors were sex, severity of respiratory symptoms (i.e., severe vs. moderate), hypnotisability (i.e., high vs. low) and age (<35 vs. ≥35 years). To define baseline severity of symptoms, subjects were asked to provide visual analogue scale (VAS) scores concerning the 2 years preceding the study period. From each odd-numbered stratum, 1 subject was randomly selected and put aside before applying stratified randomisation. These 'leftovers' were then assigned to the two treatment groups using the method of minimisation [17]. Randomisation was performed using random numbers from a statistical program (SAS), the random allocation plan was set up by the statistician, after the study population had been defined. When all data concerning stratification variables were gathered, patients were informed by mail about their assignment to either group A or B. Patients, therapist and physicians were aware of patients' assignment.

In year 1, group A (hypnosis group) learnt self-hypnosis at the beginning of the pollen season and continued anti-allergic medication, group B (control group) received standard anti-allergic therapy only. During year 2, group A continued to perform self-hypnosis whereas group B learnt self-hypnosis at the beginning of the pollen season (table 1).

The time course of the intervention and the assessments is depicted in figure 1. To control for the amount of time spent with group A during the first year, all patients in group B were offered two additional consultations with the research fellow (J.I.) to discuss physiological and psychological mechanisms of the allergen response.

Grass and birch pollen counts were assessed on a daily basis throughout the study seasons with a Burkhard pollen trap situated on the roof of the University Hospital Basle [18].

Skin and Nasal Provocation Tests

Skin and nasal provocation tests (NPTs) were performed following a standard clinical protocol: Skin tests included common respiratory allergens (grass, birch, mugwort pollen, moulds, house dust mites, animal danders), a positive (histamine 10 mg/ml) and a negative glycerosaline control (ALK, Denmark). An adjusted wheal diam-

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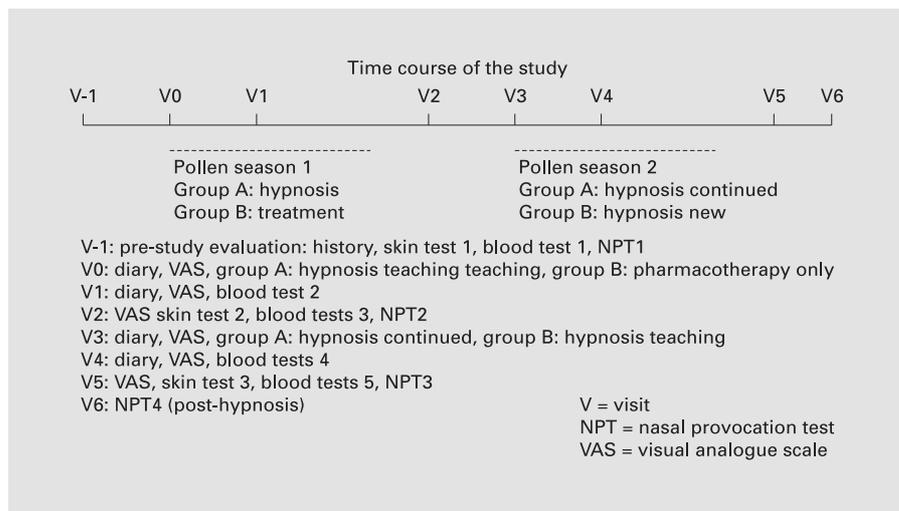
Fig. 1. Time course of the study.

eter of ≥ 3 mm (i.e., after subtracting the diameter of the control from the allergen-induced wheal) was considered positive. For NPTs following vehicle, three increasing doses of allergen were given. This was done before entering the study (V-1) and after the first (group A; V2) and the second (group B; V5) pollen seasons. In 39 subjects, the NPT was repeated at the end of the study (V6; fig. 1) with the additional instruction to induce self-hypnosis. About 15 min later, NPT was performed following the standard clinical protocol, as outlined above, and was compared with pre-intervention NPT. Responses to NPTs were assessed by a clinical score and measured by anterior rhinomanometry (Jaeger Rhinoscreen). Tests were performed in the nostril with the higher baseline flow yielding baseline values, after vehicle, and then with the corresponding allergen (grass or birch pollen, ALK, Denmark) in tenfold increasing concentrations (100–100,000 SQ units). When nasal flow reached 70% of baseline value, the test was considered positive. Tests were performed in a single-blind manner by applying three consecutive vehicle provocations before allergen administration. In 23 subjects from group A and 16 subjects from group B this took place after season 2 (V6; fig. 1). To estimate the critical dose at which the flow would have reached the 70% threshold, we used linear interpolation between the two consecutive points (d_i, f_i) and (d_{i+1}, f_{i+1}) of the dose flow diagram satisfying $f_i > 0.7f_0$ and $f_{i+1} \leq 0.7f_0$. The critical dose was thus computed according to the formula $d_{crit} = d_i + (d_{i+1} - d_i) (f_i - 0.7f_0)/(f_i - f_{i+1})$.

Intervention and Outcome Variables

Primary outcome variables were self-reports of daily symptoms, changes in retrospective VAS scales (0–100) concerning symptoms and well-being in the past pollen season compared with a baseline year prior to the intervention and the use of anti-allergic medication. Secondary outcome variable was a change in nasal flow under the influence of self-hypnosis.

At the earliest occurrence of symptoms, self-hypnosis was instructed in two to five sessions: Following a standard trance induction (mostly using individual relaxation experiences) patients were instructed to imagine a 'safe place' where breathing was undisturbed, eyes, nose and throat were feeling comfortable and cool. A post-hypnotic suggestion was given emphasising the patients' ability to return to the safe place whenever they wished. Patients were advised to perform self-hypnosis at the onset of allergic symptoms as often and as long as they felt necessary. Patients were asked to keep a diary; variables recorded included: rhinoconjunctivitis symptoms, lower respiratory symptoms, restriction of well-being and daily activities on a scale ranging from 0 (no symptoms/no restriction), 1 (low intensity), 2 (medium intensity) to 3 (high intensity of symptoms/restrictions). The daily use of rescue medication was noted as well. This included levocabastine eye drops (Livostin®, Janssen), budesonide nasal spray (Rhinocort liquid®, Astra), cetirizine (Zyrtec®, UCB) and salbutamol (Ventolin®, Glaxo-Wellcome) in recommended doses.

Furthermore, patients were asked to rate restrictions of well-being and severity of allergic symptoms on visual analogue scales (0–100; not at all to very much) during a follow-up visit after the pollen season.

Statistical Analyses

Because the grass and the birch pollen season differed in length and occurred at different time periods, analyses were performed for the whole sample and for the sub-samples of grass- and birch-sensitised persons, respectively. To compute the means of diary scores, first the exact duration of the relevant pollen season was assessed based upon the observed pollen counts. Second, the first 2 weeks into symptom reporting were discarded because this was the time period when most subjects were learning self-hypnosis.

Differences in the distribution of quantitative variables between groups A and B were tested using the Wilcoxon-Mann-Whitney test. For changes in quantitative variables between two assessments, a normal distribution was assumed and analyses were therefore done using a paired t test.

To compare the initial NPT with the one performed under self-hypnosis, different outcomes were considered. Survival-analytic methods (i.e., Cox regression and log-rank test) were used because not every subject reached the critical threshold of nasal flow (70% of the initial flow) at the highest allergen dose. A comparable approach has been described by Omenaas et al. [19].

Flow of participants through study protocol
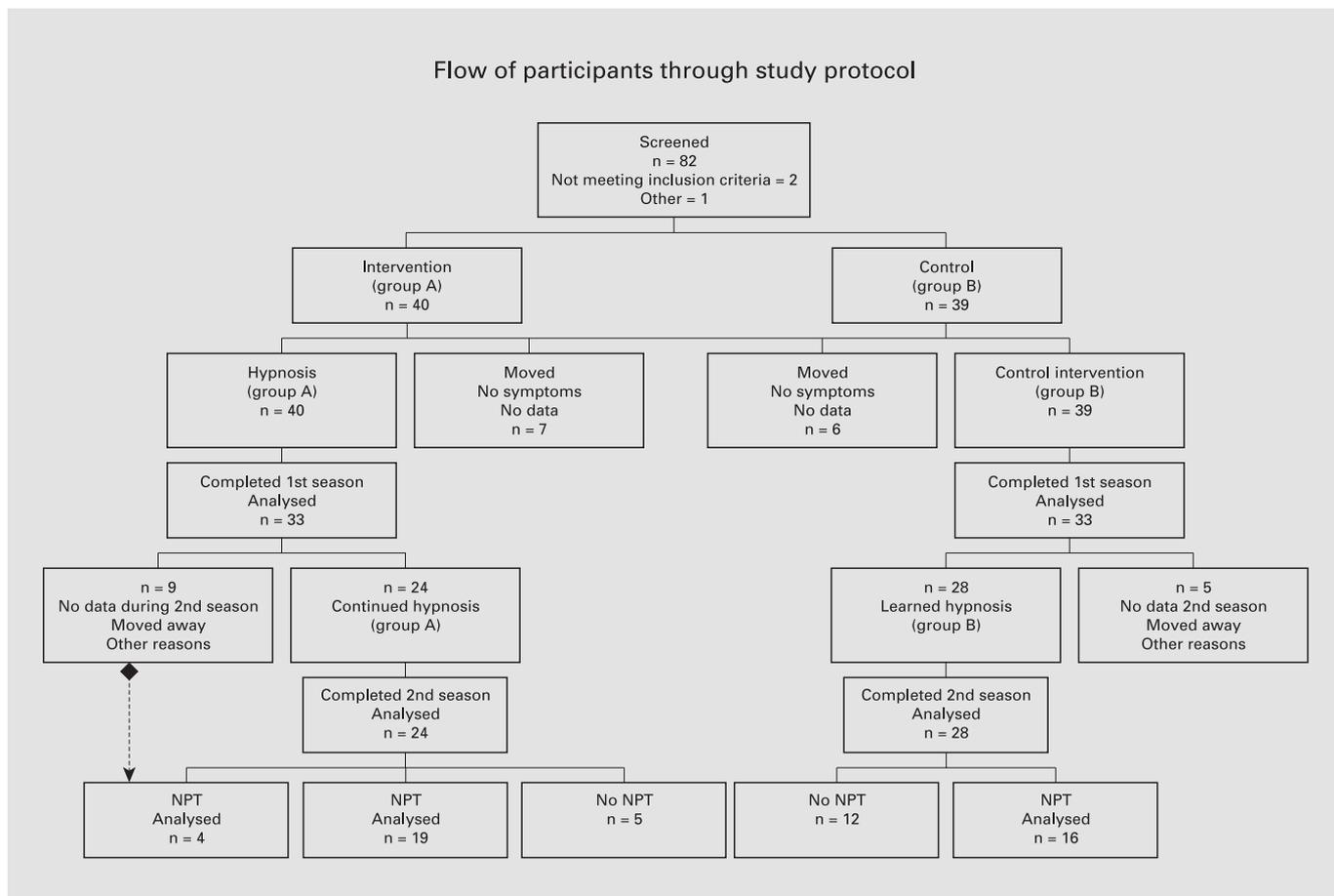
Fig. 2. Flow of participants through the study protocol. Numbers refer to patients in whom analysis could be completed.

If the critical dose of allergen causing a fall below 70% of the initial value had not been reached, the highest allergen dose was used as censored outcome. In order to adjust for individual differences in the shape of dose-response curves, each person was treated as a separate stratum. A symptom response was defined as the change in symptom score between vehicle level and a given dose level. Differences in symptom response at a given level between the test under hypnosis and the initial test were assessed using a paired t test. To compare the change in nasal flow between the two provocation tests, individual flows were first converted into relative flows (i.e., by expressing the flow value at the respective level in percent of the flow at baseline). Statistical analyses of these relative flows were done in analogy to those of the symptom change scores except for using the baseline and not the vehicle level as a reference when defining response. For the flow of participants through the study protocol, see figure 2.

The calculation of the number of patients necessary to find a significant difference between the intervention and the control group is hampered by the lack of comparable data in the literature. It was assumed that 30 patients per group would be sufficient.

Results

Patient Characteristics
Seventy-nine patients (41 males) were randomised to group A (n = 40, mean age 34 ± 10 years) or B (n = 39, mean age 33 ± 8 years). Thirteen early dropouts did not complete the first season, leaving 66 patients for evaluation. Fourteen late dropouts completed the first season only, 52 patients completed both seasons (group A: n = 24, group B: n = 28). Groups A and B were comparable with regard to the initial randomisation criteria (table 2).

Nasal Provocation Tests
In 39 subjects, the initial pre-study NPT was compared with the tests performed after induction of self-hypnosis. At each dose level, the average relative flow was lower in the initial test than in the test performed under self-hyp-
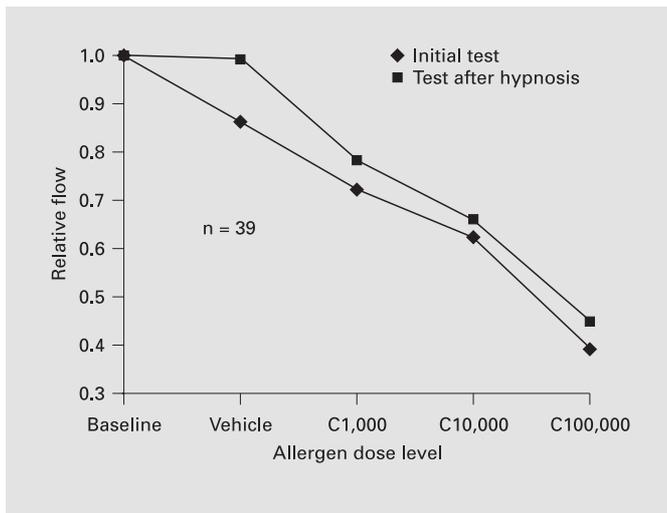
Fig. 3. Average relative flow in the nasal provocation test with allergen (n = 39): comparison of pre-study flow with flow after induction of self-hypnosis.
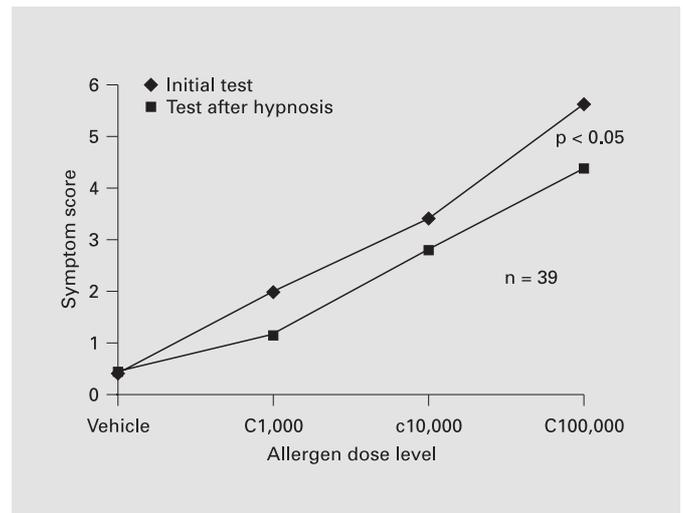
Fig. 4. Symptom score in the nasal provocation test with allergen (n = 39): comparison of pre-study symptoms with symptoms after induction of self-hypnosis.

Table 2. Stratification variables in the hypnosis and the control group

	Hypnosis group (n = 33)	Control group (n = 33)	Significance
Females	14	16	n.s.
Grass season[1]	27	28	n.s.
Severe symptoms	19	18	n.s.
High hypnotisability	16	17	n.s.
Hypnotisability score	2.58 ± 1.39	2.36 ± 1.32	n.s.
Age, years	31.8 ± 7.8	33.9 ± 8.4	n.s.

Values for hypnotisability score as well as age are presented as means ± SD. n.s. = Not significant.
[1] Definition based on initial examination.

Table 3. Hazard ratios and 95% CIs of reaching the critical flow threshold (i.e., 70% of baseline) between the test performed after the induction of self-hypnosis and the test performed at the beginning of the study

	Hazard ratio	p value[1]
Entire sample (n = 39)	0.333 (0.157–0.741)	0.003
Sub-sample of grass-sensitised persons (n = 34)	0.333 (0.150–0.709)	0.005

[1] Log-rank test.

nosis, but none of these differences was statistically significant (fig. 3). Most strikingly, the difference was largest at the vehicle level. On average, with a hazard ratio of 0.333, the critical dose was reached at a significantly higher level of allergen in the test performed under self-hypnosis than in the initial test (table 3). Furthermore, the symptom response at the highest dose level was significantly smaller in the test under hypnosis than in the initial test (fig. 4), the difference being 1.3 (95% CI: 0.2–2.4) on the underlying scale.

Diary and VAS

Even though the average diary scores of pollinosis symptoms and of medication use in year 1 were lower in group A than in group B, this difference did not reach statistical significance. To illustrate the time course of dependent variables in groups A and B, the effect of hypnosis on the use of eye drops in the sub-sample of grass-sensitised persons is shown in figure 5.

Table 4 lists changes in VAS scores for group A and group B between baseline and follow-up data. The results are unequivocal for group A. There is a clear improvement from baseline to the score at the end of the first pollen season. During year 2, there is a slight increase in

symptoms and restrictions, yet, as the third row shows, patients from group A have improved substantially at the end of the second year compared with their baseline values.

The results are less clear for group B: the improvement is almost equally distributed between an effect during year 1, which should be referred to as a placebo response because during that time they did not receive an active
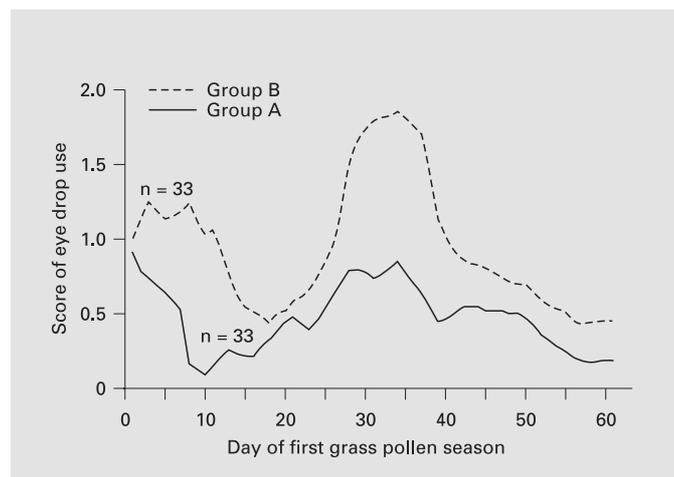
Fig. 5. Effect of practising self-hypnosis on the daily use of eye drops in the sub-sample of grass-sensitised persons in the first year: intervention (group A) versus control group (group B).

treatment. During year 2, there was further improvement which could now be attributed to the intervention. Thus, at the end of year 2, both groups improved significantly compared with baseline, they have achieved a similar success. However, in group B a significant proportion of this effect cannot be attributed to the intervention.

Comparing the differences in changes between groups A and B shows that the improvement in group A during active treatment in year 1 is significantly higher than the improvement observed in group B during the waiting period. At the end of the second year, both groups reached a similar reduction in pollinosis symptoms and restrictions in well-being (table 4).

Of the intervening variables none had a significant impact on the results. The improvement in dependent variables for both groups in the second season was not due to a less intense exposure to grass pollen: grass pollen counts were higher in the second year, hypnotisability did not influence any of the dependent measures; age and sex did not affect the results.

Discussion

Influence of Self-Hypnosis on Symptoms, Well-Being and Medication – Global Evaluation of Self-Hypnosis
A significant effect of self-hypnosis upon hay fever symptoms could be demonstrated for the *retrospective evaluation* of the whole pollen season but not for the day-

Table 4. Changes in visual analogue scores

	Pollinosis symptom score			Restriction of well-being		
	group A	group B	difference between groups[1]	group A	group B	difference between groups[1]
Score after 1st season – baseline score n	–29.2 (–38.2 to –20.2) 33***	–9.9 (–18.0 to –1.8) 32*	p = 0.006	–26.2 (–36.4 to –16.0) 33***	–11.2 (–20.1 to –2.3) 32*	p = 0.07
Score after 2nd season – score after 1st season n	5.4 (–2.6 to 13.4) 25	–10.2 (–20.9 to 0.5) 26	p = 0.04	6.5 (–4.0 to 17.0) 25	–10.3 (–19.0 to –1.6) 26*	p = 0.04
Score after 2nd season – score at baseline n	–24.8 (–36.8 to –12.8) 25***	–20.3 (–32.6 to –8.0) 26**	p = 0.60	–23.7 (–36.1 to –11.3) 25***	–19.7 (–32.5 to –6.9) 26**	p = 0.90

Longitudinal changes within groups are expressed as means (95% CI).
[1] Wilcoxon-Mann-Whitney test.
  * p < 0.05; ** p < 0.01; *** p < 0.001 for change within group (signed-rank test).

by-day protocols. This finding might reflect a recall bias: looking back upon the whole season, the everyday hassle of hay fever symptoms might become less important than a sense of being more in control of allergic symptoms. Drugs were used less frequently after the intervention. Combining this result with the stability of day-by-day symptoms might yield another explanation for the superiority of the retrospective evaluation: One might assume that study participants were willing to learn and to practice self-hypnosis because they are sceptical towards 'chemical interventions'. Thus, patients might well have tolerated a certain amount of symptoms if only the 'chemical therapy' could be reduced. Another argument concerning the difference between daily symptom scores and the retrospective evaluation might be due to a methodological problem well known from the literature on the assessment of continuous complaints or symptoms: when subjects are asked to rate their symptoms several times during the day, they make an entry when symptoms are severe enough to remind them of the protocol. Thus, unless taking notes is triggered independently from subjects' perceptions, e.g. by an automatic alarm, daily protocols tend to exaggerate the average symptom load [20, 21].

Nasal Flow

The data indicate that after self-hypnosis, subjects were better able to tolerate allergen exposure, their allergic symptoms were less severe and the increase in nasal obstruction following increasing allergen provocation was less pronounced. This is an interesting finding because it illustrates under placebo-controlled conditions that hypnosis has indeed 'biological' effects similar to drugs typically used to control nasal congestion. Such an effect has also been reported for another non-conventional treatment: Taylor et al. [22] reported on the improvement of nasal inspiratory peak flow after ingestion of a homeopathic preparation.

Overall, the level of significance of our results is not very high; power analyses have shown that under the premise that the positive trends reflect a real phenomenon, the results from the day-by-day protocols would have become significant for pollinosis symptom scores with 80% certainty if 700 subjects had been included. To demonstrate a significant effect of nasal spray use with 80% certainty, 380 subjects would have been sufficient. The power of the evaluation instruments might also be improved by using an external trigger to remind patients of the protocol at random intervals.

Influence of Hypnotisability

Hypnotisability did not affect the efficacy of self-hypnosis. In the literature, the relevance of hypnotisability for the occurrence of trance phenomena or for long-lasting effects of hypnosis is a matter of debate [see, for example 23]. While some authors report that at least some physiological correlates of hypnosis depend strongly on hypnotisability [e.g., 24], others do not find such a relationship [e.g., 25, 26]. In a recent paper investigating the influence of emotions on cutaneous hypersensitivity, Zachariae et al. [27] could only partly replicate previous findings by Laidlaw et al. [26] concerning the influence of hypnotisability. It seems that we are still far away from a conclusive statement concerning the role of hypnotisability in explaining physiological changes [28].

Methodological Considerations – the Problem of a Control Group in Research Involving Hypnosis

Hypnosis requires a specific interaction between the patient and therapist. As the teaching and practice of self-hypnosis constitutes a therapeutic intervention, the patient has to be informed about its use. Of course, hypnosis cannot be applied in a double-blind fashion because the therapist knows that he/she is using hypnotic techniques. Even a single-blind fashion with the patient not knowing whether or not he/she is being taught 'true' hypnosis seems unfeasible because the verification of the state of trance is based upon the therapist informing the patient about classical trance phenomena and the patient checking on the occurrence of specific indicators of trance. We have tried to control for the amount of time the physician spent with patients in either group by offering meetings with the research fellow (J.I.) which most patients in the control group attended. Another methodological consideration concerned randomisation to an intervention group and a waiting list control. As non-traditional therapies including hypnosis are easily accessible in our area, we assumed that putting patients on a waiting list would mean that they would organise the treatment withheld from them on their own. Furthermore, a waiting list control group neglects the influence of positive expectations concerning treatment response because patients explicitly know that they are in a 'no-treatment' condition.

The study has some important limitations: As it had been announced as an attempt to influence hay fever symptoms by means of complementary therapy, the study cohort most probably consisted of people with some interest in non-conventional treatments. This selection bias limits the applicability of our results to general patient populations. Furthermore, self-hypnosis was taught by

only one therapist (J.W.); therefore, a dissection of unspecific therapist effects and specific effects of self-hypnosis is impossible. However, we hope that our results will encourage other groups to undertake similar studies to elucidate these questions.

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