ORIGINAL ARTICLE

Relaxation therapies for asthma: a systematic review

A Huntley, A R White, E Ernst

Thorax 2002;**57**:127–131

See end of article for authors' affiliations

Correspondence to: Dr A Huntley, Department of Complementary Medicine, School of Sport and Health Studies, University of Exeter, Exeter EX2 4NT, UK; A.Huntley@ex.ac.uk

Revised version received 10 September 2001
Accepted for publication 19 September 2001

Background: Emotional stress can either precipitate or exacerbate both acute and chronic asthma. There is a large body of literature available on the use of relaxation techniques for the treatment of asthma symptoms. The aim of this systematic review was to determine if there is any evidence for or against the clinical efficacy of such interventions.
Methods: Four independent literature searches were performed on Medline, Cochrane Library, CISCOM, and Embase. Only randomised clinical trials (RCTs) were included. There were no restrictions on the language of publication. The data from trials that statistically compared the treatment group with that of the control were extracted in a standardised predefined manner and assessed critically by two independent reviewers.
Results: Fifteen trials were identified, of which nine compared the treatment group with the control group appropriately. Five RCTs tested progressive muscle relaxation or mental and muscular relaxation, two of which showed significant effects of therapy. One RCT investigating hypnotherapy, one of autogenic training, and two of biofeedback techniques revealed no therapeutic effects. Overall, the methodological quality of the studies was poor.
Conclusions: There is a lack of evidence for the efficacy of relaxation therapies in the management of asthma. This deficiency is due to the poor methodology of the studies as well as the inherent problems of conducting such trials. There is some evidence that muscular relaxation improves lung function of patients with asthma but no evidence for any other relaxation technique.

Bronchial asthma is a multifactorial disease in which environmental, infectious, allergic, and psychological elements all play a part.[1] There is evidence that emotional stress can either precipitate or exacerbate both acute and chronic asthma.[2] Whatever precipitates an asthmatic attack, anxiety is likely to accompany it.

Mathe and Knappe found that psychological stress is associated with a decrease in airway resistance in non-asthmatic subjects but with an increase in those with asthma.[3] Similarly, several investigators have shown that exercise leads to bronchodilation in non-asthmatic subjects but to bronchoconstriction in asthmatics.[4–7] Thus, the physiological response of the asthmatic lung differs from that of the non-asthmatic lung. The hypothesis behind the studies described in this review is that relaxation therapies help patients with asthma to deal with their symptoms associated with anxiety and stress.

Using criteria generally applied to evaluation of asthma medication, it has been commented that, overall, the effects of relaxation therapy on asthma have not been of clinically significant magnitude.[8 9] When used in conjunction with medication and as a component of a self-management programme, relaxation therapy has nevertheless been accepted as useful in the treatment of asthma.

The acknowledgement of the role of anxiety in asthma onset and exacerbation, and the fact that there is a large body of literature available on the use of relaxation techniques for the treatment of asthma symptoms, demand that this subject should be examined systematically. This systematic review therefore seeks to examine all randomised clinical trials (RCTs) of relaxation therapies to determine their effectiveness in the treatment of asthma.

METHODS

Computerised literature searches were performed to identify published articles on asthma and relaxation therapies. The following databases were used: Medline, Cochrane Library, CISCOM, and Embase, all from their inception to December 1999. The bibliographies of all papers thus located were searched for further relevant articles. In addition, our own extensive database on complementary medicine was searched. The following search terms were used: asthma, relaxation therapy, autogenic, biofeedback, hypnosis, meditation. Descriptions of the therapies included in this review are detailed in table 1. Yoga and breathing techniques have been reviewed elsewhere and so will not be considered in this paper.[10]

Studies were included if the relaxation therapy involved regular self-practice of a psychophysiological technique which promotes primarily physical or mental relaxation without

Table 1 Relaxation therapies included in this systematic review

Therapy	Description
Jacobsonian progressive relaxation	A routine of tensing, relaxing and attending the sensation of each of the 15 muscle groups
Hypnotherapy	Induction of a trance-like state of heightened suggestibility or compliance. The client passively receives ideas or instructions from the hypnotist
Autogenic training	Similar to self-hypnosis involving a series of visual and sensory exercises; used to gain deep relaxation
Biofeedback training	A technique learnt to monitor and gain control over automatic, reflex regulated body functions using information obtained from monitoring apparatus
Transcendental meditation (TM)	Mental repetition of a mantra provided by the instructor to induce deep relaxation

Table 2 RCTs of progressive muscle/mental relaxation for asthma symptoms

Source	N [age range] ATS criteria	Design: a) Sample size calculated b) true randomised c)blind	Design: d) daily e) duration f) follow up	Treatment	Control	Dropouts (DO) and withdrawals (WD)	Jadad score	Primary measures	Results
Alexander *et al*[13]	44 [10–15 yrs] No	Two parallel stratified groups a) no b) yes c) no	d) no e) 3–6 days f) no	6×20 min sessions of Jacobsonian systematic relaxation training (n=20)	6×20 min sitting quietly (n=16)	2 DO from treatment group, 6 DO from control group	2	i) PEFR (best of three) ii) Relaxation thermometer	i) Treatment >control, p<0.01 ii) NSD
Erskine and Schonell[14]	12 [16–46 yrs] Yes	Two paired parallel groups a) no b) yes c) no	d) daily ×2 e) 4 weekly sessions f) 6 weeks	Mental and muscular relaxation (plus home tapes) (n=6)	Muscular relaxation (no home tape) (n=6)	2WD	2	i) FEV_1 ii) Self report inventories: daily and weekly	i) NSD ii) NSD
Hock *et al*[15]	20 [not stated] No	Two parallel groups a) no b) yes c) single blind	d) no e) 8 weekly f) 1 month	Relaxation training for 40 min (n=10)	Assertive training for 40 min (n=10)	Not described	1	i) FEV_1	i) Relaxation >assertive, p<0.01
Lehrer *et al*[16]	106 [18–65 yrs] No	Three parallel groups a) yes b) yes c) no	d) daily e) 8 sessions f) no	Progressive muscle relaxation 8×1 hour (n=38)	Listening to relaxing music 8×1 hour (n=38) Waiting list control (n=30)	34 DO (13 relaxation, 12 music, 9 control) Only 37 completed lung function tests	2	i) 4 lung function tests including FEV_1/ FVC ii) Self report	i) NSD ii) NSD
Loew *et al*[17]	18 [children and adolescents] No	Crossover with 3 groups a) no b) yes c) single blind	d) daily e) 3 days f) no	Functional relaxation (FR) (n=18)	Placebo relaxation method (n=18) Salbutamol (n=18)	Not described	1	i) Lung function tests including Raw	i) NSD

PEFR=peak expiratory flow rate, FEV_1=forced expiratory volume in 1 second, FVC=forced vital capacity, Raw=airway resistance, NSD=no significant difference (between groups).

suggestion or repetition of phrases aimed at a specific effect on asthma. Only RCTs (parallel or crossover designs) were included. There were no restrictions regarding publication language. Studies were included if they defined asthmatic subjects by American Thoracic Society (ATS) criteria or specified reversible airway constriction. Any studies involving experimentally induced asthma or patients suffering from other medical conditions in addition to their asthma were excluded, as were purely immunological studies.

Studies were included by agreement between the first two authors. All studies that met the criteria were read in full and data were extracted using purpose designed data forms, independently by the first two authors, any discrepancies being resolved by discussion. Their methodological quality was assessed according to the method of Jadad *et al*.[11] The Jadad score is a method of quantifying the likelihood of bias in clinical trials which awards points for correct randomisation (2), blinding (2), and description of withdrawals and dropouts (1). The maximum score is 5, minimum 0.

The outcome measures extracted were lung function parameters, symptom diaries, medication usage, and asthma events (unscheduled visits to doctors, prescriptions of antibiotics or prednisolone, or days missed from school/work). The lung function tests extracted were, initially, as a "gold standard", airway resistance (Raw) and, subsequently, forced expiratory volume in 1 second (FEV_1) and peak expiratory flow rate (PEFR) which, despite known limitations, are commonly used. A change in lung function of 15% or more was considered clinically relevant.[12] Studies in which a statistical comparison was performed between the outcomes of treatment and control groups were entered into a table and described in the text. Studies in which no such comparison was performed were only described in the text. Studies were rated as positive if the treatment group showed clinically significant changes in lung function and/or statistically significant changes in symptoms, medication, or asthma events that were superior to the control group.

RESULTS

Fifteen RCTs concerning relaxation therapies for treatment of asthma symptoms were identified. Five described progressive muscle relaxation, one described mental and muscular relaxation, three investigated the role of hypnotherapy and self-hypnosis, three involved autogenic training, two described biofeedback techniques, and one investigated transcendental meditation (TM). The overall quality of these studies was poor with only one study scoring 3 points on the Jadad score, eight scoring 2 points, five scoring 1 point, and one scoring zero points. Of these 15 studies, nine fulfilled our criteria for comparing the treatment group statistically with the control group and thus are included in tables 2, 3, and 4.

Muscular/mental relaxation (table 2)

Alexander and coworkers investigated the short term effects of Jacobsonian relaxation or sitting quietly in 44 children with moderate/severe asthma in a home for chronic asthma sufferers.[13] Mean PEFR was significantly increased in the treatment group compared with the control group ($p<0.01$), but the increase was not of clinical relevance (11%). In addition, a "relaxation thermometer" used to rate subjects' feelings of relaxation after treatment showed a greater sense of relaxation in both groups with no significant difference between them.

In a study by Erskine and Schonell 12 adults with chronic asthma were allocated to either muscular and mental relaxation sessions followed by relaxation tapes for home use or to muscular relaxation without home practice.[14] No significant changes in lung function or self-reports were seen in either group.

In a study by Hock *et al* 20 asthmatic boys attending a clinic received either Jacobson's relaxation or assertive training.[15] There were no significant differences between the groups at weeks 4 and 8. However, FEV_1 values in the relaxation group improved by 17.7% by the end of training and were superior to the assertive training group ($p<0.01$) at 1 month follow up. The detail given in reporting these results was limited.

Table 3 RCTs of hypnosis/self-hypnosis or autogenic training for asthma symptoms

Source	N [age range] ATS criteria	Design: a) Sample size calculated b) true randomised c) blind	Design: d) daily e) duration f) follow up	Treatment	Control	Dropouts (DO)/ withdrawals (WD)	Jadad score	Primary measures	Results
Anon[18]	252 [10–60 years] No	Multicentre two parallel groups a) no b) yes c) no	d) yes e) 1 year f) no	Hypnosis and self hypnosis at home 15 min (n=127)	Relaxation and breathing exercises 15 min (n=125)	28 DO and 8 WD from treatment group; 22 DO and 18 WD from control group	3	i) FEV_1 ii) Daily wheeze and medication diary	i) NSD ii) NSD
Deter and Allert[19]	31 [16–60 years] No	Three parallel groups a) no b) yes c) no	d) no e) 1 year f) 1 year	1 session for 1 hr/wk Info, discussion and autogeneic training (n=9) Info, discussion and systematic relaxation (n=10)	Waiting list control group (n=12)	2 DO autogenic; 3 DO systematic relaxation	2	i) Raw ii) Use of sympathomimetics iii) Self score iv) GP visits	i) NSD ii) NSD iii) NSD iv) NSD

FEV_1=forced expiratory volume in 1 second, Raw=airway resistance, NSD=no significant difference (between groups).

One hundred and six adults were involved in a three armed RCT by Lehrer *et al* in which progressive muscle relaxation, listening to relaxing music, and no treatment were assessed for their effect on asthma symptoms.[16] There were no clinically relevant changes in any of the parameters measured in any group.

In a study by Loew and coworkers functional relaxation was investigated in a three armed crossover study compared with a placebo relaxation method and salbutamol.[17] Eighteen children and adolescents attending a clinic with acute bronchial asthma undertook all three treatments at random. Both functional relaxation (14%) and salbutamol (32%) significantly improved Raw from baseline values ($p<0.05$ and $p<0.01$, respectively). The placebo relaxation method had no effect. However, functional relaxation was not significantly different from placebo treatment.

Hypnosis and autogenic training (table 3)

In a multicentre trial coordinated by Maher-Loughnan, the effect of hypnosis on asthma symptoms was examined over the period of 1 year in 252 children and adults with moderate, persistent, or severe asthma.[18] Participants were randomised either to monthly hypnosis sessions and daily autohypnosis or to daily relaxation and breathing exercises (control group). Hypnosis significantly increased FEV_1 compared with baseline ($p<0.05$) but only by 4.3%. No significant change in FEV_1 occurred in the control group. The results from the daily wheeze and medication diaries for both groups showed an improvement but overall this was not significant.

Deter and Allert performed a three armed trial in which 31 adults with mild, medium, or severe asthma recruited from a clinic were allocated to either discussion and autogenic training, discussion and systematic relaxation, or to a waiting list control group.[19] The study period was 1 year with a 1 year follow up. The only significant change following autogenic training and relaxation was the decreased use of sympathomimetics compared with baseline ($p<0.05$). There were no significant differences between the treatment and control groups for either lung function or use of sympathomimetics.

Biofeedback (table 4)

A study by Kotses investigated the long term effect of biofeedback induced facial relaxation on asthma symptoms in 33 children attending a clinic.[20] They were allocated to either biofeedback for facial relaxation or control biofeedback for maintaining face tension at a stable level. It is unclear whether biofeedback was practised daily. Despite extensive analysis of lung function measurements, scoring for symptom severity, medication use and frequency of attack, no meaningful conclusions can be drawn from the data.

Biofeedback training was used in a similar way by Coen *et al*.[21] Twenty subjects from a paediatric clinic with non-steroid dependent reactive airway disease were randomised to either biofeedback assisted facial muscle tension or the control group (telephone contact). Results showed decreased asthma severity ($p<0.027$) in the experimental group compared with baseline but not in the control group. No effect on pulmonary function was seen.

Studies with inadequate analysis

The following RCTs were located by our search but did not compare the outcomes in different groups statistically.

Progressive muscle relaxation was used by Field and coworkers as the control intervention in an RCT of hands-on massage for 32 children with mild/moderate/ severe asthma.[22] Children were stratified into two age groups (4–8 years and 9–14 years) and received the intervention from their parents for 30 days. Neither age group responded to relaxation treatment, with FEV_1 remaining unchanged. In the 4–8 year old group massage treatment led to a 36.7% improvement in

Table 4 RCTs of biofeedback for asthma symptoms

Source	N [age range] ATS criteria	Design: a) Sample size calculated b) true randomised c) blind	d) daily e) duration f) follow up	Treatment	Control	Dropouts (DO)/withdrawals (WD)	Jadad score	Primary measures	Results
Kotses *et al*[20]	33 [7–16 years] Yes	Two parallel groups a) no b) yes c) no	d) unclear e) 2 months f) 5.5 months	Biofeedback for facial relaxation (FD) (n=17)	Biofeedback for maintaining face tension at a stable level (FS) (n=16)	2 DO from each group	2	i) Lung function tests incl. FEV_1/FVC, PEFR ii) Scores a) Asthma severity b) Medicine c) Frequency of attacks	i) NSD ii) NSD
Coen *et al*[21]	20 [12–22 years] No	Two parallel groups a) no b) yes c) no	d) daily ×2 e) 8 weeks f) 14 days	Relaxation techniques aided by biofeedback 15 mins twice daily (n=10)	Telephone contact (n=10)	Not stated although only sporadic data on PEFR because of compliance	1	i) Lung function tests ii) Symptom/medication score	i) NSD ii) NSD

FEV_1=forced expiratory volume in 1 second, FVC=forced vital capacity, PEFR=peak expiratory flow rate, Raw=airway resistance, NSD=no significant difference (between groups).

FEV_1 over the study period ($p<0.01$) and a 30% increase in PEF ($p<0.005$). In the 9–14 year old group who received massage FEV_1 did not change significantly.

Ewer and Stewart performed a two armed 6 week study investigating the effect of hypnotherapy on asthma symptoms.[23] Forty four adults from a hospital clinic with mild to moderate asthma were stratified according to hypnotic sensitivity and then randomised to receive weekly sessions of hypnosis or weekly visits to the nurse to check symptom diary (attention control). FEV_1 and Raw improved in both groups but these changes were not clinically relevant. Hypnotic sensitive subjects who received hypnosis showed improvement in symptom and medication diaries from baseline ($p<0.01$ and $p<0.05$, respectively). Control subjects and those receiving treatment but with a low hypnosis sensitivity did not rate their symptoms and medication significantly different from baseline.

In a study by Maher-Loughnan *et al*, 62 adults with a 1 year history of asthma but newly attending an asthma clinic were randomised to receive hypnosis with daily practice or a new brand of bronchodilator.[24] The duration of the trial was 6 months and the outcome measure was a daily diary which included wheezing incidence and medication use. The authors stated that the effect of hypnosis was "positive" but no results or statistical analysis were given.

Over an 8 month period Henry and coworkers compared autogenic training with supportive group psychotherapy for the treatment of asthma symptoms.[25] Twenty four chronic adult asthmatics taking maximum medication were randomised to receive either autogenic training or supportive group psychotherapy. Main outcome measures were lung function testing. In both groups FEV_1 increased compared with baseline but only significantly so in the autogenic group (19%, $p<0.01$). There was no intergroup comparison.

Autogenic training for control of asthma symptoms was also investigated by Speiss *et al*.[26] In an RCT with two parallel treatment groups, 56 patients with bronchial asthma received eight 2-hour sessions of either information and autogenic training or information alone. Lung function testing was among the outcome measures. No changes were observed in either group.

Transcendental meditation (TM) for the treatment of asthma symptoms was investigated by Wilson and coworkers.[27] Over a 3 month period 25 stable asthma subjects were recruited into a crossover trial. Subjects were either randomised to be taught and to practise TM for 3 months followed by reading relaxation literature which did not describe TM for a further 3 months, or vice versa. There was no washout period. The main outcome measures were lung function tests and daily diaries. Following TM, Raw was significantly reduced in both groups (52% and 59%, $p<0.05$), although FEV_1 remained unchanged. The reading of relaxation literature produced no significant changes in lung function. After the 6 months of the study 11 of 18 responders thought TM had helped their asthma. The main limitation of this trial is that, after the crossover, at least half of the subjects in the first group continued to meditate, thus invalidating themselves as a control for the second part of the trial.

DISCUSSION

Fifteen RCTs that investigated the effect of relaxation therapies on asthma symptoms were found in the literature. Nine of these compared the outcomes of treatment and control groups statistically. Data from some studies suggest that muscular relaxation may provide some improvement in lung function but that there was no evidence that hypnosis, autogenic training, or biofeedback are effective for asthma symptoms.

The main limitation in the evidence overall is the poor quality of the trials. Only one of the 15 studies scored 3 points on

the Jadad scale. Other methodological weaknesses included small sample size, short study duration, inappropriate outcome measures, and incorrect statistical analysis. Many of the studies were short, five trials lasting 2 months or less. Sample size calculation was only reported in two of the 15 trials, and blinding of assessors, though highly desirable to reduce bias, was only described in three trials. In addition, the therapy may not have been applied optimally. It is important that the intervention is practised frequently, which only occurred definitely in nine of the trials.

A particular difficulty with trials of relaxation techniques is finding an appropriate control intervention that is indistinguishable from the genuine intervention but inactive. Certainly the characteristics of an inactive control should take into account repeated daily practice as well as the same amount of time and therapist's attention as the relaxation method under examination. It is possible that a truly inactive (placebo) control for relaxation is not achievable. This may partially account for the fact that, in the trials where the control intervention was possibly active—for example, massage[22], a new bronchodilator,[24] or supportive psychotherapy[25]—authors only reported improvements from baseline and not comparisons with control groups. Even if the control is only partially effective, large sample sizes will be required if the therapy is to be accurately assessed. Direct comparison with standard pharmaceutical asthma care is likely to be fruitless since the effectiveness of relaxation therapies is unlikely to be of the same order. However, relaxation therapies with even small effect sizes, if demonstrated reliably, might be cost effective as an adjunct to conventional pharmaceutical intervention.[28]

There have been several other reviews on relaxation, psychoeducational, and behavioural therapies for the treatment of asthma symptoms.[1 8 9 28 29] Most are non-systematic and the only previous systematic review included non-randomised trials.[29] They all point out, as does this review, the methodological weakness of the majority of studies, in particular the fact that many do not distinguish between adults and children and between clinical conclusions and statistically significant data. However, they also concluded that psychological relaxation therapies have potential in asthma self-management and that these therapies warrant future research.

In conclusion, there is a lack of good quality evidence on which to assess the efficacy of relaxation therapies in the management of asthma. The existing evidence is seriously limited by poor quality. There is some evidence to suggest that muscular relaxation may warrant further investigation for the improvement of lung function in asthma patients, but the evidence for hypnotherapy, autogenic training, biofeedback, and transcendental meditation is less promising.

Authors' affiliations
A Huntley, A R White, E Ernst, Department of Complementary Medicine, School of Sport and Health Studies, University of Exeter, Exeter EX2 4NT, UK

Alyson Huntley is sponsored by Boots the Chemists.

REFERENCES

1 **Lehrer PM**. Emotionally triggered asthma: a review of research literature and some hypotheses for self-regulation therapies. *Appl Psychophysiol Biofeedback* 1998;**23**:13–41.
2 **Sandberg S**, Paton JT, Ahola S, *et al*. The role of acute and chronic stress in asthma attacks in children. *Lancet* 2000;**356**:982–7.
3 **Mathe AA**, Knappe PH. Emotional and adrenal reactions to stress in bronchial asthma. *Psychosom Med* 1971;**33**:323–40.
4 **Von Euler US**. Sympatho-adrenal activity in physical exercise. *Med Sci Sport* 1974;**6**:165–73.
5 **Sly RM**, Heimlich EM, Busser RJ, *et al*. Exercise-induced bronchospasm: effect of adrenergic or cholinergic blockage. *J Allergy* 1967;**40**:93–9.
6 **Itkin IH**, Anand SC. The role of atropine as a mediator blocker of induced bronchial obstruction. *J Allergy* 1970;**45**:178–86.
7 **Katz RM**, Whipp BJ, Heimlich EM, *et al*. Exercise-induced bronchospasm, ventilation, and blood gases in asthmatic children. *J Allergy* 1971;**47**:148–58.
8 **Richter R**, Dahme B. There is little evidence for the effectiveness of behavioral therapy and relaxation. *J Psychosom Res* 1982;**26**:533–40.
9 **Erskine-Milliss J**, Schonell M. Relaxation therapy in asthma: a critical review. *Psychosom Med* 1981;**43**:365–72.
10 **Ernst E**. Breathing techniques: adjunctive treatment modalities for asthma? A systematic review. *Eur Respir J* 2000;**15**:969–72.
11 **Jadad AR**, Moore RA, Carrol D, *et al*. Assessing the quality of reports of randomized clinical trials: is blinding necessary? *Control Clin Trials* 1996;**17**:1–12.
12 **Brewis RAL**, Corrin B, Geddes DM, *et al*. *Respiratory medicine*. 2nd ed. London: WB Saunders, 1995.
13 **Alexander AB**, Miklich D, Hershkoff H. The immediate effects of systematic relaxation training on peak expiratory flow rates in asthmatic children. *Psychosom Med* 1972;**34**:388–94.
14 **Erskine J**, Schonell M. Relaxation therapy in bronchial asthma. *J Psychosom Res* 1979;**23**:131–9.
15 **Hock RA**, Bramble J, Kennard DW. A comparison between relaxation and assertive training with asthmatic male children. *Biol Psychiatry* 1977;**12**:593–6.
16 **Lehrer PM**, Hochron SM, Mayne T, *et al*. Relaxation and music therapies for asthma among patients prestabilised on asthma medication. *J Behav Med* 1994;**17**:1–24.
17 **Loew TH**, Martus P, Rosner, *et al*. Wirkung von funktioneller Entspannung im Vergleich mit Salbutamol und einem Plazeboentspannungsverfahren bei akutem Asthma bronchiale. *Monatsschr Kinderheilkd* 1996;**144**:11357–63.
18 **Anon**. Hypnosis for asthma: a controlled trial. *BMJ* 1968;4: 71–6.
19 **Deter HC**, Allert G. Group therapy for asthma patients: a concept for the psychosomatic treatment of patients in a medical clinic- a controlled study. *Psychother Psychosom* 1983;**40**:95–105.
20 **Kotses H**. Long-term effects of biofeedback-induced facial relaxation on measures of asthma severity in children. *Biofeed Selfreg* 1991;**16**:1–21.
21 **Coen BL**, Philip B, McGrady A, *et al*. Effects of biofeedback-assisted relaxation on asthma severity and immune function. *Pediatr Asthma Allergy Immunol* 1996;**10**:71–8.
22 **Field T**, Henteleff T, Hernandez-Reif M, *et al*. Children with asthma have improved pulmonary functions after massage therapy. *J Pediatr* 1998;**132**:854–8.
23 **Ewer OC**, Stewart DE. Improvement in bronchial hyper-responsiveness in patients with moderate asthma after treatment with a hypnotic technique: a randomised controlled trial. *BMJ* 1986;**293**:1129–32.
24 **Maher-Loughnan GP**, MacDonald N, Mason AA, *et al*. Controlled trial of hypnosis in the symptomatic treatment of asthma. *BMJ* 1962;2: 371–6.
25 **Henry M**, de Rivera JLG, Gonzalez-Martin IJ, *et al*. Improvement of respiratory function in chronic asthmatic patients with autogenic therapy. *J Psychosom Res* 1992;**17**:265–70.
26 **Spiess K**, Sachs G, Buchinger C, *et al*. Effects of information and relaxation groups on lung function and psychophysical status in asthma patients: a pilot study. *Prax Klin Pneumol* 1988;**42**:641–4.
27 **Wilson AF**, Honsberger R, Chiu JT, *et al*. Transcendental meditation and asthma. *Respiration* 1999;**32**:74–80.
28 **Lehrer PM**, Sargunaraj D. Psychological approaches to the treatment of asthma. *J Consult Clin Psychol* 1992;**60**:639–43.
29 **Devine EC**. Meta-analysis of the effects of psychoeducational care in adults with asthma. *Res Nurse Health* 1996;**19**:367–76.