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Breathing techniques - adjunctive treatment modalities for asthma? A systematic review

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Breathing techniques - adjunctive treatment modalities for asthma? A systematic review. E. Ernst. ©ERS Journals Ltd 2000.

ABSTRACT: Breathing techniques are used by a large proportion of asthma sufferers. This systematic review was aimed at determining whether or not these interventions are effective.

Four independent literature searches identified six randomized controlled trials.

The results of these studies are not uniform. Collectively the data imply that physiotherapeutic breathing techniques may have some potential in benefiting patients with asthma. The safety issue has so far not been addressed satisfactorily.

It is concluded that too few studies have been carried out to warrant firm judgements. Further rigorous trials should be carried out in order to redress this situation.

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A recent survey on a large (n=3,837) sample of asthma sufferers carried out by the National Asthma Campaign, UK showed that 30% of respondents were using breathing techniques to relieve their symptoms [1]. This begs the question as to how efficacious these techniques are. The present communication is an attempt to make a step towards answering this question.

Methods

Computerized literature searches were performed in order to identify all randomized controlled trials (RCTs) on the subject. Databases including Medline, Embase, CISCOM (Centralized Information Service for Complex Medicine) and the Cochrane Library (all from their respective institution) were searched to December 1996. The search terms used were asthma, breathing techniques/exercise, yoga, Buteyko and physiotherapy. In addition, several experts in the field were asked to contribute published and unpublished material on this topic. Furthermore, the author's own (extensive) files were scanned. The bibliographies of the studies thus retrieved were searched for further trials. There were no restrictions according to language of publi-

cation. RCTs were included if performed on human patients with asthma. Data were extracted in a predefined standard fashion (table 1). Initially a meta-analytical approach was anticipated; this plan, however, had to be abandoned when the heterogeneity of the data became apparent.

Results

Six RCTs were found. They relate to various forms of breathing technique. Their key data are summarized in table 1.

SINGH *et al.* [2] from Jaipur Medical College (Jaipur, India) submitted 12 asthmatics with nocturnal wheeze (no demographic data or medical history of patients provided) to a 6 weeks investigation. During the first 2 weeks, patients breathed regularly through a mouthpiece with no attachment (placebo phase). Subsequently they received at random treatment A followed by treatment B or *vice versa*. Treatment A consisted of regularly breathing through a "Pink City Lung Exerciser" (PCLE). The PCLE was designed to mimic pranayama yoga breathing exercise. It imposes slowing of breathing and a 1:2 inspiration:expiration duration. Treatment B was similar

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Table 1. – Randomized controlled trials of breathing techniques for asthma

First author [Ref.]	Design	Subjects n	Description of sample	Interventions	Endpoints	Results
Singh [2">2]	Crossover	12	Mild asthma controlled with β_2 -agonists	Slow deep breathing (with "Pink City Lung Exerciser") 15 min periods for 2 weeks or placebo device (intervention mimics pranayama yoga exercise)	FEV1; PEFr; symptoms score; inhaler use	Compared to baseline, improvement was numerically greater in experimental phase but not significant
Singh [3]	Crossover	18	Mild asthma controlled with β_2 -agonists	Slow deep breathing (with "Pink City Lung Exerciser") 15 min periods 2 weeks or placebo device (intervention mimics pranayama yoga exercise)	FEV1; PEFr; symptoms score; inhaler use	Compared to baseline, improvement was numerically greater in experimental phase but not significant
Asher [4]	Two parallel groups	38	Children admitted to hospital with acute severe asthma	6–24 h after admission patients received inhaled salbutamol followed by either physiotherapy breathing exercises or "placebo visits" (4 such interventions in 2 days); all received standard treatment in addition	Lung volume and flow rates by body plethysmography	No significant differences between groups
Girodo [5]	Three parallel groups	67	Media-solicited volunteers with mild asthma	16 weeks' programme of respiratory muscle strengthening to increase "capacity for maximum lung efficiency" (diaphragmatic breathing technique); normal physical exercise training; or waiting list control	Medication use; symptom score; time spent on physical activities	Diaphragmatic breathing technique superior in all three endpoints
Fluge [6]	Three parallel groups	36	Mild-to-moderate asthma controlled by medication	Yoga breathing exercises; physiotherapy breathing exercises (both 15 sessions of 3 h over 3 weeks plus unsupervised home exercises); or no intervention	V _{LI,max} ; FEV1; residual volume; resistance (body plethysmography); symptom score	Yoga and physiotherapy led to significant reductions in symptoms; only physiotherapy had a positive influence on lung function; effects persisted at 3 months follow-up
Vedanathan [7]	Two parallel groups	17	No clinical details provided	Integrated set of yoga practices; or no such treatments in addition to conventional care (3 per week for 16 weeks)	Medication used; symptoms; peak flow	No significant intergroup differences

FEV1: forced expiratory volume in one second; PEFr: peak expiratory flow rate; V_{LI,max}: maximal inspiratory lung volume.

to A but with the addition of humidifying and warming the inspirational air. Compared to the placebo phase, the forced expiratory volume in one second (FEV₁) increased significantly with A and B (4.3 L placebo, 5.2 L A and 5.9 L B). Similarly the frequency of nocturnal wheezing decreased (11 *versus* 7.5 (A) and 6.5 days. 2 weeks⁻¹ (B). Even though encouraging, these findings are limited through the lack of details provided, *e.g.* no description of statistical methodology.

The same first author with colleagues from Nottingham, UK performed a similar study on 18 patients with mild drug-controlled asthma [3]. This paper does provide sufficient methodological detail. The authors defined FEV₁, peak expiratory flow rate symptom score and frequency of inhaler use as their primary endpoints. In contrast to the first study of SINGH *et al.* [2], this trial compares pranayamic breathing exercise with an adequate sham intervention. Even though there is a trend for the results to favour breathing exercises, this fails to gain statistical significance. The authors state that there was a significant increase in the dose of histamine needed to provoke a 20% reduction in FEV₁, during pranayama breathing but not during the sham control phase. Both of these studies [2, 3] suffer from small sample sizes, and it is conceivable that the latter [3] fell victim to a type II error.

A team of paediatricians from New Zealand tested the efficacy of physiotherapy breathing techniques in severe childhood asthma cases [4]. Thirty-eight children who had to be admitted to hospital because of severe acute asthma attacks were randomized into an experimental and a control group. The former received four sessions of a complex physiotherapeutic programme during the first 2 days after admission. The programme contained elements of breathing techniques but also relaxation, positioning and techniques aimed at clearance of secretion. The control groups received "placebo visits". Both groups received nebulized salbutamol at the start of each visit. Lung volume and flow rates were measured by body plethysmography. The results show no significant differences between the two groups. It is conceivable that certain elements in the chest physiotherapeutic intervention (*e.g.* vibration and percussion) are detrimental to asthmatic lung function. If this were true, an overall negative result would be expected in spite of the possibility that breathing techniques are of benefit.

A Canadian team randomized 67 patients with mild asthma and no allergies into one of three groups [5]. Group A received a 16-weeks exercise programme of increasing intensity. It was aimed at developing respiratory musculature and lung efficiency. Group B received an exercise programme of comparable intensity but not directed towards respiratory function. Group C was a waiting list control group. Group A experienced a reduction in asthma medication use, an improvement in symptoms and a 300% increase in time spent on physical activities. After 16 weeks, the programme was stopped and patients were observed for a further 2 months. At the end of this follow-up, patients in group A had returned to their baseline values in respect of all outcome variables.

FLUGE *et al.* [6] from the medical school in Hanover, Germany randomized 36 asthmatics into three groups: A: yoga breathing exercises (asana, mudra and pranayama); B: physiotherapy breathing exercises (gymnastics, diaphragmatic breathing, expiration against resistance, cou-

ghing techniques and relaxation); and C: no intervention control group. All patients were maintained on β_2 -agonists in addition. During the initial 3 weeks, patients were taught the above techniques and were subsequently asked to regularly do the exercises at home without supervision. The follow-up period was 4 months. At the end of this time, subjective symptoms had improved in groups A and B. Objective lung function measurements, however, had improved significantly only in group B.

VEDANTHAN *et al.* [7] from the University of Texas (Dallas, TX, USA) recently published a RCT in 17 adult asthma patients. Yoga breathing exercises (pranayama), postural exercises (yogasanas) and meditation were regularly carried out by the experimental group three per week for 16 weeks. The control group received no such treatments. The main outcome variables were subjective symptoms, medication requirements and peak flow. There was a (nonsignificant) trend towards reduction in medication use and symptoms in the yoga group. Similarly, there were no significant intergroup differences in terms of peak flow. In spite of these inconclusive findings, the authors concluded that "yoga techniques seem beneficial as an adjunct to the medical management of asthma".

Discussion

These results suggest that severe cases of acute asthma may not profit from physiotherapeutic breathing techniques [4]. For yoga breathing techniques, the data seem insufficient for firm conclusions [2, 3, 6, 7]. Physiotherapeutic breathing techniques may offer some benefit for mild-to-moderate asthma [5, 6], but the data are less convincing than is desirable. Most of the studies are burdened by methodological flaws, of which small sample size is the most obvious and prevalent.

Several other types of study were found; they fall into the following categories: cross-sectional comparisons of users of a given breathing technique and nonusers (*e.g.* [8]), observational studies without a control group (*e.g.* [9, 10]) and controlled clinical trials lacking random allocation (*e.g.* [11, 12]). Generally speaking, the results of these investigations imply that the interventions tested have positive effects on asthma symptomatology.

Rigorous investigations into the efficacy/effectiveness of breathing techniques for asthma are faced with a number of methodological and logistical problems: it is difficult to find a credible placebo intervention which can be blind for the patients. Blinding and placebo control, in turn, are two essential features for differentiating between specific and nonspecific therapeutic effects [13]. Cointerventions are a necessary prerequisite when studying adjuvant therapies; this would usually increase the need for large sample sizes. Furthermore trials of this kind are tedious to carry out and need proper funding. Yet funding for this type of research is rarely available.

In view of the high prevalence of breathing techniques in asthma patients, it is necessary to be sure that such treatments do more good than harm. The potential for doing harm is neglected in virtually all papers on the subject. In the survey quoted above [1], no evidence has been found for breathing techniques being harmful. Nevertheless, more convincing evidence is needed to be

sure of this. Funding bodies should therefore be encouraged to support future studies on this subject.

It is concluded that few randomized controlled trials have tested the effectiveness of breathing techniques for asthma. On the basis of the data available to date, it is not possible to make firm judgements. Breathing techniques seem to have some potential and should be tested rigorously in the future.

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