

Effects of yoga practices for respiratory disorders related to the Union Carbide Gas Disaster in 1984

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SUMMARY

Isocyanate asthma is the dominating professional asthma. In Bhopal 1984, 500,000 residents were exposed to methyl isocyanate (MIC). Chronic respiratory disorders are the most predominant long-term symptoms, with obstructivity as well as restrictivity. At Sambhavna clinic, 26 persons were instructed in different yoga techniques. After six months follow up, all parameters except FER showed significant increased lung function, and the use of medicines was decreased.

INTRODUCTION

Isocyanate asthma is the dominating professional asthma, and 5-10 percent of those who are exposed to low to moderate doses are supposed to develop asthma (1). Among the highly exposed as many as 15-30 percent might develop asthma. The asthma can be chronic and exaggerated, even if the exposure is ceased. Inhalation of nitrous or chloride gases can give bronchiolitis obliterans, with thickening of membranous bronchioli including collagenous storage and fibrosis (2). If lumina are constricted, the patient will be seriously and irreversibly obstructive.

On the midnight of 2-3 December 1984 in Bhopal, India, 43 tonnes of methyl isocyanate (MIC) and other gases leaked from a pesticide factory owned by Union Carbide Corporation, USA. Over half of a million people of Bhopal were exposed to the lethal chemicals. Over 16,000 persons have died as a result of the exposure and hundreds of thousands still carry multisystemic injuries. The respiratory system was one of the most affected, and chronic respiratory disorders are common among the survivors.

Several studies (3, 4, 5) and reviews (6, 7, 8, 9) on survivors from the Bhopal gas leak indicate a heavy load of morbidity due to respiratory problems throughout the post disaster period. It continues to be a major cause of death among the exposed population. In a report, covering a period till March 1991, it was reported that there was no change in the pulmonary parameters of patients examined, but sequelae of chronic bronchitis and cor pulmonale was increasing (10).

Till today, little is known about the medical treatment of exposure induced injuries, and medical care of the survivors continues to be based upon symptomatic drugs that provide temporary relief, if at all. Dependence on drugs over a long period of time has also given rise to a host of iatrogenic problems. Yoga therapy is offered at the Sambhavna Clinic, a free clinic for survivors run by the Sambhavna Trust, as a means to provide sustained relief from breathlessness without the use of drugs.

Studies carried out by Bhole et al (11, 12) and Gore et al (13, 14) have established improvement in ventilatory efficiency breathing pattern, breath holding time, vital capacity and other respiratory function parameters as a result of treatment through Yoga.

There are no studies available on the yogic treatment of survivors with pulmonary injuries related to the Union Carbide disaster in Bhopal.

OBJECTIVES

To document objective changes in specific lung function parameters among survivors with chronic respiratory disorder towards an objective assessment of yoga therapy.

MATERIALS AND METHODS

The study started in 1997. Participants were selected from the population visiting the Sambhavna Clinic with chronic respiratory problems ever since the disaster. Through detailed history taking it was ascertained that none of the persons suffered from any respiratory problems prior to the disaster. Initial screening of the persons was done by the physician at the clinic. Persons with pre-existing pulmonary problems, those with acute respiratory distress and those with pulmonary tuberculosis were excluded from the study. Until April 1999, 30 persons have been included in the study. Of those, 22 have fulfilled the programme, four have made parts of it and four have dropped out.

Three types of yoga were used: *Yoga asanas*, that is based on postures, *pranayama*, which is breathing exercises, and *shodhana kriyas* or cleaning, for example rinsing the nose. A programme was made up for each individual, taking in consideration other disabilities like joint pains and *ghabravat* (anxiety attacks).

The participants were initially trained for fifteen days under direct supervision at the clinic. Then they were given a pictorial chart showing their programme, and they were advised to continue with the exercises at home. If they had any problems, they were welcome back to get new instructions. The participants were asked to come back for evaluation four times during the next half year.

For each participant was registered background data: age, sex, occupation, income, distance from the factory the night of leakage, aggravating factors like fuel and smoking, symptoms, disability and use of medicines for respiratory problems.

At day 1, day 10, day 15, after 1 months, 2 months, 3 months and 6 months the following parameters were measured: respiratory rate prior to and after standard exercise, pulse rate prior to and after standard exercise, and peak flow rate (PFM). In 1998 a spirometer was introduced, and from then on was also measured Forced Vital Capacity (FVC), Forced Expiratory Volume in the first second (FEV₁), Peak Expiratory Flow (PEF) and Forced Expiratory Rate (FER) (also called Forced Expiratory Flow or FEF₂₅₋₇₅).

At the follow-ups from 1 month and onwards, it was also registered how often the participants did exercises at home, and use of medicines for respiratory problems. All data are analysed in EpiInfo.

RESULTS

Four are still on the programme, and data for the last one or three controls respectively are missing.

The group consisted of 11 women and 15 men aged 10-65 years. Complaints were breathlessness at rest and other symptoms from the respiratory tract, pain in body, back, joints or head, and mental problems as *ghabravat* (anxiety attacks) and disturbed sleep. Four had diagnosed hypertension, three anaemia and two asthma bronchiale. One had no disability problem, nine could do their work (including housework) with difficulty, three could not do their work, and nine had difficulties in walking or playing. Body mass index (BMI) varied between 13 and 26. Peak flow rate at the first visit varied between 70 and 450. At the enter of the study, 19 took allopathic medicines and seven took Ayurvedic medicines.

Three women and one man dropped. Background data did not differ from the analysed group.

At the 6 month follow up, six persons did yoga at home maximum five times per month, five persons did it 6-15 times a month, and eleven persons more than every other day. There was no long-term difference between the three groups in the parameters that follow.

The difference of respiratory rate and pulse rate before and after exercise significantly decreased during the study. The significance for the mean values was very high.

Spirometry was not measured for the first 14 participants in the study. Comparison is made between the first control and each one of the following controls. All parameters except FER showed an increasing lung-function. The significance for the mean values is 0.01 or higher.

At the last follow up visit, five persons were using allopathic medicine for breathlessness, and two were using Ayurvedic medicine. This is a two third reduction of the use of medicines.

CONCLUSIONS

It is seen that Yoga therapy is an effective means to provide sustained relief to persons suffering from chronic breathlessness as a consequence of toxic gas exposure. Objective assessment of this therapeutic approach shows significant improvement, already during the education period, in pulmonary function among survivors who have suffered pulmonary injury.

Yoga seems to have a prolonged effect after the education period, even if the person do not regularly perform yoga exercise at home. This might be a result of learning a better breathing technique.

DISCUSSION

The study was carried out involving persons from low socio-economic background none of whom were familiar with Yoga. Most have been on a constant medication ever since the disaster and the idea of obtaining relief from symptoms without the aid of drugs was also alien to them. Given this context, additional efforts were required to ensure that people took interest in Yoga training and continued with practice at home. However, all participants reported a sense of well being after yoga training and no further motivation was required after this self-realisation. More than seven persons became active in propagating the benefits of yoga in their community.

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