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EFFECT OF COUGH SUPPRESSION THERAPY IN PATIENTS WITH ALLERGIC COUGH: A SINGLE CASE STUDY

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Abstract
Intense continuous dry cough is a physically, psychologically and socially disturbing problem. Voluntary suppression of cough may be used as part of a self help management programme for patients with allergic cough to minimize the impact of excessive or intense coughing. Cough suppression therapy involves educating patient about the cough reflex and negative effects of repeated coughing, identification of cough triggers, techniques to reduce laryngeal irritation and increase hydration, cough suppression exercises and psycho-educational counseling.

Objective
To find the effect of cough suppression therapy in patient with allergic cough. ***Study Design:*** *Experimental Design, A single case study.*

Subjects
Patient was selected according to inclusion and exclusion criteria. A pretest measure was taken with the help of Leicester Cough Questionnaire. Cough suppression therapy is an outpatient therapy delivered over multiple session tailored to the individual patient need. It consists of four components educating the patient, laryngeal hygiene and hydration, cough control, and psycho educational counseling. Post-test measures were taken on 1st day, end of 1st week, 2nd week, 3rd week and end of 4th week.

Results
The results show there is improvement in suppression of cough, frequency and intensity.

Conclusion
Cough suppression therapy is effective in self management strategies to control the cough and to decrease the impact of cough on physical, psychological and social aspects of life.

Keywords: Leicester cough questionnaire, Cough Suppression Therapy, Allergic Cough.

Introduction

Allergic rhinitis represents a global health problem affecting 10 to 20% of the population. Allergic rhinitis is defined clinically by the symptoms caused by immunologically mediated (most often IgE-dependent) inflammation after the exposure of the nasal mucous membranes to offending allergens. Symptoms of allergic rhinitis include rhinorrhea, nasal obstruction or blockage, nasal itching, sneezing, and postnasal drip that reverse spontaneously or after treatment. Allergic conjunctivitis often accompanies allergic rhinitis.

Chronic refractory cough (CRC) is defined as a cough that persists despite guideline based treatment. It is seen in 20-46% of patients presenting to specialist cough clinics and it has a substantial impact on quality of life and healthcare utilization[17]

Cough is a reflex caused by the stimulation of lining of the nose, throat, voice box or lungs and it's normal defense mechanism of the body. Most coughs based on their cause can be mainly divided into allergic cough (coughing due to an allergen) or those caused due to infections.

Cough suppression therapy (CST), also known as cough suppression physiotherapy is a promising non-pharmacological therapeutic option for patients with refractory chronic cough. Cough suppression therapy consist of education, improving laryngeal hygiene and hydration, cough suppression techniques, breathing exercises and counselling[5]. Voluntary suppression of cough may be used as part of a self help management programme for patients with allergic cough to minimize the impact of excessive or intense coughing[5].

Cough suppression therapy involves educating patient about the cough reflex and negative effects of repeated coughing, identification of cough triggers, techniques to reduce laryngeal irritation and increase hydration, cough suppression exercises and psycho-educational counselling[9].

Cough suppression therapy has been shown to improve cough related quality of life, cough hypersensitivity and cough frequency. There was no greater awareness and training in this technique and so there was no sufficient evidence for the effectiveness of this technique, only few researches has been done on this technique. It was limited to a few specialist centers, and little awareness in the field of pulmonary rehabilitation.

The effectiveness of cough suppression therapy in respiratory conditions such as allergic rhinitis, chronic obstructive pulmonary disease, idiopathic pulmonary fibrosis and bronchiectasis have not been investigated.

Thus this case study tries to find out the effect of cough suppression therapy in patient with allergic cough.

Methodology

Study design is experimental and study type is single case study.4 weeks was the study duration and study conducted at SRM Medical College Hospital and Research centre SRM University, Kattankulathur. Kancheepuram District, Tamil Nadu, India.

Case Description

Inclusion criteria for the study were presence of cough, presence of allergic rhinitis, presence of allergic bronchitis, individual willing to participate within age 25 – 30 years.

Exclusion criteria were presence of cough due to infection, cough with sputum, haemoptysis, recent injuries and fractures to the chest region& diagnosed cardiac abnormalities & complaint of chest pain.

Informed consent was obtained from the patient prior to the intervention and explained clearly about the intervention procedures and assessment procedures to the patient.

27 year old female staff nurse working at SRM Hospitals and Research Centre met inclusion criteria and consented to participate in the study

The patient complained that she had regular and repeated cough with throat pain and breathing difficulty during cough. She also complained of feeling restlessness and sleep disturbance due to repeated cough during night time and during exposure to smoke, dust or fumes. She was a diagnosed case of allergic rhinitis. She was administered antibiotics and mucolytic cough syrup whenever symptoms get worse. No history of rhinitis present in the family members. She was a non smoker and doesn't chew tobacco.

Subjective examination reveals presence of nocturnal cough without sputum and absence of wheeze. When assessed with New York Heart Association (NYHA) grading she scored Grade-1: dyspnoea on sternous activity.

On objective examination her vitals were stable: blood Pressure: 118/69mmHg, Temperature: 98.3 F, Heart rate: 80/min& Respiratory rate: 14breaths/min on the day of assessment. She was of mesomorphic built with no abnormalities in posture assessed in both standing and sitting position from antero posterior and lateral view, on observation. There were no abnormalities such as clubbing, cyanosis, edema, tremor, skin changes &joint deformity**.**

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On palpation no tracheal shift & no tenderness present. Difference of chest expansion at inspiration and expiration were 2 cm, 2 cm & 3 cm at axillary level, nipple level & xiphisternum level respectively.

On Percussion mild hypo resonant present over lower lobes bilaterally.

On Auscultation normal vesicular breath sounds present.

On Examination using incentive spirometry she was able to get result of 1200cc/sec.

Functional Assessment was assessed using FIM (Functional Independent Measurement) scale which scored complete independent.

Leicester Cough Questionnaire was used to assess the components like physical, psychological and social pre test score is 58 out of 133. The Leicester Cough Questionnaire is a patient-reported questionnaire evaluating the impact of cough on quality

of life. The Leicester Cough Questionnaire comprises 19 items and takes 5 to 10 minutes to complete. Each item assesses symptoms, or the impact of symptoms, over the last 2 weeks on a seven-point Likert scale. Scores in three domains (physical, psychological and social) are calculated as a mean for each domain (range 1 to 7). A total score (range 3 to 21) is also calculated by adding the domain scores together. Higher scores indicate better quality of life[18].

From assessment Continuous repetitive cough, prolong cough & sneezing to dust, fumes or chalk powder were considered as Problems to her.

Management
Treatment plan was prepared specially for the subject with cough suppression therapy for four weeks as subject was a staff nurse at SRM Hospital it helped in regular administration of the therapy for four weeks with out any hindrance. Out come measure was planned to record prior to therapy and at end of each week for four weeks.

Prior to the intervention, a pretest measure was taken with the help of Leicester Cough Questionnaire.

Cough Suppression Therapy
Cough suppression therapy is an out patient therapy delivered over multiple session tailored to the individual patient need. It consists of four components educating the patient, laryngeal hygiene and hydration, cough control, and psycho educational counseling.

Education
The patient was educated on the Cough Reflex and cough reflex hypersensitivity by demonstrating a diagram (fig.2) to the patient and instructing the patient orally about the benefits of cough suppression therapy (CST) and the negative effects of repeated coughing such as laryngeal irritation and trauma were discussed and patient was reassured that suppressing her cough is not harmful. Patient's doubts were cleared immediately.

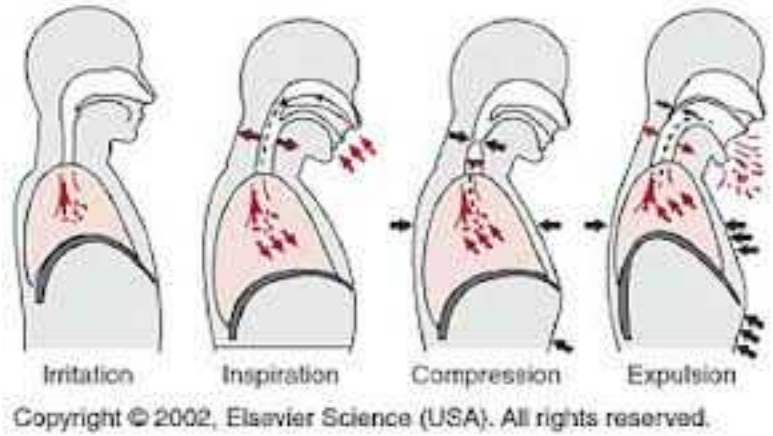


Fig. 2 Diagram used to educate the Patient

Laryngeal Hygiene and Hydration
The patient was made aware of the Do's and Don'ts to be followed as a part of laryngeal hygiene and hydration. Patient was recommended for reduction of caffeine consumption up to 2 cups a day and to avoid smoky atmosphere and increasing the frequency and volume of water intake up to 4 to 7 glasses of water per day as she was consuming only 3-5 glasses per day before the intervention, Steam inhalation was advised, its importance was taught and she did it for twice a week for four weeks.

Cough Control
The patient is taught cough substitution behaviors like throat clearing, breath-hold, huff and swallowing. The patient was taught to identify the cough triggers and was instructed to use cough suppression or distraction techniques at the first sign or sensation of the need or urge to cough.

Cough suppression and distraction techniques included: forced swallowing, sipping water whenever a patient feels like coughing out, and the patient was advised to carry a water bottle where ever she goes and advised to sip water when she finds

the cough triggers and if possible she was advised carry sweet along with her and asked to suck sweets when she finds the cough triggers, as the patient was non diabetic she was advised for sucking sweets . As advised earlier she was advised to drink water which helped to also hydrate the larynx.

Breathing Exercises
Breathing exercises included were relaxed throat breathing, breathing pattern retraining& pursed lip breathing.

Relaxed Throat Breathing
She was asked to sip water before and after the exercise. The patient was asked to keep the shoulders down following by placing hands on the abdomen which supports relaxed breathing. Quick sip of air was taken by breathing through mouth with pursed lips, taking about 1 second for inhalation. Air is blown out gently with pursed lips, taking about 2-3 seconds for the exhalation. The patient was advised clearly that the breathing should be easy and relaxed.

This exercise was done 5-7 times a day and asked her to perform even she does not show symptoms, each session comprising of 10 breathes. She was also advised to perform at daily activities such as in the car, when reading, watching television, or before medications.

The patient was properly explained that relief from symptoms would start appearing after several minutes of breathing. This technique has also reduced stress in the patient.

Breathing Pattern Retraining-Diaphragmatic Breathing
The patient was positioned in comfortable position that gravity assists the diaphragm so half lying was chosen. The Patient was asked to place hands on the rectus abdominis just below the anterior costal margin and asked to breathe in slowly and deeply through the nose with the shoulder relaxed and upper chest quiet, allowing the abdomen to rise slightly. The patient was asked to repeat this for 3 times a day with each session comprising of 3-4 breathes.

Pursed Lip Breathing Exercise
Patient positioned in a comfortable and relaxed position such as half lying position. The patient was asked to breathe in slowly and deeply through the nose and then breathe out gently through lightly pursed lips as if blowing and bending the flame of a candle but not blowing it out. The patient asked to place their hands over the abdominals to detect any contraction of the abdominals.

Psycho Educational Counselling
Psycho educational counseling was important as patient also involved in setting realistic time frames and goals for the Cough suppression therapy. Patient was motivated to facilitate self efficacy. The time frame set for seeking improvement with Cough Suppression therapy was 4 weeks. Modifying behavior was tried by reducing stress and anxiety with the help of music therapy (patient choice was music) and recreational activities patient's choice was badminton play so advised have rest between matches to avoid risk of exhaustion, encouragement and re-inforcement of prescribed exercises were done as an integral part of the Cough suppression therapy. Patient was also encouraged that increasing their control of their cough may help break the negative cycle of repeated coughing and laryngeal irritation. The Cough suppression therapy includes facilitating management of adverse symptoms associated with cough such as urinary incontinence pelvic floor exercises taught but this patient doesn't had those symptoms even though as a precautionary measure and as an education exercises were taught.

Prior to the intervention, a pretest measure was taken with the help of Leicester Cough Questionnaire. Post-test measures were taken on 1st day, end of 1st week, 2nd week, 3rd week and end of 4th week.

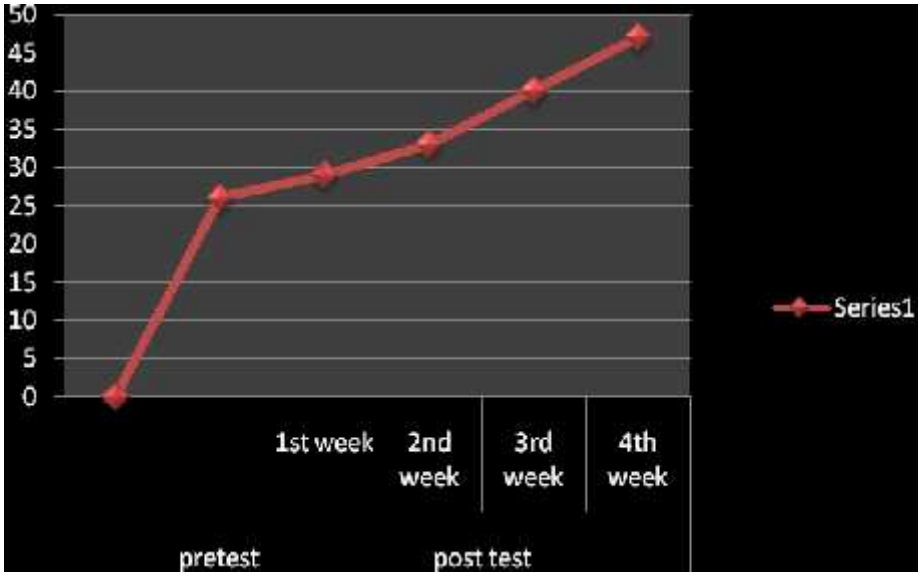
Data Analysis

Table 1: Pre and Post Test Values of Physical, Psychological and Social Components of Leicester Cough Questionnaire at 1st Week to 4th Week

Components of Leicester Cough Questionnaire	Pre test	Post test			
		1st week	2nd week	3rd week	4thweek
Physical	26	29	33	40	47
Psychological	19	23	28	35	39
Social	13	16	17	22	26

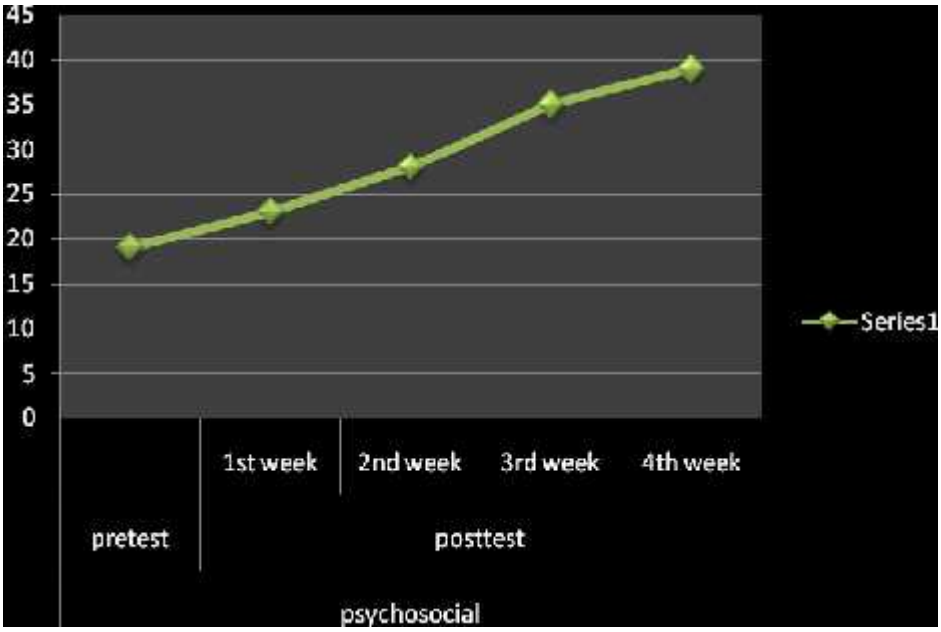
Table 1. Shows the pre test score and post test score of Physical component, Psychological component and Social component of Leicester Cough Questionnaire.

Graph 1



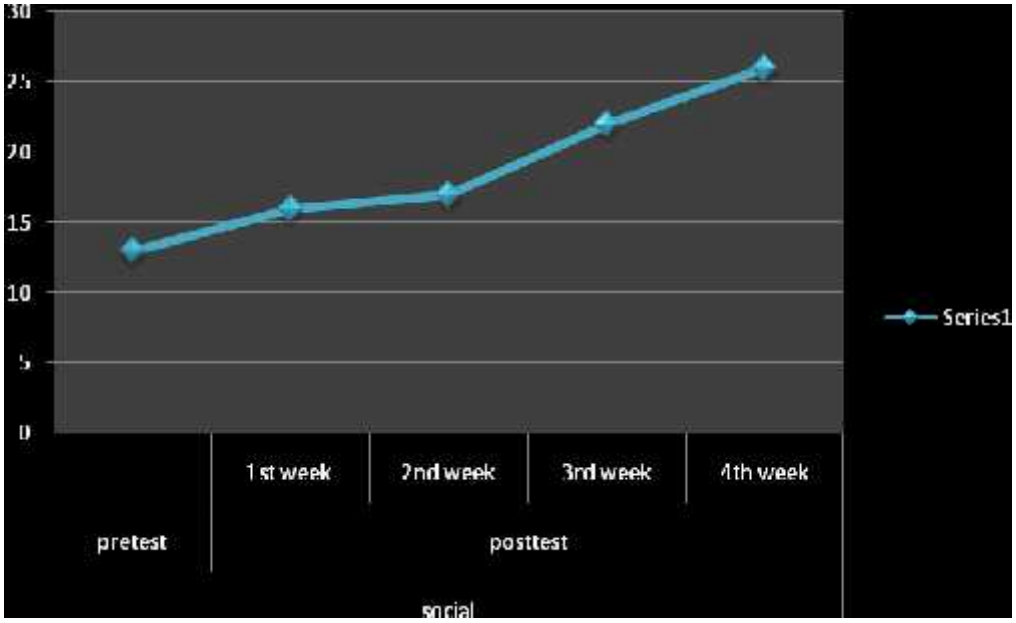
Graph 1 shows the Pre Test score and Post Test scores of the physical component of Leicester Cough Questionnaire.

Graph 2



Graph 2 shows the Pre Test score and Post Test scores of the Psychological component of Leicester Cough Questionnaire

Graph 3



Graph 3 shows the Pre Test score and Post Test scores of the Social component of Leicester Cough Questionnaire

Results

According to table 1 and graph 1 the physical component of Leicester Cough Questionnaire the pre test score is 26 and post test score of 1st week is 29, 2nd week is 33, 3rd week is 40 and 4th week is 47.when comparing the pre and post test results among the weeks at the end of 4th week there is improvement in physical component.

According to table 1 and graph 2 the psychological component of Leicester Cough Questionnaire the pre test score is 19 and post test score of 1st week is 23, 2nd week is28, 3rd week is 35 and 4th week is39.when comparing the pre and post test results among the weeks at the end of 4th week there is improvement in psychological component.

According to table 1 and graph 3 the social component of Leicester Cough Questionnaire the pre test score is 13 and post test score of 1st week is 16, 2nd week is17, 3rd week is 22 and 4th week is 26.when comparing the pre and post test results among the weeks at the end of 4th week there is improvement in social component.

Discussion

Physiotherapists have long been advising patients to suppress cough voluntarily using a wide range of techniques. But, there is limited research in effectiveness of specific techniques used to suppress the cough**.**

Some studies suggest cough suppression therapy as a promising approach for patients with a persistent cough despite medical therapy but the studies on effect of cough suppression therapy in allergic cough is limited.

This single case study was done to find the effect of suppression therapy on allergic rhinitis patient with persistent cough and symptoms of excessive or intense coughing lasting for 4 weeks. The cough suppression therapy was used as a part of a self help management program for patient with intense cough through educating the patient, laryngeal hygiene and hydration, cough control and psycho educational counseling.

While taking the pre test measurement of the patient using Leicester Cough Questionnaire the physical component of chest or stomach pain, sputum production, hoarse voice, physical tiredness as a result of cough and cough due to exposure to paints or fumes, disturbance of sleep, energy consumption due to cough and frequency of coughing bouts a day were on low scores. These results have showed maximal level of physical impact of coughing.

The post test results at the end of 1st week shows a very minimal level of physical improvement with decreasing frequency and intensity of cough, by the end of 2nd and 3rd week there is a moderate improvement in physical components and its effect

on cough with further decrease in frequency and intensity in cough finally, by the end of intervention period i.e., 4th week the post test results showed an improvement in physical components and maximum subsiding of the cough occasionally she coughed. While taking the post test measure of the patient using Leicester Cough Questionnaire the physical component scores have increased this shows the minimal level of physical impact of coughing.

This goes in hand with Vertigan A et al. "It demonstrated that Cough Suppression Therapy delivered in 4 sessions over a 2 month period to patients with a refractory chronic cough; improved cough, breathing, voice and upper airway symptom scores significantly greater than those receiving healthy lifestyle advice alone[1"].

While taking the pre test measure of the patient using Leicester Cough Questionnaire the psychological component of control of the cough , feeling embarrassing by the cough, feeling anxious with the cough, feeling frustrated, feeling fed up, worried about cough may indicate serious illness and concerned about other people think something is wrong with the person because of her cough. These results have showed maximal level of psychological impact of coughing.

The post test results at the end of 1st week shows a very minimal level of psychological improvement with decreasing frequency and intensity of cough, by the end of 2nd and 3rd week there is a moderate improvement in psychological components and its effect on cough with further decrease in frequency and intensity in cough finally, by the end of intervention period i.e., 4th week the post test results showed an improvement in psychological components and maximum subsiding of the cough occasionally coughed. While taking the post test measure of the patient using Leicester Cough Questionnaire the psychological component scores have increased this shows the maximal level of psychological impact of coughing. This may be due to psycho educational counseling given as a part of Cough suppression therapy.

While taking the pre test measure of the patient using Leicester Cough Questionnaire the social component that feeling of coughing is interfering with the job, or daily tasks, overall enjoyment of life, interruption within the conversation or telephone calls and annoying their partner, family or friends due to cough. These results have showed maximal level of social impact of coughing.

The post test results at the end of 1st week shows a very minimal level of social improvement with decreasing frequency and intensity of cough, by the end of 2nd and 3rd week there is a moderate improvement in social components and its effect on cough with further decrease in frequency and intensity in cough finally, by the end of intervention period i.e., 4th week the post test results showed an improvement in social components and maximum subsiding of the cough occasionally coughed.

Improvements reported may be due to reduction in cough reflex sensitivity following a programme of Cough Suppression Therapy which would have a impact on the afferent or efferent limb of the cough reflex (for example vocal hygiene and improved voluntary control of cough respectively). S Chamberlain et al stated **"**There is evidence to support the efficacy of CST: a randomised controlled trial reported a significant reduction in cough symptoms and other studies have reported improved cough related quality of life, reduced cough reflex hypersensitivity and cough frequency. The mechanism of action of CST is not clear, but it has been shown to reduce cough reflex sensitivity, paradoxical vocal fold movement (PVFM) and extrathoracic hyperresponsiveness[16]**".**It has therefore been hypothesised that a reduction in Paradoxical Vocal Fold Movement and laryngeal irritation may be a mechanism by which Cough Suppression Therapy is effective in patients with a laryngeal origin of cough.

This study aimed to find effectiveness of cough suppression therapy proves that cough suppression therapy is effective and safe for patient with allergic cough. Cough suppression therapy has been shown to improve cough related quality of life cough hypersensitivity and cough frequency. Patel A et al. also reported an improvement in cough specific quality of life, also measured by the Leicester Cough questionnaire, in an uncontrolled study of up to 3 Cough Suppression Therapy sessions delivered by respiratory physiotherapists over a 2 months period[13].

So cough suppression therapy can be considered as a treatment option when pharmacological intervention has failed or is partially effective. Great awareness and training is needed. There is emerging evidence that Cough Suppression Therapy is effective and safe for patients with a refractory chronic cough. Like relaxation positions for asthmatic patients as an patient administering intervention which has a great awareness among health and allied health professionals this Cough suppression therapy should also be aware among health and allied health professionals for patients with chronic cough as this therapy is easy to administer. This single case study too aimed to prove effectiveness of this therapy and create awareness among professionals and patients.

Conclusion

The results of the study have demonstrated that is Cough suppression therapy is capable of producing beneficial effects on physical, psychological and social quality of life in a patient with chronic cough. The results show reduction in cough frequency and intensity. Cough Suppression Therapy has been shown to improve cough related quality of life, cough hypersensitivity and cough frequency the single case methodology employed in this study limit generalization of its findings; but the results give further impetus to controlled clinical trials.

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