

Steam Inhalation in Respiratory Illnesses - Full Steam Ahead or Full Stop? A Systematic Review of Randomized Controlled Trials

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The clinical question in this EURECA is: “Does steam inhalation (*Intervention*) result in clinical improvement (*Outcome*) in people with respiratory illness (*Population*), as compared to no steam inhalation/placebo (*Comparison*)? The clinical conditions include upper (common cold, croup, sore throat) and lower (bronchiolitis, pneumonia) respiratory tract illnesses.

RELEVANCE

Steam inhalation is perhaps one of the most widely prevalent home-based practices, amongst laity and the professionals; based on the perception that warm humidified air provides subjective relief of respiratory symptoms, by loosening the respiratory secretions(1). Advances in understanding of pathophysiology of respiratory infections/illnesses and development of specific therapy; make it important to examine this age-old ‘remedy’ in the light of modern evidence-based health-care practice.

CURRENT BEST EVIDENCE

A Medline (through Pubmed) search updated on 25th October 2010, using the term “steam” and Limits: *Clinical trials, randomized controlled trials and meta-analysis*; short-listed 8 potentially relevant publications(1-8) including five relevant RCTs(2-6). Simultaneous Cochrane Library search with the term “steam” and filter “*Record Title, Abstract or Keywords*” yielded 4 Cochrane Reviews(9-12), 1 Cochrane review protocol(13), and 103 Clinical Trials. One Cochrane review(9) and the protocol(13)

were relevant; two did not deal with steam/heated humidified air inhalation(10,12), and one evaluated steam in ventilated patients(11). No additional trials were identified. Scanning reference lists of included publications yielded one more trial(14). Thus a total of six trials were relevant to this review; five evaluated steam in adults with common cold(2,3,5,6,14); only one trial was conducted in children (with pneumonia or bronchiolitis)(4). This trial lacked the methodological refinements of the other trials. Characteristics of included studies are summarized in **Table I**.

The Cochrane review on common cold(9) was updated till May 2006; no additional trials are identified. Hence the data therein can be considered current, but a few methodological errors necessitate a fresh review.

Data from the common cold trials were heterogeneous (in terms of participants, outcome measures, timing of measurement, and baseline status. One trial(2) suggested subjective improvement with steam; another(3) suggested the opposite and yet another showed no difference(5). Meta-analysis did not show benefit (RR for non-improvement=1.78; 95%CI 0.01-226.51). The single trial in children with pneumonia showed no benefit of steam, but some benefit in bronchiolitis(4). No data were found pertaining to croup and sore throat. There was limited data on the adverse events associated with steam inhalation especially the risk of burns/scalds in infants and children.

TABLE I SUMMARY OF RCTs EXAMINING STEAM INHALATION IN RESPIRATORY ILLNESSES

No	Study design	n (steam/ control)	Intervention	Results	Outcomes	Ref
1	DB, PC, RCT	62 (32/30)	Nasal inhalation of air at 42-44 C twice x 20 min versus air at 22-24 C	Subjective response daily x 7 dPeak nasal inspiratory and expiratory flow (patency) on d1, d2, d7	Subjective improvement : 26/32 vs 7/30 Increased nasal patency 61-74% vs 6-8%.	2
2	DB, PC, RCT	66 (32/34)	Nasal inhalation of air at 40-42 C twice versus air at 20-24 C	Subjective symptom scores for nasal congestion, nasal drainage, and sneezing. Nasal resistance using mimomanograph.	Subjective improvement on d7 : 24/32 vs 34/34 Nasal resistance improvement 6% vs 11%. Side effects 36% vs 9%	3
3	DB, PC, RCT	68 (32/36)	Inhalation of air at 47 C x 60 min to raise nasal temp to 43 C versus air at 20-24 C	Subjective symptom scores for nasal congestion, nasal drainage, and sneezing. objective measures of nasal resistance	No significant difference in daily symptom scores. Improvement in nasal resistance favoring placebo on d7	5
4	RCT	20	Nasal inhalation of air at 42-44C at 24 and 48 hr after infection versus air at 22-24 C.	Improvement in symptom scores. Nasal washing viral titres (shedding) over 4 days	Mean viral titres (/mL) 10(1.7) vs 10(1.8) 10(1.7) vs 10(1.9) 10(1.2) vs 10(1.6) 10(0.9) vs 10(0.7)	6
5	RCT, DB	96 (87 records available) 45/42	Nasal inhalation of air at 43C versus air at air at 30C.	Subjective improvement Proportion shedding viruses	No difference in proportion	14
6A	RCT	16	Steam inhalation within a cloth tent versus no steam	Respiratory status at 0, 6h, 48h	In bronchiolitis, less time for recovery and less duration of hospitalization	4
6B	same as above	20	same as above	same as above	No difference in improvement.	4

DB=double blind, PC=placebo controlled, RCT=randomized controlled trial.

EURECA CONCLUSIONS IN THE INDIAN CONTEXT

- There is not enough evidence supporting benefit of steam inhalation in acute (upper and lower) respiratory illnesses in children.

CRITICAL APPRAISAL

At first glance, this EURECA systematic review does not appear to present significant new findings in terms of management, except that there are no scientific grounds to encourage steam inhalation in children. However, it presents the opportunity to critically appraise a few important issues.

Is steam inhalation relevant in modern practice? It must be noted that the practice of steam inhalation could have been relatively justifiable at a time when there was limited understanding of pathophysiologic mechanisms in various respiratory tract illnesses; coupled with limited therapeutic options. Presently, both situations have dramatically changed for most respiratory conditions.

Subjective versus objective improvement: It is interesting that subjective improvement/perception of relief; often does not correlate with objective measurements. This raises the tricky issue of whether, 'feeling better' is superior to 'being better'. In the context of conditions as diverse as acute common cold to chronic arthritis, the former cannot be ignored, and may take precedence over precise objective measurements. On the other hand, for most other clinical conditions, demonstration of subjective improvement may be inadequate to prove that an intervention works. The precise balance between subjective and objective outcome measures in common cold, is not clear. Moreover, the subjective and objective outcome measures reported in adult studies are difficult to replicate in children, necessitating less robust methods to evaluate benefit. This could alter the results of pediatric trials significantly.

Is there any harm in recommending steam inhalation? Many care-givers (physicians and parents) may prefer to opt in favour of steam inhalation, based on personal (favourable) experiences, and might argue that this outweighs the

(absence of) data from research studies. It must be emphasized that one of the goals of evidence-based health-care is to protect patients from precisely this tendency.

EXTENSIBILITY

Most of the included trials recruited adults, delivered hot humidified air, through commercial devices and used complex objective measurements. The lone pediatric trial was limited in terms of quality and quantity, to draw a meaningful conclusion in favor of steam inhalation. Hence strictly speaking, the data is not extendible to the population of interest.

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