

# Chest physiotherapy in primary pneumonia

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## Abstract

One hundred and seventy one patients with primary pneumonia entered a single blind, placebo controlled trial of physiotherapy. Treatment was allocated at random, physiotherapy consisting of postural drainage, external help with breathing, percussion, and vibration and the controls receiving advice on expectoration, deep breathing, and how to exercise to avoid thrombosis. Principles of pharmaceutical management were the same in the two groups.

There was no objective evidence that daily physiotherapy helped during the acute phase of the disease. On the contrary, in younger patients, smokers, and patients with interstitial pneumonia physiotherapy appeared to prolong the duration of fever as well as the hospital stay.

It is concluded that chest physiotherapy is at best useless in patients with primary infectious pneumonia.

## Introduction

A main indication for chest physiotherapy as an adjunct to treatment is primary pneumonia, the aim being to evacuate inflammatory exudate in a patient whose airways or gas exchanging tissues are pathologically affected by a microbial infection. At departments of infectious diseases in Sweden patients admitted with primary pneumonia receive daily treatment by licensed physiotherapists, and the same is true at other clinics to which these patients are admitted, the only limiting factor being the availability of physiotherapists.

So far as we know only one controlled therapeutic trial of chest physiotherapy in pneumonia has been conducted.<sup>1</sup> No beneficial effects could be proved, but the numbers were small and thus did not allow any definite conclusions. We therefore decided to carry out a more comprehensive study. Based on clinical impressions and the notion that evacuation of inflammatory exudates is beneficial for the healing of localised infectious processes, we hypothesised that chest physiotherapy would indeed be useful in these patients.

## Patients and methods

Patients aged 15-75 years admitted to the department of infectious diseases at this hospital with a diagnosis of acute pneumonia were included and randomised. Criteria for diagnosis were the sudden onset of typical symptoms such as coughing and fever and an acute x ray picture showing infiltrates compatible with pneumonia and not present in earlier films. The main reason for admission was severity of symptoms, admission for social reasons being unusual in Sweden. Patients with secondary pneumonia—that is, as a complication of dysfunction of respiratory muscles, established chronic bronchitis, emphysema, or

asthma—were excluded, as were patients with known pulmonary tuberculosis or lung cancer.

Patients were randomised by the physiotherapists, who drew a card from a sealed envelope. The study group received chest physiotherapy daily until discharge consisting of postural drainage, external help with breathing, percussion, and vibration. This treatment took 15-20 minutes on each occasion. The same four very experienced physiotherapists delivered the treatment throughout the two years of the study. Patients in the control group received advice on the need for expectoration and deep breathing, as well as on how to perform prophylactic exercise against thrombosis. Principles of pharmaceutical management in the two groups were the same.

The study was single blind—that is, the house doctor did not know to which group the patients belonged. Criteria for efficacy of treatment were duration of fever, length of hospital stay, sequential determination of dynamic air flow, and subjective assessment of time to complete healing. Body temperature was measured rectally twice daily and two consecutive determinations of less than 37.5°C taken as evidence of disappearance of the fever. Dynamic air flow was determined by the physiotherapists using a portable air flow meter.<sup>2</sup> Patients were tested on admission and three to six days later. The mean of three consecutive readings on each occasion was scored. Age, sex, maximal body temperature, arterial pressure of oxygen on admission, smoking habit, microbial diagnosis, and radiological type of infiltrates (mainly alveolar or interstitial) were used as comparative criteria between the two groups.

Eleven of 94 patients were excluded after randomisation to the study group and 18 of 106 after randomisation to the control group. The main reason for excluding these patients was that their pneumonia was found to be secondary to congestive infiltrates, collagen disease, bronchial asthma, lung cancer, or tuberculosis. The median age (57 years) as well as mortality (six deaths) were much higher in this group as a whole compared with the main study but there were no differences between those excluded from the treatment and control groups.

Two months after discharge the patients were contacted by mail and asked to state on a special form the time that they considered that they had returned to complete health. Those who had received physiotherapy were asked to evaluate the role of physiotherapy in the healing process.

Results are expressed as means. Student's *t* test was used to assess statistical significance, differences significant at  $p < 0.01$  being indicated in the tables.

The study was approved by the ethical committee of the Karolinska Hospital, Stockholm.

## Results

The two treatment groups were comparable in age, sex, maximal temperature, arterial pressure of oxygen on admission, type of pneumonia, and smoking habits (table I). Interestingly, 79 (46%) of the patients were regular smokers, whereas only 30% of the Swedish population at large are smokers in this age category. One patient in each group died.

TABLE I—Details of patients with primary pneumonia randomised to physiotherapy or placebo. Where appropriate, values are means

	Physiotherapy group (n = 83)	Placebo group (n = 88)
No of patients	34	40
Age (years)	47.2	47.4
Maximal temperature (°C)	39.5	39.4
Arterial oxygen pressure (kPa)	10.8	10.4
No of smokers of > 5 cigarettes daily	40	39
No with mycoplasmal pneumonia	17	19
No with pneumococcal pneumonia	17	13

Conversion: SI to traditional units—Arterial oxygen pressure: 1 kPa ≈ 7.5 mm Hg.

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There was no significant difference between the study and control groups in the duration of hospital stay, healing time, and development of dynamic air flow (table II). Surprisingly, however, the duration of fever was significantly longer in those who had received physiotherapy. In view of this unexpected finding we made careful analyses of the patient sample with emphasis on age, smoking habits, and radiological type of infiltrate (alveolar or interstitial), respectively. For smokers both duration of fever and hospital stay were significantly longer in the group who had received physiotherapy (table III).

TABLE II—Effect of chest physiotherapy in primary pneumonia. Values are means

	Physiotherapy group	Placebo group	p Value
Hospital stay (days)	9.0	7.8	
Duration of fever (days)	6.8	4.9	<0.01
Dynamic air flow (FEV <sub>1</sub> ):			
On admission	1.7	1.7	
After five days	2.1	2.1	
Healing time (days)	30.6	31.3	

FEV<sub>1</sub> = Forced expiratory volume in one second (litres).

TABLE III—Effect of physiotherapy in smokers (>5 cigarettes/day) versus non-smokers suffering from primary pneumonia. Values are means

	Physiotherapy group	Placebo group	p Value
<i>Smokers (n = 79)</i>			
Hospital stay (days)	10.0	7.2	<0.01
Duration of fever (days)	8.2	4.4	<0.01
Healing time (days)	29.6	32.5	
<i>Non-smokers (n = 92)</i>			
Hospital stay (days)	8.1	8.3	
Duration of fever (days)	5.4	5.3	
Healing time (days)	29.3	30.7	

For those above median age (47 years) there was no significant difference in duration of hospital stay, fever, and healing time, whereas patients under 47 treated with chest physiotherapy had a significantly longer period of fever as well as of hospital stay compared with those not given physiotherapy (table IV). For patients with mainly alveolar infiltrates in the chest radiograph there was no significant difference between the treatment and control groups, whereas patients with mainly interstitial infiltrates had a longer period of hospital stay as well as of fever if they received physiotherapy (table V).

A total of 145 patients (85%) returned the postal questionnaire. Of those receiving physiotherapy, all considered it of positive or very positive value for the healing process.

## Discussion

The only safe conclusion from our findings is that patients suffering from primary pneumonia do not benefit objectively from chest physiotherapy. This indication for physiotherapy may thus be abandoned and patients need only be informed verbally of the probable importance of active expectoration. Since we excluded patients with acute pneumonia who in addition suffered from chronic bronchitis or bronchial asthma we cannot comment on the role of chest physiotherapy for these groups. In patients with chronic bronchitis producing large volumes of sputum conventional chest physiotherapy, as above, proved to have a beneficial effect on air conductance,<sup>3</sup> and so it might be that such patients with pneumonia are helped by chest physiotherapy.

We cannot explain why patients with pneumonia given chest physiotherapy had a longer duration of fever than those not

TABLE IV—Effect of physiotherapy in patients older and younger than 47 years, respectively, suffering from primary pneumonia. Values are means

	Physiotherapy group	Placebo group	p Value
<i>Age &gt;47 (n = 83)</i>			
Hospital stay (days)	9.5	9.7	
Duration of fever (days)	6.7	6.3	
Healing time (days)	31.2	33.1	
<i>Age &lt;47 (n = 83)</i>			
Hospital stay (days)	8.6	5.9	<0.01
Duration of fever (days)	6.8	4.4	<0.01
Healing time (days)	27.1	28.7	

TABLE V—Effect of chest physiotherapy in patients with primary pneumonia of mainly alveolar or interstitial type as assessed radiologically on admission. Values are means

	Physiotherapy group	Placebo group	p Value
<i>Alveolar infiltrates (n = 85)</i>			
Hospital stay (days)	8.2	7.8	
Duration of fever (days)	5.8	5.2	
Healing time (days)	30.7	29.5	
<i>Interstitial infiltrates (n = 78)</i>			
Hospital stay (days)	9.7	7.6	
Duration of fever (days)	7.9	4.1	<0.01
Healing time (days)	29.5	34.4	

receiving such treatment. Chest physiotherapy is known to cause airflow obstruction in acute exacerbation of chronic bronchitis but we found no evidence of this in the dynamic airflow determinations. Since the extension of the period of fever was most pronounced in the younger patients with interstitial pneumonia we speculate that chest physiotherapy for these patients may result in spread of the infiltrates rather than a reduction. Interestingly, in the Soviet Union chest physiotherapy is not started in pneumonia until the end of the feverish period, and this approach is claimed to give more prompt and complete healing; however, no hard data are available.<sup>4</sup>

We conclude that conventional chest physiotherapy should not be applied to patients with primary pneumonia.

## References

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## Correction

### Total and high density lipoprotein cholesterol in the serum and risk of mortality: evidence of a threshold effect

We regret that an error occurred in this paper by Dr U Goldbourt and others (27 April, p 1239). In the third paragraph of the Discussion the second sentence should have read: "Keys pointed out that the sweeping use of multivariate analysis has led to the obscuring of L shaped or J shaped associations. . . ."