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Prevention of Common Colds by Hydrotherapy:
A Controlled Long-term Prospective Study

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Key words: Colds, hydrotherapy.

Summary: In a search for an effective prophylaxis against common colds, 25 volunteers were treated regularly with a standardised hydrotherapy programme for half a year, while 25 matched untreated persons served as controls. The frequency, duration and strength of colds were recorded. Results show that there is a significant reduction in frequency of colds in the treated group. Similarly, this group seemed also to be affected less severely. The duration of common colds was shorter in the treated group which, however, failed to reach the level of significance. The prophylactic effects took about three months to become apparent. The underlying mechanism, by which the effect is mediated, is speculative at present. It is suggested that regular hydrotherapy represents an effective prophylaxis against common colds.

Biography: Edzard Ernst graduated from Munich University Medical School in 1979. He joined the university department of physical medicine as a young doctor and subsequently worked in London for several years. After several other appointments he re-joined the Munich physical medicine department where he worked for six years and gained his PhD. His main research interest is haemorheology on which he has published many papers and several books. In addition he pursued an interest in clinical research into physical medicine. In 1989 he was appointed professor in his present department at the Medical School of Hanover.

The co-authors of the present paper are two of his students who were deeply involved in the study.

Table 1: Personal data in groups 1 and 2

	Group 1 (hydrotherapy)	*Group 2 (controls)*
Number	n=25	n=25
Men	n=14	n=10
Age (mean ± SD)	29.4 ± 7.4	27.1±5.4
Working in climatised environment	n=0	n=6
Frequency of common colds in the last half year (mean ± SD)	1.8±1.3	2.0±1.3
Regular alcohol consumption	n=12	n=11
Smoking	n=17	n=18
Regular sport	n=9	n=8
History of 'serious' diseases (requiring hospital visit)	n=7	n=3
Drugs*	n=3	n=7
Alcohol consumption (occasional or regular)	n=20	n=21
Predisposition to colds (as judged subjectively by participants)	n=8	n=7

*Lithium (n=1), L-thyroxin (n=2), oral contraceptives (n=7)

Introduction

THE common cold ranks among the most frequent diseases in man (Gwaltney *et al*, 1966). Yet there exists no causal therapy (apart from expensive interferon — Scott *et al*, 1982) or convincingly effective prophylactic measure (Gwaltney, 1976). These facts may seem acceptable to most of us because the illness is usually benign. However, because of the immense economic losses due to absenteeism, visits to doctors and the cost of (ineffective) drugs (Wood *et al*, 1980), common colds represent a major health problem.

Any feasible measure to reduce the incidence of common colds would therefore be advantageous. The notion that hydrotherapy (particularly alternating warm and cold showers) represents one such measure is is deeply rooted in the belief of laymen and doctors alike (Amelung and Wiesner, 1962; Rodbard, 1981). Yet proof or disproof of this thesis cannot be found in the scientific literature. The present prospective study compares the incidence, duration and strength of common colds in volunteers treated with regular hydrotherapy to those of untreated controls.

Methods

The trial was conducted between October 1987 and March 1988 in Munich, West Germany. A total of 60 men and women, aged 20–50 years, volunteered to take part. At the end of the trial 50 cases could be evaluated (drop-out rate due to non-compliance 16%). Exclusion criteria were clinically overt circulatory diseases, history of respiratory diseases, or other physical treatment during the preceding half-year and during the observation period. All important variables were distributed comparably between the control and treatment groups. Thus none of the characteristics listed in table 1 were significantly different in the two groups.

All participants of group 1 (n=25) were given hydrotherapy at least five times per week for six months, while individuals from group 2 (n=25) abstained from this (or any comparable) treatment. In the first week, hydrotherapy consisted of showering arms and legs for 30 seconds with cold (18–40°C) water after the whole body had been showered with warm (36–40°C) water for five minutes. In the second week, a cold (18–24°C) whole-body shower was introduced following the warm shower (durations as before). Thereafter the treatment comprised five seconds whole body shower at 36–40°C. The latter time span was slowly (within two to three weeks) enlarged to one to two minutes. This sequence was repeated twice each session. A cold (12–18°C) shower always concluded the therapy (fig 1). After thorough instruction by one of the authors, the

Fig 1: Treatment schedule for group 1 — each repeated once or twice

Week 1: Arms and legs only
Five minutes warm shower followed by 30 seconds cold shower

Week 2: Whole body
Five minutes warm shower followed by 30 seconds cold shower

Weeks 3–26
Five minutes warm shower followed by 30 seconds gradually increasing to two minutes cold shower

volunteers were left to their own devices to carry out the procedure. No treatments were applied in the presence of, or shortly (one week) after a common cold; in this event each participant was treated symptomatically according to his/her own choice.

Common colds were diagnosed clinically. When typical (Gwaltney, 1976) catarrhic symptoms (rhinitis with nasal discharge or obstruction, sneezing, sore throat or cough) were felt, the affected volunteer called one of the authors who confirmed the diagnosis and took a blood sample. Thus blood counts, plasma viscosity, serum electrophoresis and erythrocyte sedimentation rate were quantified. These measurements were repeated later (after more than two weeks) in the subjects who remained completely free of common colds or other symptoms. Complications of common colds such as sinusitis, bronchitis, etc, were also confirmed by one of the authors and recorded in a diary.

Each patient documented the duration of symptoms in a diary. The end of a common cold was defined as subjective cessation of catarrhic symptoms. The strength of each cold was judged subjectively, dividing it into three possible grades (weak=1, medium=2, strong=3). Each hydrotherapy session was entered into the diary for compliance control. The participants were asked to give additional information on variables such as drinking and smoking habits as well as level of 'stress' felt subjectively (table 1). Outside temperatures were obtained from the local weather station.

Statistical analyses were performed using the chi-squared test. The control group was thus compared to the treatment group. The null-hypothesis was rejected when p was less than 0.05.

Results

On average each participant had 137.4 treatments during the observation period. Compared to long-term averages, outside temperatures were warm in December and January (+1.3° and +2.1° *versus* −0.4°C, −1.7°C) and cold in March (2.5°C *versus* 3.3°C).

The expected frequency of common colds during the trial period was 50 events for each group (Gwaltney *et al*, 1966). The recorded frequency was 35 in group 1 and 46 in group 2. This difference was statistically significant. In the first half of the observation period 25 events were recorded in group 1 and 23 and group 2. The respective figures were 10 and 23 in the second half (not analysed statistically due to small numbers). Figure 2 shows the cumulative frequency as a function of time for both groups. In group 1 there were three cases with complications (bronchitis or sinusitis) while in group 2 five such events were documented.

The average duration per person of common colds was 5.9±3.1 days in group 1 and 7.5±5.7 days in group 2. The difference did not reach the level of significance. In the first half of the observation period, the cumulative durations (sum of days with common colds for each group) per group were 137 (group 1) and 180 days (group 2). In the second half the respective figures were 69 and 163 (not analysed statistically because this is not an independent variable). Figure 3 shows the cumulative duration of common colds in the two groups.

The sum of scores (strength), according to the scoring system outlined above, was 63 (group 1) and 93 (group 2). In group 1, a total of 17 individuals scored an average of 0–4 points, 8 scored 5–7 points and none scored 8–14 points. The respective numbers for group 2 were 12, 9 and 4. This

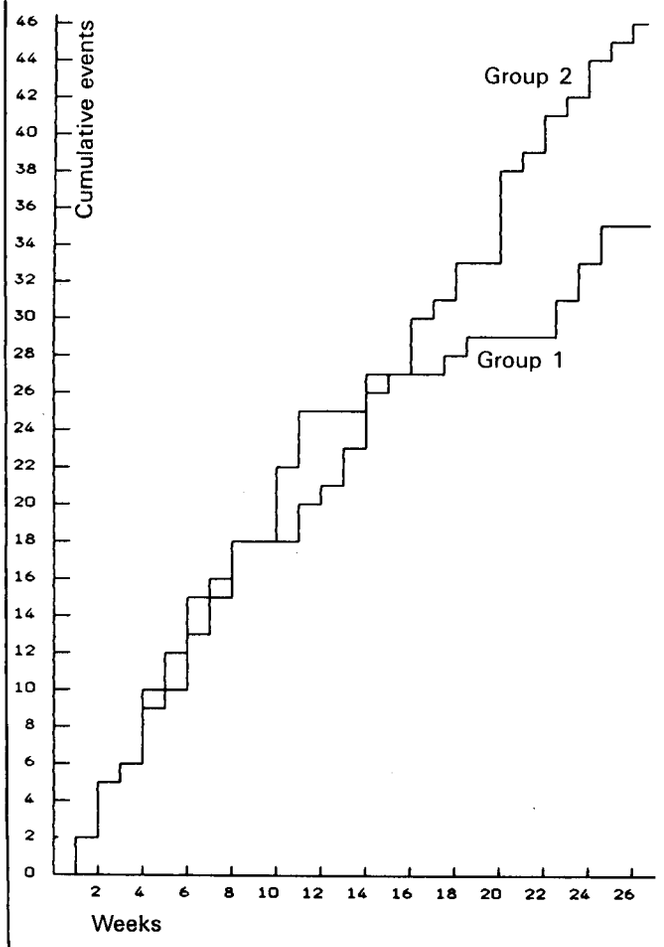

Fig 2: Cumulative frequency of common cold in groups 1 and 2 during the trial period

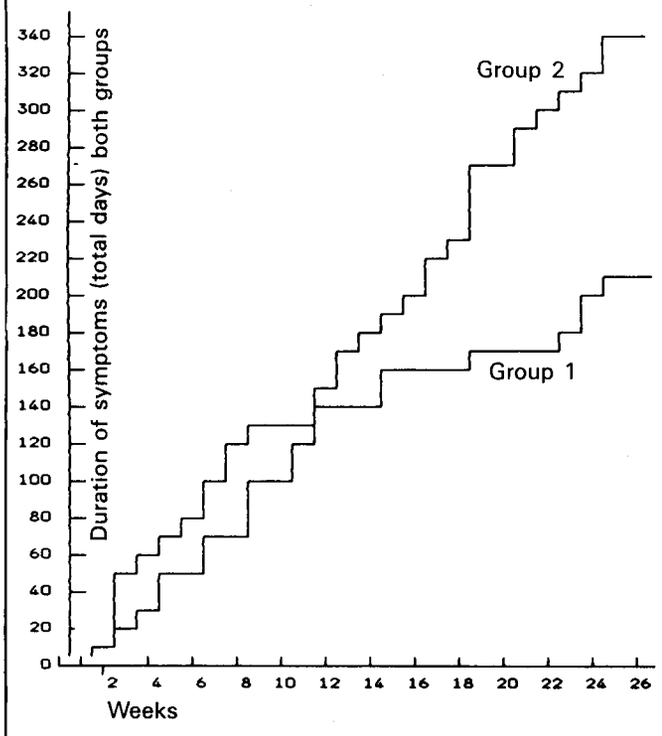

Fig 3: Cumulative duration of common cold in groups 1 and 2 during trial period

distribution was significantly different between the two groups. The total score in the first half of the observation period was 44 (group 1) and 50 (group 2), while in the second half these numbers were 19 and 43 (not analysed statistically owing to small sample size). Figure 4 shows the cumulative strength of common colds in the two groups.

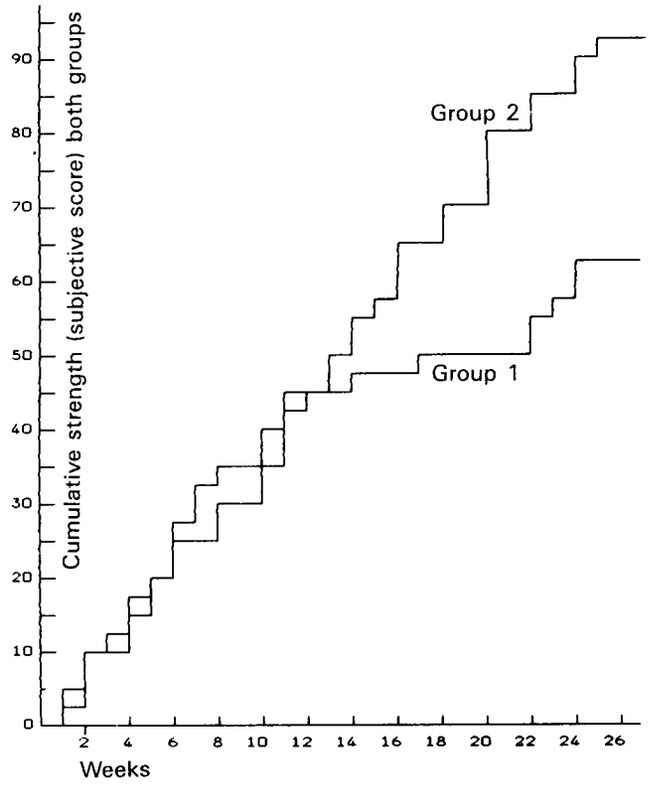

Fig 4: Cumulative strength of common cold in groups 1 and 2 during the trial period

Table 2 summarises the results of the blood tests. There are no significant differences between value in the presence or absence of common colds (longitudinal comparison where each subject is his/her own control). There were also no significant differences between the groups either in the absence or presence of common colds (cross-sectional comparison of experimental and control groups).

Volunteers who subjectively felt high levels of psycho-emotional stress (n=15 from group 1 and n=13 from group 2) suffered from 2.1±1.4 events while the rest (n=22) had 1.0±0.8 colds. Other factors (smoking, working in air-conditioned or non-air-conditioned rooms, living in or out of town, nutritional factors, being 'weather-sensitive', regular sport), which had been estimated using a standardised questionnaire, had no apparent influence on the frequency of common colds. Only descriptive evaluation was performed on these data.

Discussion

The present results imply that both the frequency and the strength of common colds can be reduced by regular hydrotherapy using alternating cold and warm showers. The effect becomes apparent after three months of treatment (figs 2, 3, 4), suggesting a slow, adaptive process induced by this procedure.

Table 2: Results of blood tests (blood count, plasma viscosity, ESR, and electrophoresis)

Parameter	*Dimension*	*During common cold*	*Without common cold*
Group 1			
Leukocytes	$x10^3/\mu l$	7.0± 2.3	7.2± 2.6
Red cells	$x10^6/\mu l$	4.7± 0.7	4.9± 0.6
Haematocrit	%	42.1± 5.0	44.1± 4.5
Mean corpuscular volume	μ^3	88.8± 4.5	89.5± 4.1
Mean haemoglobin content	μg_3	30.3± 1.3	29.8± 1.2
Platelets	mm	210.9± 45.1	233.6±65.0
Erythrocyte sedimentation rate (1h/2h)	mm	8/20± 9.2/19.9	3/11± 2.8/9.2
Plasma viscosity	mPa·sx10	1.20± 0.07	1.12± 0.08
Albumin	%	68.6± 3.9	67.8± 2.3
Alpha 1	%	3.0± 0.7	2.8± 0.4
Alpha 2	%	7.0± 1.1	7.0± 1.0
Beta	%	9.9± 2.1	9.3± 1.0
Gamma	%	11.6± 2.2	13.1± 1.7
Group 2			
Leukocytes	$x10^3/\mu l$	8.4± 2.5	8.4± 2.0
Red cells	$x10^6/\mu l$	4.9± 0.4	4.8± 0.4
Haematocrit	%	44.8± 3.8	44.7± 3.6
Mean corpuscular volume	μ^3	90.2± 2.3	92.7± 2.3
Mean haemoglobin content	μg_3	30.4± 0.9	30.8± 1.1
Platelets	mm	240.0±51.7	246.0±55.2
Erythrocyte sedimentation rate (1h/2h)	mm	9/23± 4/12	8/17± 4/11
Plasma viscosity	mPa·s	1.17± 0.06	1.19± 0.08
Albumin	%	66.5± 4.7	66.6± 2.3
Alpha 1	%	2.8± 0.5	3.0± 0.5
Alpha 2	%	7.8± 1.4	7.5± 1.1
Beta	%	10.0± 1.2	9.2± 0.8
Gamma	%	13.0± 2.6	13.6± 1.1

Other authors advocate similar procedures for the prevention of common colds on the basis of empirical data (Amelung and Wiesner, 1962; Rodbard, 1981; Knight, 1986). Since the days of Kneipp and Priessnitz this line of thought has a living tradition, particularly in Germany. In order not to harm the recipients, a regimen was selected where the volunteer could gradually adapt to the final treatment schedule. Home therapy was chosen because any prophylactic measure against common colds ought to be practical and economical.

This trial was designed to study the effectiveness of the method, not the mechanisms by which it might operate. Thus one can only speculate on the latter point. It has been shown that bathing arms or legs in cold (12°C–15°C) water for one or two minutes reduces the perfusion of the nasal mucosa (Franke, 1973), thus making it vulnerable for viral

infections transmitted to a large extent by air-borne droplets (Anonymous, 1988). This effect could be reduced after a series of treatments ('Kneipp-therapy'), which also entails the application of cold and warm water. Others reported that repeated short thermal stimuli would 'train' body thermoregulation, while long exposure had the opposite effect (Haase *et al*, 1987). Furthermore it has been demonstrated that a complex therapy including hydrotherapeutic measures induces an increase in protein subfractions, possibly indicating an enhancement of immunological defence (Ring, 1976; Ring and Teichmann 1979), which is known to play a role in the development of clinical symptoms of common colds (Callow, 1984). Despite these clues to a possible mechanism, the exact mode of action of the experimental procedure chosen for this study is unknown.

In addition to this drawback, the study had other limitations. The number of people studied was small and the trial period was short. Looking at figures 2, 3 and 4, it is tempting to speculate that the effect would have been more pronounced, if the observation time had been longer. Yet this hypothesis needs experimental testing.

The present results give some indication that psychoemotional stress may predispose to common colds. Experimental animals submitted to stress develop immunological incompetence (Lindemann *et al*, 1978). Others have shown in humans that the strength of common colds is related to psychological factors, personality and stress (Totman *et al*, 1977; Totman *et al*, 1980; Broadbent *et al*, 1984). Thus our finding (even though open to bias) is supported by the literature.

Past attempts to find an effective prophylaxis against common colds had disappointing results, even though there are some fascinating new possibilities (Al-Nakib and Tyrrell, 1986). Summarising all available data on vitamin C, Dykes and Meier (1975) find no evidence for its efficacy in the prevention of common colds. Interferon may work both therapeutically and prophylactically; it is, however, not very practicable mostly due to its high cost (Merigan *et al*, 1973; Panusarn *et al*, 1974) and side effects (Tyrrell, 1987). Vaccinations have so far been unsuccessful because of the vast numbers of virus serotypes (Tyrrell, 1987). Another effective prophylactic measure is the use of virucidal paper tissues (Dick *et al*, 1986). The disadvantage of this approach is, of course, that it only helps to avoid spreading the infection to others, it does not help an individual wishing to protect himself.

In conclusion, the findings suggest that regular warm/cold water hydrotherapy can reduce the incidence and strength of common colds. The effect takes three months to become apparent. Thus an efficient, practical and inexpensive prophylaxis against one of the most frequent (and 'expensive') diseases in man has been identified at last.

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