

## THERAPEUTIC EFFECT OF COMPLEX PHYSICAL FACTORS IN DISEASES OF THE EXTREMITIES DUE TO OVERSTRAIN AND MICROTRAUMATISM

L. Dimitrova, Zh. Zheleva, T. Todorov, I. Dzhedzhev, V. Nestorova,  
Z. Holevich, E. Vladeva

*Department of Physiotherapy, Rehabilitation, Thalassotherapy and Occupational Diseases,  
Medical University of Varna*

### ABSTRACT

The authors treated with drugs and complex physical therapy 65 patients with occupational diseases of the extremities. According to the physiotherapeutic procedures, the patients were divided into five groups: 1<sup>st</sup> - treated with galvanic baths; 2<sup>nd</sup> - with galvanic baths and diadynamic current; 3<sup>rd</sup> - with galvanic baths and short-wave therapy; 4<sup>th</sup> - with galvanic baths and paraffin, and 5<sup>th</sup> - with galvanic baths and high-voltage, low-frequency current. Patient's improvement was evaluated according to the reduction of subjective complaints such as shivering and pain as well as to a series of objective parameters such as muscle strength, skin temperature, time for skin temperature restoration, and peripheral blood flow. The subjective complaints were better influenced than the objective indices. The combination of galvanic baths with short-wave therapy exerted the best effect in the patients with occupational diseases of the extremities.

**Key words:** occupational diseases, preformed physical factors, pain, shivering, skin temperature, peripheral blood flow

### INTRODUCTION

Polysymptomatic pathology of occupational diseases of the extremities which symptomatics originates from heterogenous tissue structures creates considerable therapeutic difficulties. The favourable therapeutic effect requires a long-lasting and combined application of drug treatment and physical therapy. Nevertheless, in these diseases, the complaints commonly persist, often exacerbate and take a protracted course (1).

The aim of the present study is to compare the effect of the individualized application of preformed physical factors in patients with occupational damages of the extremities in order to actualize the complex therapeutic approach.

### MATERIAL AND METHODS

The study covered 65 patients with occupational diseases of the extremities divided into five groups according to the kind of complex physiotherapeutic procedures administered. Group one was treated with galvanic baths only; group two - with combination of galvanic baths and diadynamic current; group three - with galvanic baths and

short-wave therapy; group four - with galvanic baths and paraffin, and group five - with galvanic baths and high-voltage, low-frequency current. The composition of the groups was matched according to sex, age, length of service and severity of diseases.

Physical treatment was carried out on the background of uniform drug therapy and hygienic and dietary regimen. The deviations of the following parameters were followed-up:

1. Subjective complaints: a) shivering in fingers and toes after an eight-grades scale of Merl-d'Obinier modified by Todorov and b) pain in the distal part of the extremities after a ten-grades scale of Borg.
2. Objective indices: a) hand muscle strength measured by means of alternating dynamometry; b) finger skin temperature read by using thermistor thermometer; c) time for restoration of the skin temperature in a mild cold stress, and d) capillaroscopy of peripheral blood flow. The assessment of these parameters was done twofold: immediately prior to the application of the physiotherapy and after a 10-days long course of treatment. Data were statistically processed by the variation and alternative analyses.

### RESULTS AND DISCUSSION

Our results show that there occurs a favourable effect predominantly on the subjective complaints such as shivering and pain in the extremities (Fig. 1). This effect is statisti-

#### Address for correspondence:

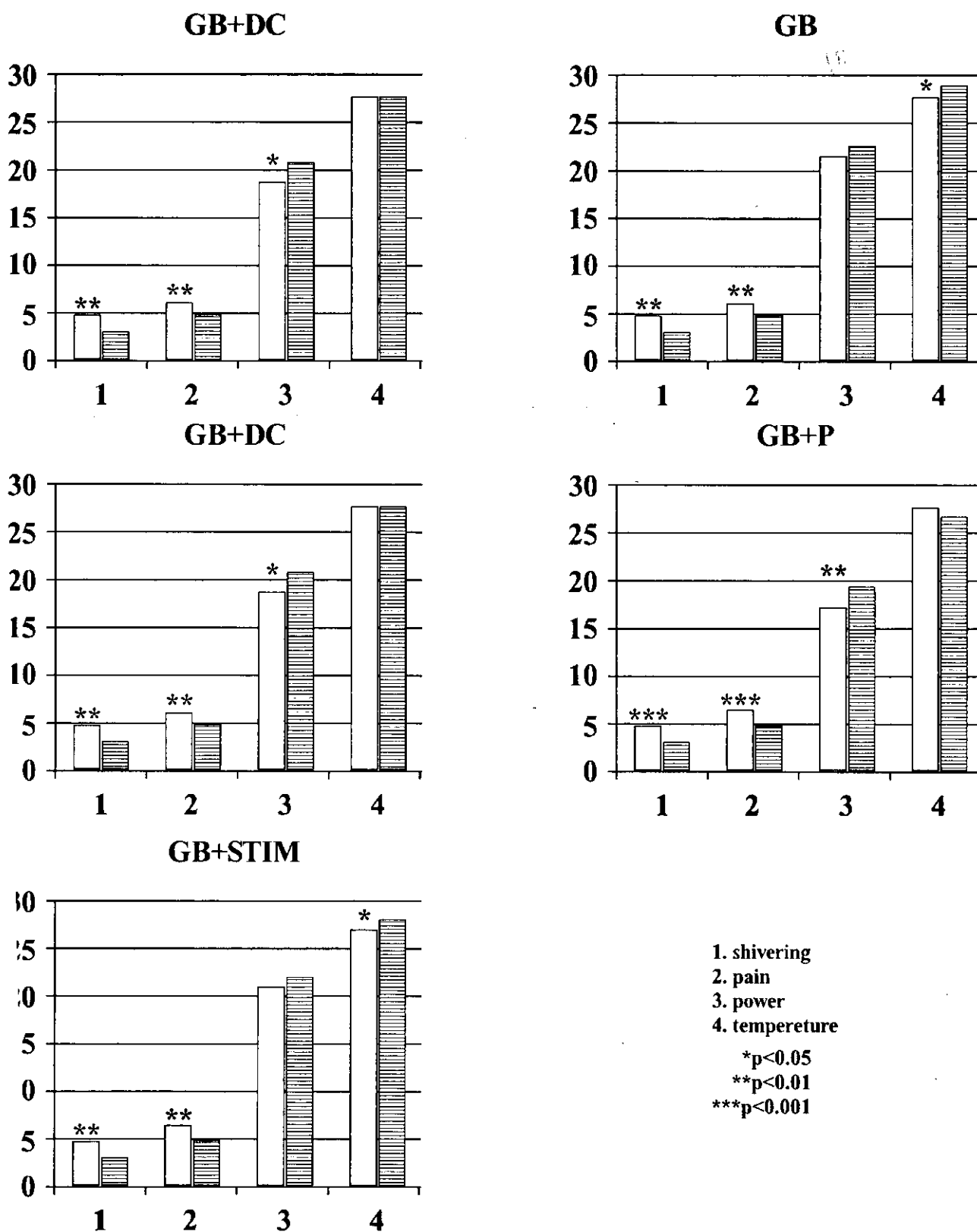
L. Dimitrova, Clin. of Occupational Diseases, Medical University,  
55 Marin Drinov St, BG-9002 Varna, BULGARIA  
E-mail: kpzvub@telecoms.bg

cally verified to be significant in all the groups. The probability of the hypothesis remains highest in the patients from groups three and four.

Most likely, the analgetic effect is related with the influence of the direct paraffin application on sensory nerves along

with the inhibitory action of the short-wave therapy on the receptors and afferent neurons (4).

When applied immediately as a second procedure the galvanic baths potentiate the effect of the aforementioned therapy.



g. 1. Deviations of parameters examined at the onset and after the physiotherapy

It has been established that the combined application of the physical factors results in a stronger statistical correlation than the independent use of the same procedures (3).

The objective symptoms such as muscle strength, skin temperature and time for restoration of the skin temperature are influenced asymmetrically and to a lesser extent as well. However, in the groups with complex acting physical factors the tendency towards restoration of the muscle strength and normalization of the skin temperature is more outlined (5). The latter is statistically most significant in group three followed by that in group five.

The results from the statistical data processing concerning the effect of the galvanic baths alone as compared with the complex physical therapy administered in the rest four groups are demonstrated on Fig. 2. The pain syndrome has been most favourably influenced by the complex treatment except for group two.

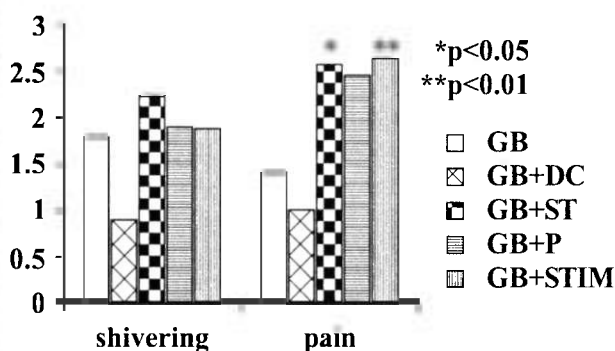


Fig. 2. Comparative evaluation of improvement of the pain and shivering after physical therapy

Therefore, while the combinations of paraffin and galvanic baths and of short-wave therapy and galvanic baths prove to exert an outlined favourable effect the combination of diadynamic current and galvanic baths remains unsatisfactory. We assume that the preceding application of endogenic or exogenic heat potentiates the action of the galvanic baths while the simultaneous application of two low-frequency currents is, possibly, unfavourable as already mentioned in the literature available (2).

The therapeutic effect on the peripheral blood flow was assessed according to the time required for skin temperature restoration. A good effect has been read in 30 to 60 per cent of the patients in all the groups except for the group with paraffin and galvanic baths where an insignificant improvement has been observed. The precise evaluation of this fact has been hampered by the relatively small number of the patients in that group and by the very severe degree of their initial hypothermia.

It could be summarized that the more rapid and outlined effect of the preformed physical factors is, probably, related with their peripheral reflectory action on the pathogenetic mechanisms of pain and shivering in the extremities (6-8). It is likely that both central and peripheral nervous mecha-

nisms of regulation of the peripheral blood flow and skin temperature, respectively, require a longer-lasting treatment with drugs and physical means. The restoration of the muscle strength is related with the influencing upon the nervous and humoral-tropical mechanisms and it is thus a much more difficult task. Taking into consideration the extraordinarily complex interactions within the vegetative regulation at central and peripheral levels we are allowed to state that even the isolated improvement of some symptoms such as pain and shivering possesses a considerable value for the healing process as a whole, indeed.

Based on our results and literature data the following main conclusions could be drawn:

1. The physical therapy influences favourably upon the subjective complaints in patients with occupational damage of the extremities.
2. The combined usage of the preformed physical factors set up as complexes exerts a better effect than their independent application.
3. The objective parameters such as muscle strength, skin temperature and its restoration time can be improved by the complex application of the physical factors only.
4. The comparative assessment of the combined and independent action on the painful syndrome of the galvanic baths proves the advantages of the therapeutic combinations except for the joint usage of the galvanic baths with diadynamic current.
5. We would recommend the administration of the galvanic baths together with short-wave therapy especially in manifested painful syndromes while the joint usage of the galvanic baths with diadynamic current necessitates a further interpretation.

## REFERENCES

1. Клячкин, М. Х., Н. И. Стрелкова. Физические методы лечения в неврологии. Москва, 1991, 320 с.
2. Костадинов, Д., И. Гачева. Ръководство по физикална терапия. Т. 1. София, Медицина и физкултура, 1989.
3. Кююмджиева, М., Ж. Колев, Б. Фортунова, И. Колева. Физик., курорт. и рехабил. мед., 1995, № 1, с. 24.
4. Овнянян, А. А. *Вопр. курортол., физиотер. и леч. физкульт.*, 1993, № 5, с. 23.
5. Шиман, А. Г., В. С. Лобзин, А. В. Максимов, Н. Г. Заволоков. *Вопр. курортол., физиотер. и леч. физкульт.*, 1993, № 5, с. 38-41.
6. Farkkila, M., J. Pyykko, E. Heinonen. *Kurume Med. J.*, 37, Suppl., 1990, 853-860.
7. Kumazama, K., G. Sobue, J. Aizama, N. Nakaо, J. Mitzuma. *Clin. Neurol.*, 30, 1990, 599-604.
8. Lederman, R. J. *Ann. Neurol.*, 26, 1989, 640-646.