

ORIGINAL PAPER

Mater Sociomed. 2014 Dec; 26(6): 364-365

Effects of Sulphate-Sulphide Mineral Water „Mlječanica“ in Patients with Hypertension

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ABSTRACT

Introduction: Arterial hypertension is the main independent risk factor for cardiovascular (CV) disease and death. It affects development and course of cerebrovascular insult (CVI) and chronic kidney disease (CKD). Balneotherapy with sulphide baths was administered to patients having stage I hypertension (BP values 140-159/90-99), with no arrhythmia or pronounced coronary disease. Baths also had advantage in patients having hypertension joined with obesity, diabetes, microangiopathy, and atherosclerosis of peripheral arteries. **Goal:** Determine the effects of sulphate-sulphide mineral baths on stage I hypertension after 10 days therapy. **Materials and methods:** Patients having stage I hypertension were sent to „Mlječanica“ Institute for rehabilitation. All subjects were treated with kinesitherapy and electrotherapy, while experimental group (n=30) was also treated with 20 minute baths, daily, for period of 10 days. **Results:** In experimental group BP level lowered in average 10 mmHg after 10-day therapy, and change was evident even after only 5 days. **Conclusion:** Sulphate-sulphide mineral water „Mlječanica“ caused significant ($p<0.05$) lowering of arterial BP level after 10 days of therapy in patients who had stage I hypertension.

Key words: sulphate-sulphide mineral water, arterial hypertension.

1. INTRODUCTION

Arterial hypertension is the main independent risk factor for cardiovascular (CV) disease and death. It affects development and course of cerebrovascular insult (CVI) and chronic kidney disease (CKD). The hypertension defining threshold is flexible and it depends on blood pressure as well as on overall cardiovascular risk (1). According to European Society of Hypertension (ESH) and European Society of Cardiology guidelines from 2007, stage I hypertension is defined by BP values 140-159 / 90-99. Anti-hypertension therapy in patients having stage I hypertension and high overall CV risk should begin as soon as possible. The goal of the therapy is to lower the BP to 140/90 mmHg, and in high risk patients to 130/80 mm Hg. Results of numerous trials show positive effect of sulphate-sulphide mineral water „Mlječanica“ in different conditions (2, 3, 4). Hypothesis: Application of balneotherapy in experimental group should result in lowering stage I arterial hypertension, compared to application of hydrotherapy in control group.

2. GOAL

Determine the effects of sulphate-sulphide mineral baths on stage I hypertension after 10 days therapy.

3. METHODS

The trial is designed as controlled, randomized, prospective study. The trial protocol was approved by Institute's Ethics Committee and written informed consent was obtained from all participants. Participants were patients sent for rehabilitation

to „Mlječanica“ Institute because of degenerative rheumatism (arthrosis, spondylosis), having also stage I hypertension. Patients with pronounced coronary disease, heart decompensation, hyperthyroidism or neurosis were excluded from trial. Patients were divided in two groups: experimental and control group. All the patients were treated with kinesitherapy and electrotherapy. The experimental group (n=30) was also treated daily with sulphate-sulphide mineral water baths, $t=31-33$ °C, for 20 minutes, 2 hours after breakfast, for 10 days. The control group (n=20) was treated with tap-water bath (hydrotherapy) under same conditions. „Mlječanica“ mineral water is rich in hydrogen sulphide ions which determine specific impact on the whole organism, penetrating the skin and somewhat mucosae (Table 1) (5).

BP values were followed daily, before and after bath treatments, with mercury sphygmomanometer „Spirit“, according to ESH and ECS guidelines (6, 7). Pharmaceutical therapy has been conducted according to ESH and ECS guidelines.

4. RESULTS

Total of 50 patients participated in this trial (32 women, 18 men, average age 65.47), 30 of them in experimental, 20 in control group. Groups were homogeneous regarding sex and age. There were more women in both groups. (Table 2).

In experimental group, after 10 days BP values lowered 10 mmHg in average and the decrease in values is evident already in first 5 days of therapy. Figure 1. In control group there was no significant decrease of arterial BP values. Average decrease

COMPOUND	mg/l	m.mol/l	m/val/l	m.val%	
ANIONS	Hydrocarbon	577.06	9.460	9.460	18
	Chloride	15.80	0.440	0.440	1
	Sulfate	2840.00	21.250	42.500	81
	Phosphate	0.01	0.000	0.000	-
Total mineralization (mg/l)		2932,87			
KATIONS	Sodium	165.00	7.174	7.174	14
	Potassium	7.20	0.185	0.185	-
	Calcium	436.86	10.900	21.800	41
	Magnesium	257.79	10.600	21.200	40
	Strontium	11.20	0.127	0.225	1
	Ammonium	35.00	1.940	1.940	4
	Total mineralization (mg/l)		913.06		

Table 1. Physical chemical analysis of sulphate-sulphide water „Mlječanica“

Age	Experimental group	Control group	Total
41-50	2	0	2
51-60	10	5	15
61-70	12	4	16
>70	6	11	17
Mean	64,21	67,35	65,47

Table 2. Age structure of participants

of 2 mmHg is noticeable on 2nd and 3rd day of therapy, but afterwards values increase again. Diastolic pressure values change in the same way as systolic pressure values in both experimental and control groups. Figure 2. Student t-test showed statistically significant difference (0.05 significance) between average systolic BP before and after 10 days bath therapy in experimental group, which differs in control group.

5. DISCUSSION

Arterial hypertension is one of the greatest health issues of today in both developed and non-developed countries. It largely affects labour force what makes it also a socioeconomic problem. During rehabilitation of patients in “Mlječanica” Institute, regulation of arterial BP was noticed in patients treated with sulphate-sulphide mineral water. Values of systolic and diastolic BP changed in the same way as a consequence of sulphide baths. It should be emphasized that this is our preliminary trial on this subject. The effects of “Mlječanica” mineral water on stage 2 and 3 hypertension are still unknown, as well as long term effects on patients having stage I hypertension. However, any therapy regulating arterial BP even for short term should not be ignored.

6. CONCLUSION

Sulphate-sulphite mineral water “Mlječanica” brought significant decrease of arterial blood pressure values in patients having stage I hypertension, only 10 days after treatment.

CONFLICT OF INTEREST: NONE DECLARED.

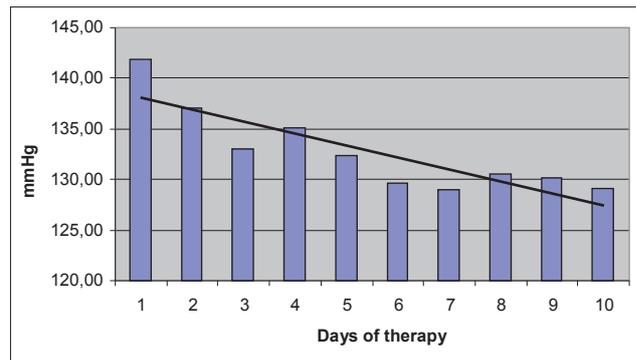


Figure 1. Average daily values of systolic blood pressure in experimental group

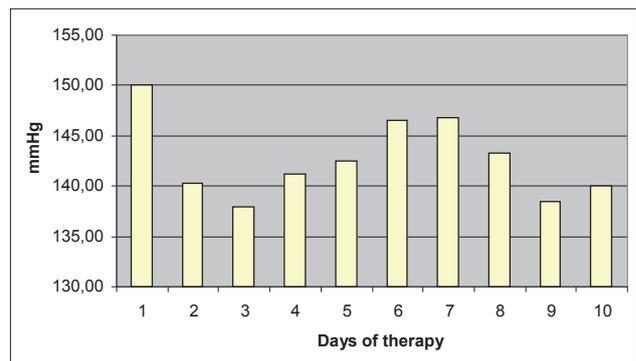


Figure 2. Average daily values of systolic blood pressure in control group

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