HEALING MUD FROM SECOVLJE SALTPANS

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Abstract
The Secovlje saltpans are the northernmost in the Adriatic Sea. Salt is recovered from sea water by solar evaporation and during this process two side products are produced - salt pan mud and brine, both of which have healing effects. Due to its balneological features, healing mud (peloid) is used to threat various diseases and to improve general health and well-being. In order to determine the composition of the mud to be used for pelotherapy different chemical and mineralogical analysis were performed.
Keywords: Adriatic Sea, Coastal Systems, Chemical Analysis

Introduction
The Secovlje saltpans are the northernmost in the Adriatic Sea and one of the few in the Mediterranean where salt is still produced in the traditional way. Salt is recovered from sea water by solar evaporation and during this process twoside products are produced - salt pan mud and brine, both of which have healing effects. Due to its balneological features, healing mud (peloid) is used to threat various diseases and to improve general health and well-being. The mechanisms responsible for these therapeutic features are generally considered to be associated with physical/chemical and thermal effects of the mud [1,2].

Materials and methods
Mud samples were taken on 8th January 2009 at five different sites (M1, B2, D1, L1, P2) in the area of the Secovlje saltpans. The samples were freeze-dried and grounded to a fine powder for analysis. FT-IR spectra were obtained on homogenized samples using a Perkin-Elmer Spectrum One spectrometer. The organic carbon (OC) and total nitrogen (TN) contents were determined with a Carlo Erba model 1108 elemental analyzer. The carbohydrate content was determined spectrophotometrically after Dubois [3], while the proteint content was determined using the Bradford reagent [4]. The mineral composition of the muds was determined bx X-ray powder diffraction (XRD).

Results and discussion
In order to determine the composition of the mud to be used for pelotherapy chemical and mineralogical analysis were performed on samples from five different sites in the area of the Secovlje Salina. Three samples were taken from the crystallizing salt basins (P2, L1, B2), where the mud is exposed to higher water salinity, while the samples D1 and M1 were collected on the river Drnica and channel Curto, which are used for water supply to the saltpans. Organic matter content (Table 1) was overall rather low (0,8-2,3 wt.%), with the highest value at site M1. The values of carbohydrate and protein content were more even, with higher values for samples from the crystallizing salt basins.

Tab. 1. Organic carbon (OC), total nitrogen (TN), carbohydrate (CHO) and proteins (PRT) content.of mud samples from sites M1, L1, D1, P2 and B2.

sample	OC	TN	CHO	PRT
	(%)	(%)	(mg/g)	(mg/g)
M1	2,3	0,1	6,2	3,5
P2	1,4	0,2	6,6	0,1
D1	0,8	0,1	3,4	-
L1	1,2	0,1	3,1	0,5
B2	1,0	0,1	6,5	0,1

The FT-IR spectra (Figure 1) of the mud from all five sites revealed carbonates (2513, 1795, 1420-1450, 876 and 713 cm^{-1}), silicates (1870, 1160, 1020, 799, 780, 695 and 530 cm^{-1}) and clay minerals (3625 cm^{-1}) as the major inorganic components. The organic carbon is confirmed by peaks at 3000-2800 cm^{-1} (CH_2 and CH_3 groups), 1641 cm^{-1} (Amide I) and 1150-1000 cm^{-1} (carbohydrates). Mineralogical analysis confirmed calcite, quartz, halite, muscovite, manganium oxide and clay minerals as the major components.

The database from this study will provide essential data for establishment of normative regulations (standard criteria) and thermal mud production.

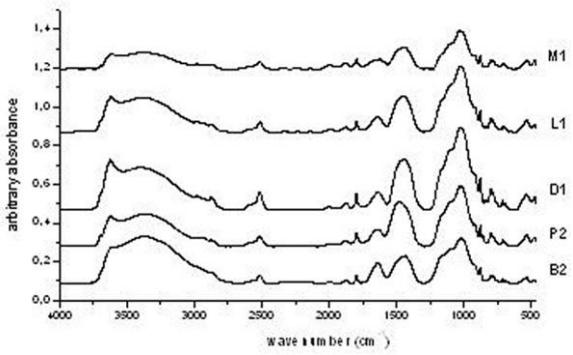

Fig. 1. FT-IR spectra of samples from sites M1, L1, D1, P2 and B2.

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