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Novel therapeutic indications – the mineral water of Termas de Águas Spa (Penamacor, Portugal)

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Abstract

Thermal mineral waters are a potential resource in the economic development of a region. The thermal Águas Spa is located in the inner region of central Portugal and its grant will enable the exploration and exploitation of this water resource for medical and therapeutic purposes through a thermal medical spa. The study area is located in the Central Iberian Zone, central Portugal, at the village of Águas, about 42 km NE of Castelo Branco and 5 km south of Penamacor. The main idea of this research is to establish the principal water characteristics that allowed its recognition, by the Portuguese Ministry of Health, for rheumatic and respiratory diseases treatment. Termas de Águas Spa has a current use groundwater catchment located in the granitic pluton of Penamacor-Monsanto, which intruded the schist-metagraywacke complex. Topically, there are dispersed alluvial materials from the Ribeira das Termas; the main river through the survey area. This thermal mineral water aquifer is located in a slightly altered granite, highly fractured, corresponding to a semi-confined – confined aquifer, with superficial runoff groundwater recharge. The groundwater catchment (AM4), about 328 m deep, holds an average flow of 0.8 L/s. The main features of the mineralized water are: temperature of 19°C, neutral pH (pH = 7.3), low mineralization (total mineralization = 244 mg/L), sulphurous ($H_2S = 0.31$ mg/L), sodium and bicarbonate type ($HCO_3^- = 128$ mg/L, Na = 56.4 mg/L), slightly fluoride ($F^- = 2.5$ mg/L) and substantial amounts of silica ($SiO_2 = 35.8$ mg/L), corresponding to 15% of the total mineralization. A physico-chemical comparison between the groundwater of the catchment AM4, and similar waters, corresponding to the main Portuguese thermal units, shows a lower pH (pH range = 8.3-9.5) and a lower fluoride content (global average of F = 9.9-24.0 mg/L). These features may introduce novel utilities concerning to hydrotherapy, particularly in the treatment of rheumatic and respiratory diseases.