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Mineralogic-chemical and physical characteristics of the mud in İzmir (western Turkey): suitability for use in pelotherapy

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Abstract: The study conducted on peloid used spas in İzmir city region (western part of Turkey) included the investigation of the mineralogical, physico-chemical and geochemical properties of the three types of peloid samples in order to assess the suitability of the material for healing- aesthetic-related purposes. In situ formed muds in lagoons near the Aegean Sea (named as first group) and inner swamp muds (second group) unprocessed and raw have been using therapy and thermal baths. Mud and hot springs at around the Aegean Sea have been popular since ancient times for the treatment of rheumatic diseases, musculoskeletal disorders in the region. The mineralogical characteristics of the thermal muds are in accordance with the geological origin of the material and water sources. Mineralogic composition, mineral content and morphologic properties of the samples were determined by X-ray diffraction (XRD) and scanning electron microscopy (SEM-EDS). Chemical composition of the muds and thermal waters were determined by ICP-EAS and ICP-MS. Both of the sediment is fine- to medium size-grained and composed mostly of clay minerals, partially quartz, feldspar, carbonates, and halite, and rarely gypsum. The mineralogic composition of the muds controls the physico-chemical properties of the muds. Anion e.g., Cl, Br, and SO4, contents the thermal waters of the first group is extremely different and so the springs contain a high level of sodium chloride, magnesium sulphate, and calcium bicarbonate. The water temperature is 45 oC with a pH of 6.95 and electrical conductivity (EC) is 4.5 mS/lt in the first group while 71 oC with a pH 6.58 and EC is 2.52 mS/lt in the second ones. However, major and some of the trace element concentration of the mud samples are nearly similar, As, Cd, Cu, Hg, Ni, Sb, Se, T and Zn content of the first group is exceptionally lower than the second ones. And the hazardous element concentrations are extremely higher than the pharmaceutical clay in the second group peloids and also in thermal water, the element concentrations is not acceptable limits for peloids and waters. The element concentration is sourced from active fault system and low temperature precious metal deposits in the area which is widespread the thermal water circulated in. The anion contents of the water are related to sea water interaction. BET surface areas, plasticity, adsorbing, abrasiveness, hygroscopic water and cooling kinetics the characteristics both of the muds are nearly similar. However, cation exchange capacity and viscosity properties of the second group muds are better than the second, the physico-chemical properties both of the mud material are in acceptable level to some extent. Nevertheless, the appropriate characteristics of the second group muds when compared to some commercial used mud for medicinal and aesthetic purposes, if the hazardous element concentrations regulated.