

## **OBSERVATIONAL ANALYSIS OF THERMAL WATER FROM KANJIŽA SPA AS POTENTIAL "GREEN" RAW MATERIAL FOR DERMATOCOSMETIC PREPARATIONS**

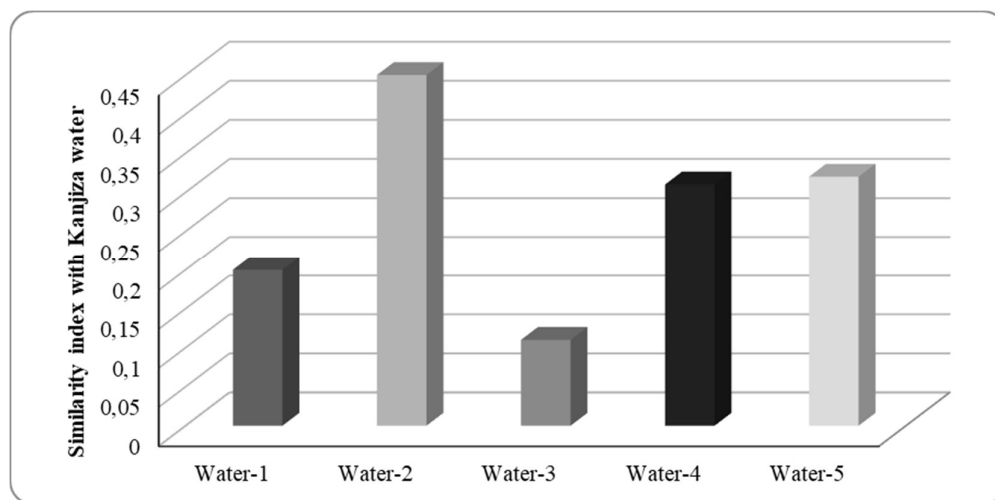
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Thermal waters have certain physico-chemical characteristics that indicate their therapeutic functions. In the Special Hospital for Rehabilitation Kanjiža Spa, alkaline hydrocarbon sulfide thermomineral water is used within balneotherapy for the purpose of treatment of patients, which has not been researched from the aspect of cosmetic application so far. The aim of this study is, on the one hand, to preliminary, qualitatively investigate the potential effect of thermal water from Banja Kanjiža as a raw material for the formulation of cosmetic products, and on the other hand, based on obtained results to preliminary prove its use as a raw material in green pharmacy.

In this paper, the method of observation was used in order to look at and investigate how certain European thermal waters perform related to their composition, based on the available literature. On the other hand, there was a statistical analysis and correlation of the results of the analysis conducted with the aim to observe the thermal water from the Kanjiža Spa and five thermal waters used as raw materials for the production of cosmetics/dermatocosmetics of several European spas, such as Avene, La Roche Posay, Uriage, Vichy and Jonzac.

The result of the correlation in the case of Water-2 is 0.45, ie. the similarity of thermal water Water-2 and thermal water from Kanjiža in this mathematical analysis (Jaccard and Kosinus index) is 45%, which is the greatest similarity compared to the others. Based on a review of the literature and statistical comparison of the composition of thermal waters (Figure 1), we can assume that the thermal water from Kanjiža Spa, similar to European thermal waters to which it was compared, could have potential antimicrobial, keratoplastic, anti-inflammatory and antioxidant (1, 2) effects. It is also thought to be able to stimulate fibroblast activity, which would increase the amount of fibers in the dermal layer of the skin and show a potential *anti-aging* effect (3).



**Figure 1. The results of the analysis of the composition of thermal Kanjiža water and five thermal waters indicated by codes 1-5.**

If the manufacturing of cosmetic products incorporated thermal Kanjiža water instead of purified water, the ecological footprint of the thus made cosmetic product can be reduced. It is assumed that its use could reduce the use of preservatives and antioxidants or cosmetic active substances (antimicrobial agents, keratolytics, or fibroblast proliferators), which themselves can be harmful to nature.

### References

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2. Yoan E, Marie-Florence G, Daniel R, Eric E. Effect of thermal spring water on human dendritic cell inflammatory response. *J Inflamm Res.* 2019; 12: 181–194.
3. Araújo LA, Addor F, Campos PMBGM. Use of silicon for skin and hair care: an approach of chemical forms available and efficacy. *An Bras Dermatol.* 2016; 91(3): 331–335.

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# **OPSERVACIONA ANALIZA TERMALNE VODE IZ BANJE KANJIŽA KAO POTENCIJALNE „ZELENE” SIROVINE ZA DERMATOKOZMETIČKE PREPARATE**

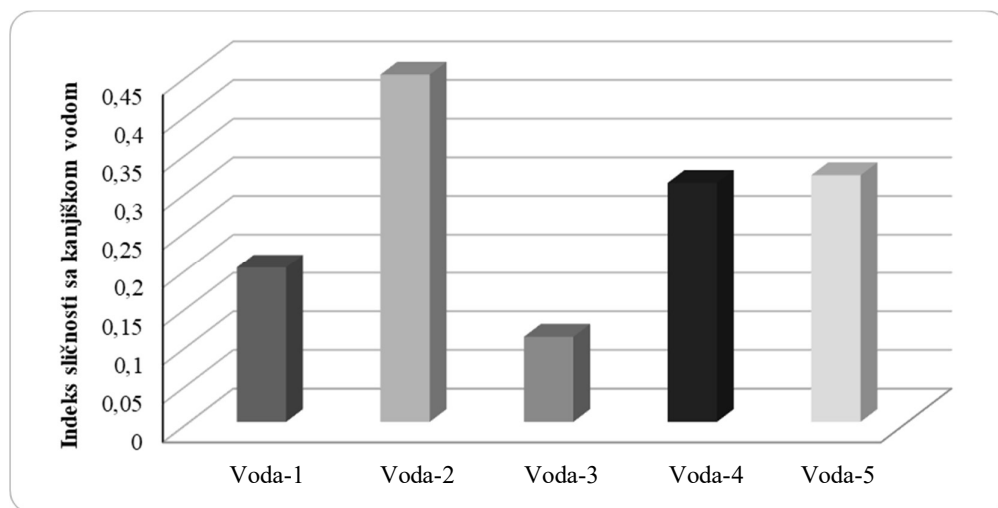
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Termalne vode imaju određene fizičko-hemijske karakteristike koje ukazuju na njihove terapijske funkcije. U Specijalnoj bolnici za rehabilitaciju Banja Kanjiža u okviru balneoterapije u cilju lečenja pacijenata primenjuje se alkalna ugljovodonična sulfidna termomineralna voda, koja do sada nije istražena sa aspekta kozmetološke primene. Cilj ove studije je, sa jedne strane, da se preliminarno, kvalitativno istraži potencijalno delovanje termalne vode iz Banje Kanjiža kao sirovine za formulaciju kozmetičkih proizvoda, a sa druge strane, da se na osnovu dobijenih rezultata preliminarno dokaže njena primena kao sirovine u zelenoj farmaciji.

U ovom radu korišćena je metoda opservacije kako bi se na osnovu dostupne literature sagledalo i istražilo kako deluju pojedine evropske termalne vode u odnosu na njihov sastav. Sa druge strane, urađena je statistička analiza i korelacija rezultata analize termalne vode iz banje Kanjiža i pet termalnih voda koje se koriste kao sirovine za proizvodnju kozmetičkih/dermatokozmetičkih preparata nekoliko evropskih banja, kao što su Avene, La Roche Posay, Uriage, Vichy i Jonzac.

Rezultat korelacije u slučaju Voda-2 je 0,45, tj. sličnost termalne vode Voda-2 i termalne vode iz Banje Kanjiža u ovoj matematičkoj analizi (Jaccard i Kosinus indeks) iznosi 45%, što je najveća sličnost u odnosu na ostale termalne vode. Na osnovu pregleda literature i statističkog upoređivanja sastava termalnih voda (Slika 1.) može se pretpostaviti da termalna voda iz Banje Kanjiža, poput evropskih termalnih voda sa kojima je upoređivana, može imati potencijalno antimikrobno, keratoplastično, umirujuće i antioksidativno (1, 2) delovanje. Takođe, pretpostavlja se da može da stimuliše aktivnost fibroblasta, čime bi se povećala količina vlakana u dermalnom sloju kože i pokazao potencijalni *anti-aging* efekat (3).



**Slika 1. Rezultati analize sastava termalne vode Banje Kanjiža i pet termalnih voda obeleženih kodovima 1-5.**

Ukoliko bi se izradu kozmetičkih proizvoda koristila termalna kanjiška voda umesto prečišćene vode, ekološki otisak izrađenog kozmetičkog preparata može da bude smanjen. Pretpostavlja se da bi njenom primenom mogla da se smanji primena konzervanasa i antioksidanasa ili kozmetički aktivnih supstanci (antimikrobne supstance, keratolitici ili proliferatori fibroblasta), koji sami po sebi mogu da budu štetni za prirodu.

#### Literatura

1. Rodrigues L, Ekundi-Valentim E, Florenzano J, Cerqueira ARA, Soares AG, Schmidt TP, Costa SKP. Protective effects of exogenous and endogenous hydrogen sulfide in mast cell-mediated pruritus and cutaneous acute inflammation in mice. *Pharm Res.* 2017; 115: 255–266.
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#### Zahvalnica

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