

OPPORTUNITIES FOR THERAPY OF MUSCULOSKELETAL DISEASES THROUGH BALNEOTHERAPY AND SPA TOURISM

I. Dimitrov

Department of Tourism, University of Economics – Varna, Bulgaria

Abstract. *This article aims to review the possibilities and existing recommendations for the application of balneotherapy and SPA therapy in musculoskeletal diseases (MSDs), as well as the possibilities for their integration into the health and tourism sector. The recommendations of the international medical community place balneotherapy alongside physiotherapy as an important element in treating patients with inflammatory and degenerative joint diseases. The article showed clear data that a number of studies prove a significant reduction in pain, improvement in functional capacity and quality of life in osteoarthritis, fibromyalgia, and other conditions. Favorable biological effects on cortisol levels and inflammatory markers are also observed. European comparative analyses emphasize the social importance of balneotherapy, related to access, financing, and health policy. In Bulgaria, there is a wide network of specialized medical and sanatorium facilities, supported by the Ministry of Health and the National Social Insurance Institute.*

Key words: *diseases, musculoskeletal system, balneotherapy, SPA tourism*

INTRODUCTION

Diseases of the musculoskeletal system include a wide range of degenerative, inflammatory joint diseases and soft tissue rheumatism (involving the periarticular soft tissues). The different pathogenesis of the disease in these groups of disorders is the basis for the established therapeutic algorithms that require a comprehensive approach. Drug therapy is an essential component in combination with the possibilities of physical and rehabilitation medicine. In patients with inflammatory joint diseases (IJD), the main goal is to influence pain, stiffness, and improvement in the functional capacity of the peripheral joints and the spine [6, 7]. The main instruments that assess quality of life and are used to objectively improve the patients are Visual Analog Scales (VAS), the patient's global assessment of pain, the Health Assessment Questionnaires (HAQ) and its variant, assessing the disability index (HAQ-DI), as well as other questionnaires that include indicators of mental and physical health (SF-36) [7, 8, 9]. A number of recommendations for non-pharmacological treatment from the European Alliance of Associations for Rheumatology (EULAR) include balneotherapy (spa therapy) as beneficial for patients with chronic rheumatic diseases, degenerative diseases, as well as fibromyalgia and other diseases [9, 10, 11, 12].

The term “balneotherapy” has its roots in the Latin word “balneum” (bath). Historically, since Roman times, it has been used most often for procedures involving the use of mineral waters for bathing, drink-

ing, and inhalation (most often in Eastern European countries) [7]. In 2010, Gutenbrunner et al. proposed a definition for “balneotherapy,” according to which the use of mineral waters, peloids, and gases is the basis of balneological treatment [13]. However, the lack of precise and clear definitions in the literature is at the core of the difficulties in positioning SPA (Sanus per aquam) therapy and climatotherapy internationally [13].

Similar to other European countries, there are specialized hospitals for rehabilitation, wellness, and spa centers in the territory of the Republic of Bulgaria, which offer programs with different focuses, depending on the patient's diagnosis. The Ministry of Health (MoH) is the principal of “Specialized Rehabilitation Hospitals – National Complex” LTD. The specialized departments perform specific rehabilitation procedures on the territory of the country, in areas rich in natural healing sources: mineral waters, healing mud, and favorable climatic conditions for the treatment of certain diseases [14].

The aim of this literature review is to summarize the recommendations for the application of balneotherapy in various disorders of the musculoskeletal system and to reveal the possibilities for treatment through SPA tourism.

MATERIALS AND METHODS

A search was conducted in the databases of Web of Science, Google Scholar, and PubMed. A total of 6147 literature sources were identified based on the

specified keywords: balneotherapy, SPA therapy, rehabilitation, osteoarthritis, rheumatoid arthritis, ankylosing spondylitis, psoriatic arthritis, inflammatory joint diseases, fibromyalgia, and treatment recommendations. After a selection of the publications was conducted, some of them were eliminated according to the inclusion and exclusion criteria (missing full text, language other than Bulgarian and English, more than 20 years old, repetition of publications). The total number of publications selected for review in this overview is 32. The selection process is presented in detail in Fig. 1.

RESULTS

The updated EULAR recommendations for the treatment of various inflammatory joint diseases and osteoarthritis classify SPA therapy, along with physiotherapy, as key factors in treating these patients with a stabilized disease course [9, 10, 15]. For patients diagnosed with fibromyalgia, balneotherapy is recommended, including warm mineral springs [9]. The recommendations are based on the results of 5 randomized clinical trials [9, 16]. Multiple clinical studies show the beneficial effect of balneotherapy in patients with osteoarthritis of the hand joints [11, 17]. Fioravanti et al. are conducting a study to assess the short-term and long-term effectiveness of balneotherapy in patients with primary osteoarthritis of the hand joints [17]. A total of 60 patients were included, who were radiographically assessed with a score of I - III according to Kellgren and Lawrence, with the majority of patients being rated with grade

I and II. These patients were divided into 2 groups, each consisting of 30 individuals. The first group underwent 12 daily sessions consisting of local application of therapeutic mud and baths with mineral water. The other control group remained on their regular regimen (exercises, non-steroidal anti-inflammatory drugs (NSAIDs), and/or analgesics) [17]. Patients were monitored for a period of 12 months, with visits at enrollment in the study, in two weeks, followed by assessments at 3, 6, 9, and 12 months. The primary endpoints were assessment of global spontaneous pain in the hand using a Visual Analog Scale (VAS) and evaluation using the Functional Index for Hand Osteoarthritis (FIHOA); the secondary endpoints included improvement in quality of life assessed by (HAQ), duration of morning stiffness, SF-36, and intake of symptomatic medications. The results of Fioravanti et al. demonstrate a significant reduction in pain as well as an improvement in quality of life (assessed through all used scales) in the group that underwent balneotherapy. In the control group, no significant changes were observed in the monitored indicators [17].

Other publications also prove the beneficial effect of balneotherapy on health. Antonelli and Donelli, present interesting results in their literature review on the impact of balneotherapy, mud therapy, peloid use, and SPA therapy on cortisol levels in the body (studied in serum and saliva) [18]. Fifteen studies were included, with a total of 684 participants. Five studies focused on the biological effects of balneotherapy as a stand-alone application.

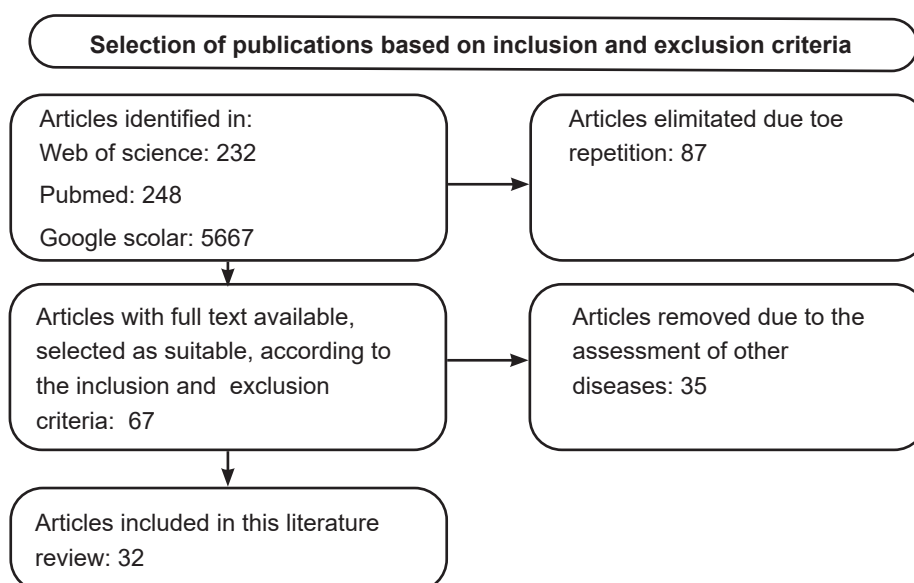


Fig. 1 Selection of publications according to inclusion and exclusion criteria

Two of them reported significant changes in cortisol levels in healthy participants and a significant beneficial effect. The other three studies reported no significant variations in patients with rheumatic diseases [18]. However, there is insufficient data on the combined effect of balneotherapy, mud therapy, and peloid therapy. In conclusion, the authors summarize that balneotherapy has the potential to influence cortisol levels in healthy individuals in a way that improves resilience to daily stress. SPA treatment, in combination with or without the addition of mud and/or peloid treatments, demonstrates the same potential to influence cortisol levels in both healthy individuals and patients with diagnosed diseases [18]. Two other author collectives – Tenti et al. as well as Szenczi et al. give us information about the beneficial effect of balneo-sanatorium treatment and its impact through its antioxidant and anti-inflammatory effect, reducing the release of free radicals, nitrogen, and inflammatory mediators, such as prostaglandin E2 (PGE2), leukotriene B4 (LTB4), adipokines, and proinflammatory cytokines in preclinical models capable of reproducing osteoarthritis conditions and in osteoarthritis patients [19, 20]. In addition to these results, increased cortisol levels have been found in patients with gonarthrosis [18, 21]. Despite insufficient data at present, available studies suggest that balneotherapy may modulate important factors involved in the pathogenesis of the disease [11].

In 2023, an interesting comparative analysis was published by de Oliveira et al., which examined the accessibility and usefulness of balneotherapy in the field of public health in four European countries: Spain, France, Italy, and Portugal [22]. The authors present a systematic review of the data from the available 22 documents published in the period from 2000 to 2022, categorizing the data into seven categories. Special attention is paid to the historical plan and the characterization of the social component of thermal therapy in the analyzed systems. The other components focus on elements of health systems related to access, financing, workforce, innovation and available technologies, organization and regulation, and networked service delivery [22]. Special attention is paid to the insurance models and social security and the criteria for payment of balneological treatment. The main specialists who represent the human resources are doctors with competence in medical hydrology. In different countries, the main differences are the number of days and procedures paid for according to the different insurers and health systems. The main structure involved in the regu-

lation of services is the Ministry of Health. In all of the listed countries, the procedures are performed in specialized spa facilities [22].

Due to the identified disparities in healthcare systems, EULAR launched the “RheumaFacts” initiative [23]. It is dedicated to collecting data on rheumatic and musculoskeletal diseases and their impact on individuals, society, and the health economy in all countries represented within the EULAR membership. One of the main parameters that significantly contributes to the treatment of patients with rheumatic diseases is physiotherapy, rehabilitation, and balneo-sanatorium treatment. Each country provides data on the methodology and strategy for delivering these services to patients with rheumatic diseases. Of the 40 invited national societies, 30 participated, with some countries establishing a similar approach and process for providing access to physiotherapy and balneo-sanatorium treatment – examples of this are Bulgaria and Romania [23]. Additional data will be published next year, when all available information, including pharmacoeconomic aspects, will be summarized and analyzed [23].

Currently, in Bulgaria, there are programs of the National Social Security Institute (NSI) for health restoration, which are focused on prevention and rehabilitation of diseases of the musculoskeletal system, respiratory system, cardiovascular system, urogenital system, gynecological diseases, as well as diseases of the peripheral and central nervous system [24]. The conditions for the use and payment of cash benefits for prevention and rehabilitation, as well as the procedures for the selection of legal entities (hotels, balneo-sanatoriums), are determined by Regulation No. 1 of 13.02.2007 on the use and payment of cash benefits for prevention and rehabilitation (NPIPPPPR) [25]. The right to financial assistance for prevention, rehabilitation, and physiotherapy is at the discretion of the general practitioner, but rheumatology specialists also have the opportunity, after hospitalization, to refer their patients for balneo-sanatorium treatment and physiotherapy [25].

Physical and Rehabilitation Medicine (PRM) is a clinical medical specialty with a predominantly therapeutic focus, which studies the biological impact of natural and modified physical factors on the human body and applies them for the needs of prevention, diagnosis, therapy, medical rehabilitation, and the overall psycho-somatic recovery of the individual [26]. The medical standard “Physical and Rehabilitation Medicine”, published in 2009 and

amended in 2010, includes a general description and definition of the main concepts in the specialty, tasks, and requirements for the level of competence [26]. The document also includes special requirements for the structures and equipment for PRM. Specialized rehabilitation hospitals include in their structures a balneotherapy, lye treatment, peloid therapy, or other section/department according to the specific natural factor [26].

Thanks to the diversity of Bulgaria's natural resources, there are numerous treatment options. There are 102 mineral water deposits (exclusive state property) on the country's territory, with more than 370 water intake facilities (boreholes and captured natural springs). Mineral water deposits – public municipal property, are more than 40 in number and have been discovered with more than 65 water intake facilities (boreholes and captured natural water sources) [27].

In comparative terms, Bulgaria significantly outperforms the countries with well-developed balneology and spa tourism around us in terms of the number of springs, diversity of composition, and water temperature [28]. Only Iceland surpasses the Republic of Bulgaria in terms of the number and average temperature of its springs [29].

Table 1. General characteristics of mineral springs in Iceland, the Czech Republic, Hungary and Bulgaria. (Adapted from Shterev K. *Atlas of Geothermal Resources of Europe*)

	Iceland	Czech Republic	Hungary	Bulgaria
Number of mineral springs	700	463	450	600
Average temperature of min. water	90° C	70° C	65-70° C	70-75° C
The warmest spring	150°C /300° C	73° C	96° C	103° C

Legislation in this direction in Bulgaria dates back to before the 20th century, as in 1891, by Decree No. 13, Prince Ferdinand approved the First Law on Hot and Cold Mineral Waters, where in Chapter 1, Art. 1 it is stipulated that all known mineral hot and cold waters today are state property and are managed in accordance with this law. The law was published in the State Gazette, 113, No. 274, 1891

Currently, in the expanding field of health tourism, respectively SPA and medical, the legal and regulatory framework is gradually regulating the status of accommodation enterprises. This was achieved through the already cited Regulation No. 4 on the conditions and procedure for certification of "balneotherapy (medical SPA) center", "spa center", "wellness center" and "thalassotherapy center".

Regulation No. 4 is timely and significant not so much for the definitions presented in the appendix, but mostly because it defines two important rules for: first – the conditions and procedure for certification of independent and adjacent to accommodation facilities in resort and urban environments balneological (medical SPA), SPA, wellness and thalassotherapy centers, and second – the minimum mandatory requirements for construction, furnishing and equipment, maintenance, services offered and professional and language qualifications of the staff, which the respective centers must meet in order to receive a certificate for "Balneotherapy (medical SPA) center", "SPA center", "Wellness center" or "Thalassotherapy center" [30].

Balneological complexes are divided mainly into two groups: balneotherapy and balneotherapy rehabilitation. The former includes balneotherapy hotels – climatic and balneotherapy hotels. Balneotherapy rehabilitation complexes are specialized rehabilitation hospitals (SRH) [30].

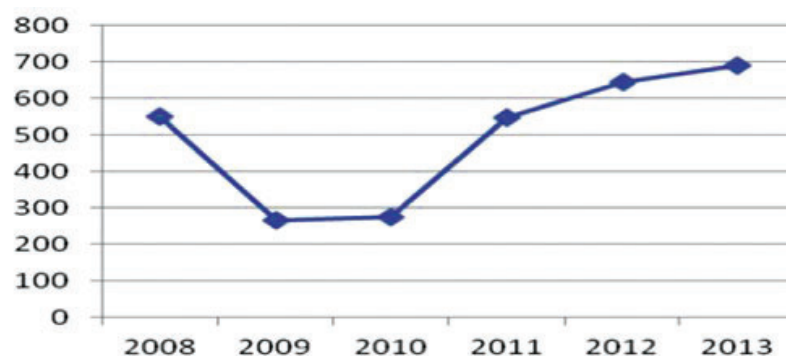


Fig. 2. Number of Spa and Wellness hotels in Bulgaria by year source: NSI [31]

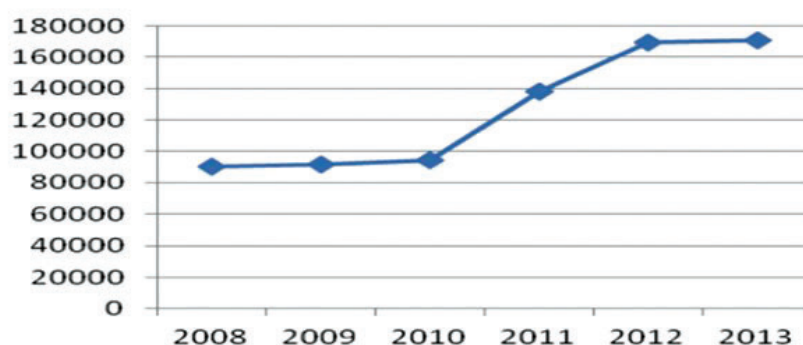


Fig. 3 Number of Spa and Wellness beds in Bulgaria by year source: NSI [32]

The development and interest in this type of tourism is steadily growing. Both the number of hotels and the number of beds in those already built are increasing.

The breakthrough in the international development of balneology, medical and spa tourism in Bulgaria occurred in 2019, when a historic document was signed, allowing German citizens to treat a certain number of illnesses in resort complexes in Bulgaria and then have their funds reimbursed by their health insurance funds upon their return to Germany.

CONCLUSION

Studies have shown the potential of balneotherapy for the treatment of various degenerative, inflammatory joint diseases, as well as soft tissue rheumatism. International recommendations confirm the extremely important role in the recovery process, prevention of disability and improvement of the quality of life in patients with various diseases of the musculoskeletal system.

References

1. Такева И, Попова И, Илиева И. Рехабилитация на пациенти с КОВИД и пост – КОВИД симптоми. Физикална медицина, рехабилитация, здраве: 19(3-4):18-26, 2020.
2. Мръцкова Г. Терапевтични ефекти на лечението с климатични фактори при пациенти с long COVID- 19 или post COVID-19 syndrome. Science & Technology. XIII, 2023. 142-148.
3. Колева И, Йошинов Б. Въведение във Физикалната превенция, физикалната терапия и рехабилитацията. (стр. 95-130), Стено, 2022, София ISBN 978-619-241-184-8
4. Gebretsadiq A, Taddesse F, Melaku N, Haji Y. Balneotherapy for musculoskeletal pain management of hot spring water in southern ethiopia: perceived improvements. Inquiry. 2021 Jan-Dec; 58:469580211049063. doi: 10.1177/00469580211049063.
5. Gutenbrunner C, Bender T, Cantista P, Karagülle Z. A proposal for a worldwide definition of health resort medicine, balneology, medical hydrology and climatology. Int J Biometeorol. 2010; 54:495-507
6. Tognolo L, Coraci D, Fioravanti A, et al. Clinical Impact of Balneotherapy and Therapeutic Exercise in Rheumatic Diseases: A Lexical Analysis and Scoping Review. Appl. Sci. 2022, 12, 7379. <https://doi.org/10.3390/app12157379>
7. Verhagen AP, Bierma-Zeinstra SM, Boers M, et al. Balneotherapy (or spa therapy) for rheumatoid arthritis. Cochrane Database Syst Rev. 2015 Apr 11;2015(4):CD000518. doi: 10.1002/14651858.CD000518.pub2.
8. Karagülle M, Kardeş S, Karagülle O, et al. Effect of spa therapy with saline balneotherapy on oxidant/antioxidant status in patients with rheumatoid arthritis: a single-blind randomized controlled trial. Int J Biometeorol. 2017 Jan;61(1):169-180. doi: 10.1007/s00484-016-1201-4.
9. Françon A, Forestier R. Thermalisme en rhumatologie: indications a partir des recommandations françaises pour la pratique clinique de la Haute Autorité de Santé et européennes de l'European league against rheumatism et de dix-neuf essais cliniques randomisés [Spa therapy in rheumatology. Indications based on the clinical guidelines of the French National Authority for health and the European League Against Rheumatism, and the results of 19 randomized clinical trials]. Bull Acad Natl Med. 2009 Jun;193(6):1345-56; discussion 1356-8. [in French].
10. Smolen JS, Landewé RBM, Bergstra SA, et al. EULAR recommendations for the management of rheumatoid arthritis with synthetic and biological disease-modifying antirheumatic drugs: 2022 update Annals of the Rheumatic Diseases 2023; 82:3-18.
11. Maccarone MC, Scanu A, Regazzo G, et al. Hand Osteoarthritis: Is Balneotherapy Useful? Bridging the Gap in the Literature with a Scoping Review of Randomized Controlled Trials. Appl. Sci. 2023, 13, 10839. <https://doi.org/10.3390/app131910839>
12. Moseng T, Vliet Vlieland TPM, Battista S, et al. EULAR recommendations for the non-pharmacological core management of hip and knee osteoarthritis: 2023 update. Ann Rheum Dis. 2024 May 15;83(6):730-740. doi: 10.1136/ard-2023-225041.
13. Gutenbrunner C, Bender T, Cantista P, Karagülle Z. A proposal for a worldwide definition of health resort medicine,

- balneology, medical hydrology and climatology. International Journal of Biometeorology 2010; 54:495-507.
14. Рехабилитация и балнеотуризм. Министерство на здравеопазването. [Internet]. Available at: <https://old.mh.government.bg/bg/informaciya-za-grazhdani/rehabilitaciya-i-balneoturizm/spisk-na-bazite-za-rehabilitaciya/>
 15. Ramiro S, Nikiphorou E, Sepriano A, et al. ASAS-EULAR recommendations for the management of axial spondyloarthritis: 2022 update Annals of the Rheumatic Diseases 2023;82:19-34.
 16. Macfarlane GJ, Kronisch C, Dean LE, et al. EULAR revised recommendations for the management of fibromyalgia Annals of the Rheumatic Diseases 2017; 76:318-328.
 17. Fioravanti A, Tenti S, Giannitti C, et al. Short- and long-term effects of mud-bath treatment on hand osteoarthritis: A randomized clinical trial. Int. J. Biometeorol. 2014, 58, 79–86.
 18. Antonelli M, Donelli D. Effects of balneotherapy and spa therapy on levels of cortisol as a stress biomarker: a systematic review. Int J Biometeorol 62, 913–924 (2018). <https://doi.org/10.1007/s00484-018-1504-8>
 19. Tenti S, Manica P, Cheleschi S, Fioravanti, A. Sulfurous-arsenical-ferruginous balneotherapy for osteoarthritis of the hand: Results from a retrospective observational study. Int. J. Biometeorol. 2020, 64, 1561–1569
 20. Szenczi A, Peter I, Nusser N, et al. Is Balneotherapy Protective Against Oxidative Stress? A Pilot Study. In Vivo 2023, 37, 858–861.
 21. Scanu A, Tognolo L, Maccarone MC, Masiero S. Immunological Events, Emerging Pharmaceutical Treatments and Therapeutic Potential of Balneotherapy on Osteoarthritis. Front. Pharmacol. 2021, 12, 681871.
 22. de Oliveira NNS, Hellmann F, Cantista P, et al. Comparative analysis of balneotherapy in European public health systems: Spain, France, Italy, and Portugal. Int J Biometeorol 67, 597–608 (2023). <https://doi.org/10.1007/s00484-023-02438-y>
 23. A. Moltó K, Billis A, Miendrova C, et al. Carmona: OP0025 Inequity in access to care for rheumatic and musculoskeletal diseases is a reality in Europe: first data from the EULAR Rheumafacts project. Annals of the Rheumatic Diseases, 84, Suppl1, 2025, 22-23.
 24. Национален осигурителен институт. [Internet]. Available at: <https://www.nssi.bg/fizicheski-lica/po-bg-zakonodatelstvo/za-profilaktika-i-rehabilitatsiya/>
 25. Министерство на труда и социалната политика. Наредба № 1. [Internet]. Available at: <https://www.misp.government.bg/uploads/15/spitao/dokumenti/naredbi/1-ot-13022007-g-za-polzvane-i-izplashchane-na-parichnite-pomoshchi-za-profilaktika-i-rekhabilitatsiya.pdf>
 26. Наредба N30. Медицински стандарт „Физикална и рехабилитационна медицина“. [Internet]. Available at: <https://iamn.bg/%D0%BD%D0%BE%D1%80%D0%BC%D0%B0%D1%82%D0%B8%D0%B2%D0%BD%D0%B8-%D0%B0%D0%BA%D1%82%D0%BE%D0%B2%D0%B5/%D0%BC%D0%B5%D0%B4%D0%B8%D1%86%D0%B8%D0%BD%D1%81%D0%BA%D0%B8-%D1%81%D1%82%D0%B0%D0%BD%D0%B4%D0%B0%D1%80%D1%82%D0%B8/>
 27. Национална стратегия за устойчиво развитие на туризма в Р. България 2014-2030 г. Актуализирана версия. Министерство на туризма. 2017; 16.
 28. Щерев К. Атлас на геотермалните ресурси на Европа. Институт по картография. София. 1971.
 29. Thorolfsdottir BO, Marteinsson VT. Microbiological analysis in three diverse natural geothermal bathing pools in Iceland. Int J Environ Res Public Health. 2013 Mar 14;10(3):1085-99. doi: 10.3390/ijerph10031085.
 30. Наредба за условията и реда за сертифициране на “Балнеолечебен (Медикъл СПА) център”, “СПА център”, “Уелнес център” и “Таласотерапевтичен център. Министерство на туризма. [Internet]. Available at: <https://www.tourism.government.bg/bg/kategorii/naredbi/naredba-za-usloviyata-i-reda-za-sertificirane-na-balneolecheben-medikul-spa-centur>
 31. Брой легла на Спа и Уелнес в България. Национален Статистически Институт. 2024. [Internet]. Available at: <https://www.nsi.bg/statistical-data/276>
 32. Брой легла на Спа и Уелнес в България. Национален Статистически Институт. 2024. [Internet]. Available at: <https://www.nsi.bg/statistical-data/36/115>

Постъпил за печат: 24.08.2025 г.

Submitted: 24.08.2025

✉ Адрес за кореспонденция:

И. Димитров
Катедра Туризм
Икономически университет – Варна, България

✉ Correspondence address:

I. Dimitrov
Department of Tourism
University of Economics – Varna, Bulgaria