PATHOPHYSIOLOGICAL MECHANISMS OF BALNEOTHERAPY WITH POTENTIAL IMPLICATIONS FOR CENTRAL ASIAN SPAS AND SANATORIUMS

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Abstract

Spa therapy includes all modalities/ treatments based on evidence that are administered in spas or sanatoriums. Balneotherapy, the immersion in mineral water, is the main balneological modality in spa therapy programs. Clinical trials performed in Europe, Turkey, and Israel have shown clinical benefits of spa therapy/ balneotherapy in several diseases mainly pertaining to rheumatic and musculoskeletal diseases and dermatological diseases as well. However, mechanisms by which balneotherapy may improve the clinical symptoms of patients have been less evaluated/ documented in the literature. Although the literature on mechanisms of action of balneotherapy has still been evolving and accumulating, some evidence from preliminary studies paves the way for generating a hypothesis that balneotherapy has an influence on physiological mechanisms, immune system, inflammation, and oxidative stress. Extrapolation of the evidence-based clinical practice and scientific experience of Europe, Turkey, and Israel to Central Asian spas and sanatoriums is although possible; future studies investigating clinical efficacy, safety profile, and possible mechanisms of action of balneotherapy of regional spas are needed to better understand the role of balneotherapy and whether it has any local differences.

Keywords: Spa therapy, Balneotherapy, Immune system, Inflammation, Oxidative stress, Central Asia

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INTRODUCTION

Spa therapy includes all modalities/ treatments based on evidence that are administered in spas or sanatoriums [1]. Balneotherapy, the immersion in mineral water, is the main balneological modality in spa therapy programs. [2]. Some spa resorts or sanatoriums also include the other spa therapy modalities in their spa therapy programs, such as peloid therapy; thalassotherapy; hydrotherapy; and climatotherapy [1-5]. In addition, physical therapy modalities and exercise are included in

some spa resorts or sanatoriums [1-3]. In this article, we focused on balneotherapy because it is the central intervention in spa or sanatorium programs. When generating, structuring, and discussing our hypothesis, we followed the instructions and guidance of an elegant article entitled “Scientific hypotheses: writing, promoting, and predicting implications” by Gasparyan et al. [6].

The systematic reviews evaluating the clinical efficacy of spa therapy/ balneotherapy in several diseases mainly

pertaining to rheumatic and musculoskeletal diseases generally conclude that most of the included studies have shown a clinical efficacy of spa therapy/balneotherapy; however, more high-quality studies are needed to draw firm conclusions [3, 7-11]. Some evidence exists on mechanisms by which balneotherapy may improve the clinical symptoms of patients [12-15]. Notably, in some spa therapy studies, all the clinical benefits could not only be attributed to balneotherapy, as complex spa therapy programs include the other balneological treatments, physical therapy modalities, and/ or exercise. Furthermore, if a patient traveled to and stayed in a health resort, climatotherapeutic effects, the changes in the environmental milieu, or escaping from daily/ work responsibilities might contribute to clinical benefits [16]. In the literature, the observed clinical benefits of balneotherapy have been attributed to a number of factors, namely, thermal, mechanical, and chemical effects [12-15]. The thermal effects, which are associated with the temperature of the water, cause vasodilation, enhance muscle relaxation, decrease pain by the gate control theory, or induce some immune mechanisms [12, 13, 17-21]. The mechanical effects, which are associated with the hydrostatic pressure and buoyancy of the water, may induce some physiological reactions such as an increase in diuresis, and cardiac output [22, 23]. The chemical effects, which are associated with the chemical composition of the water, may induce some biological activities (increase or decrease in immune mechanisms, inflammation, and/ or oxidative stress) [12-15, 24-28]. Although there is increased attention to the effects of salt, sulfur, radon, and carbon dioxide [29-32], the evidence on their specific biological effects is not yet conclusive. Overall, evidence on mechanisms of action of balneotherapy is still evolving and accumulating; therefore, further studies evaluating the hypothesis that balneotherapy has an influence on physiological mechanisms, immune system, inflammation, and oxidative stress are required to confirm/ verify/ expand pathophysiological mechanisms of balneotherapy demonstrated in preliminary studies up to now.

Clinical trials performed in Europe, Turkey, and Israel have shown clinical benefits of spa therapy/

balneotherapy in several diseases mainly pertaining to rheumatic and musculoskeletal diseases and also dermatological diseases [3, 7-11, 33-39]. However, mechanisms by which balneotherapy may improve the clinical symptoms of patients have been less evaluated/ documented in the literature. Although the literature on mechanisms of action of balneotherapy has still been evolving and accumulating, some evidence from preliminary studies paves the way for a hypothesis that balneotherapy has an influence on physiological mechanisms, immune system, inflammation, and oxidative stress. However, further studies elucidating this hypothesis are required to increase our understanding of balneotherapy. Although extrapolation of the evidence-based clinical practice and scientific experience of Europe, Turkey, and Israel to Central Asian spas and sanatoriums is possible, future studies investigating clinical efficacy, safety profile, and possible mechanisms of action of balneotherapy of regional spas are needed to better understand the role of balneotherapy and whether it has any local differences.

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AUTHOR CONTRIBUTIONS

Conception and design of the hypothesis: SK, MK; drafting the manuscript: SK; critical revision of the article: SK, MK; approval of the final version to be submitted: SK, MK.

CONFLICT OF INTEREST

The authors have no conflict of interest in this study.

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ETHICS APPROVAL

Not applicable.

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ОРТАЛЫҚ АЗИЯ КУРОРТТАРЫ МЕН САНАТОРИЙЛЕРІ ҮШІН БАЛНЕОТЕРАПИЯНЫҢ ПАТОФИЗИОЛОГИЯЛЫҚ МЕХАНИЗМІНІҢ ПОТЕНЦИАЛДЫ МҮМКІНДІКТЕРІ

Түйіндеме

Курортты терапия дәлелді медицинаға негізделген және курорттық жерлерде немесе санаторийлерде қолданылатын процедуралар мен емдік іс-шараларды қамтиды. Минералды суға батырылатын бальнеотерапия курорттық емдеу бағдарламаларындағы негізгі бальнеологиялық әдіс болып табылады. Еуропада, Түркияда және Израильде жүргізілген клиникалық зерттеулер бальнеотерапияның тиімділігін кейбір ауруларда көрсетті: негізінен ревматизммен, тірек-қимыл аппараты ауруларында, сондай-ақ дерматологиялық аурулар кезінде. Әдебиетте бальнеотерапияның пациенттердің жағдайын жақсарту механизмдері аз сипатталған және толық зерттелмеген. Алайда алдын-ала жүргізілген зерттеулердің кейбір деректері бальнеотерапия организмнің физиологиялық процестеріне, иммундық жүйеге, қабыну және тотығу процестеріне әсер етеді деген гипотезаны тұжырымдауға мүмкіндік береді. Қазіргі уақытта Еуропаның, Түркияның және Израильдің клиникалық практикасы мен ғылыми тәжірибесін Орталық Азияның курорттары мен санаторийлеріне экстраполяциялауға мүмкіндік бар. Алайда, Орталық Азиядағы курорттар мен санаторийлердің аймақтық жағдайларында бальнеотерапияны қолданудың клиникалық тиімділігі, қауіпсіздігі және механизмдері туралы зерттеулер қажет.

Түйін сөздер: спа-терапиясы, бальнеотерапия, иммундық жүйе, қабыну, тотығу стрессі, Орталық Азия

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ПОТЕНЦИАЛЬНЫЕ ВОЗМОЖНОСТИ ПАТОФИЗИОЛОГИЧЕСКИХ МЕХАНИЗМОВ БАЛНЕОТЕРАПИИ ДЛЯ КУРОРТОВ И САНАТОРИЕВ ЦЕНТРАЛЬНОЙ АЗИИ

Резюме

Курортная терапия включает в себя процедуры и методы лечения, основанные на доказательной медицине и используемые в курортных зонах или санаториях. Бальнеотерапия, представляющая собой погружение в минеральную воду, является основным бальнеологическим методом в программах санаторно-курортного лечения. Клинические испытания, проведенные в Европе, Турции и Израиле показали эффективность бальнеотерапии при некоторых заболеваниях: главным образом, связанных с ревматизмом, при заболеваниях опорно-двигательного аппарата, а также при дерматологических заболеваниях. Механизмы, с помощью которых бальнеотерапия улучшает состояние больных недостаточно описаны в литературе и плохо изучены. Однако некоторые данные предварительных исследований позволяют сформулировать гипотезу о том, что бальнеотерапия оказывает воздействие на физиологические процессы организма, иммунную систему, воспалительные и окислительные процессы. На данный момент есть возможность экстраполяции клинической практики и научного опыта Европы, Турции и Израиля на курорты и санатории Центральной Азии. Однако необходимы исследования клинической эффективности, безопасности и механизмов использования бальнеотерапии в региональных условиях курортов и санаториев Центральной Азии.

Ключевые слова: спа-терапия, бальнеотерапия, иммунная система, воспаление, окислительный стресс, Центральная Азия

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