Review Article

Efficacy of Balneotherapy and Climatotherapy for Psoriasis: A Narrative Literature Review Paper

Raghavi RSK[1], V. Deepa[2]

From, [1]BNYS CRRI, [2]Principal cum Medical Superintendent, G.T.N.MCNYSRC, Dindigul, Tamil Nadu, India

ABSTRACT

Background: Psoriasis is an immune-related inflammatory disease with an unknown cause. The disease is not contagious and usually appears as dry, red, scaly patches. It often runs in families, can affect the whole body, and has a high chance of relapse. It involves T-lymphocytes and macrophages and disrupts normal skin cell growth. Treatments like mineral water baths (balneotherapy) and climate/sun exposure (climatotherapy) can help the skin by reducing inflammation and supporting healthy skin cell development. Research shows that mineral water can lower tumor necrosis factor (TNF) release and cell activity, depending on the minerals present. Many studies worldwide have shown that balneotherapy, climatotherapy, and hydrotherapy effectively treat psoriasis. **Materials and Methods:** To evaluate the effectiveness of balneotherapy and climatotherapy for managing psoriasis, a structured narrative review was conducted using the process of PRISMA (Preferred Reporting Items for Systematic Review and Meta-Analyses) guidelines, ensuring a transparent and systematic approach. For this review, we searched PubMed, Google Scholar, and ResearchGate using targeted terms such as "psoriasis," "balneotherapy," "climatotherapy," and "PASI score." **Results**: Across 42 studies, balneotherapy and climatotherapy showed major improvements for psoriasis, with up to 90% of patients reaching a Psoriasis Area and Severity Index (PASI) score reduction in 3–4 weeks. Patients experienced significantly less scaling, redness, and itching, alongside major improvements in quality-of-life scores. **Conclusion**: Combining balneotherapy and climatotherapy serves as effective, low-risk complementary treatments for psoriasis that provide rapid clinical relief and improve overall quality of life.

Key words: Balneotherapy, Psoriasis, Mineral waters, Climatotherapy.

Psoriasis is an immune-related inflammatory disease with an unknown etiology [1]. The disease is not contagious and usually appears as dry, red, scaly patches. Psoriasis often runs in families, can affect the whole body, and has a high chance of relapse. Fast cell growth leads to flaky skin patches called psoriatic plaques, which can look like fish scales and may peel off [2]. The silvery-white plaques form because skin cells build up rapidly in certain areas [3]. The plaques often appear on the elbows and knees, but they can also affect the palms, soles, scalp, areas under the breasts and arms, and the genitals [4]. Around 125 million people worldwide have psoriasis, which is about 2% of the population. In adults, prevalence ranges from 0.51% to 11.43%, and in children, from 0% to 1.37% [2]. There are 5 types of psoriasis: plaque psoriasis, having dry, scaly patches; pustular psoriasis, containing pus-like fluid mainly infiltrated with white blood cells; erythrodermic psoriasis, characterized by exfoliation of fine, scaly skin with pain and itching; guttate psoriasis, having drop-like dots; and inverse psoriasis, which affects the flexure surfaces, characterized by smooth inflamed lesions [1]. Risk factors for psoriasis include genetic predisposition, certain drugs, vaccinations, and infections [5]. The pathophysiology behind psoriasis involves complex communication between the immune system's innate and adaptive components. T cells communicate with dendritic cells, keratinocytes, and macrophages via cytokines secreted by these cells. Plaque formation in psoriasis is not limited to inflammation in the epidermal layer; it is influenced by keratinocyte interactions with other cell types (adaptive and innate immune cells, vasculature) across the dermis. In some cases, natural immune activation driven by intrinsic danger signals or cytokines overlaps with auto-inflammatory persistence, whereas in others, T cell-driven autoimmune responses occur. Thus, psoriasis exhibits auto-inflammatory disease characteristics,

Access this article online	
Received – 17th September 2026	
Initial Review – 19th September 2026	
Accepted – 12th October 2026	

Correspondence to: Dr. Raghavi RSK, BNYS CRRI, G.T.N.MCNYSRC, Dindigul, Tamil Nadu,

E-mail: dr.raghavi070@gmail.com

with both pathways overlapping and even amplifying each other. The histological and histochemical findings show increased metabolic activity, with increased oxygen consumption in the plaques. Th1 cytokines, including interferon-γ (IFN-γ), tumour necrosis factor-α (TNF-α), and interleukin (IL-12), are elevated in psoriatic lesions. Th2 cytokines(IL-4, IL-5, IL-10) are not elevated [6]. Activated Th17 cells secrete elevated levels of IL-17 and TNF-α, which stimulate keratinocytes, induce epidermal hyperplasia, recruit neutrophils, and trigger the generation of antimicrobial peptides (AMPs) [7]. Thus, in psoriasis, T-lymphocyte activation leads to inflammation in the dermis, and epidermal hyperproliferation occurs secondary to these inflammatory events [8].

Treatment options for psoriasis range from conventional medications to phototherapy, natural therapies, and lifestyle and dietary modifications. Psoriasis can be diagnosed by skin biopsy, where it shows the Auspitz sign. Blood tests help rule out other conditions, such as infections or autoimmune disorders [7]. The Psoriasis Area and Severity Index (PASI) assesses psoriasis severity. Other tests are biomarker analyses and the Itch Quality of Life (ItchQoL) scale.

In 2002, the World Health Organization (WHO) established the Pain Management Protocol (PMP) for pain relief in the document "WHO Traditional Medicine Strategy 2002-2005", recognizing the efficacy and quality of Integrative and Complementary Practices (PICS), including balneotherapy, hydrotherapy, and chronotherapy [9]. Balneotherapy is the practice of immersing a participant in mineral water or mineral-laden mud. It has been used with water from the DS (Dead Sea) to treat psoriasis. The DS is the deepest and most saline lake on Earth, which is estimated to be 50,000 years old [10]. The salt concentration is approximately 7–10 times that of the oceans [11]. It has one of the highest concentrations of salts and minerals of any natural body of water [12]. In addition to NaCl, DS spring water contains salts such as $MgCl_2$, CaCl2, KCl, and $MgBr_2$ [13].

Climatotherapy is a medical practice in which a patient is relocated temporarily or permanently to a specific geographic climate, such as high-altitude regions, coastal areas, or hypersaline basins, to treat or manage chronic health conditions. Climatotherapy relies on the synergy of distinct natural environment elements. It comprises alternative treatment methods employing the healing nature of air, temperature, humidity, barometric pressure, and light [14]. The positive effects of sun exposure and seawater for treating psoriasis have been recognized for many years, especially in the DS region. Because climatotherapy depends on the natural environment, researchers have developed artificial treatments to replicate these conditions. Patients may take saltwater baths at the same time as, or before, ultraviolet-B (UV-B) light therapy. Some studies show that doing saltwater baths before UV-B treatment works better than UV-B alone [15].

2 MATERIALS AND METHODS:

This narrative review was done to evaluate the effectiveness of balneotherapy and climatotherapy for managing psoriasis.

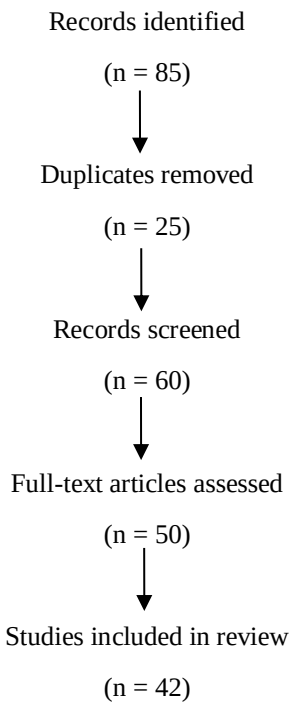
2:1 Searching the Literature: For this review paper, a search was performed on PubMed, Google Scholar, and ResearchGate using targeted terms such as "psoriasis," "balneotherapy," "climatotherapy," and "PASI score."

2:2 Selecting the Studies: Studies that focused on psoriasis patients who used mineral waters and sun exposure to measure clear clinical results (like skin clearance scores or QoL improvements) were selected for this review.

2:3 Data Extraction: A total of 42 relevant references were selected. Key details were gathered from each study to summarize how well these natural therapies work.

The study selection process followed the PRISMA (Preferred Reporting Items for Systematic Review and Meta-Analyses) guidelines, ensuring a transparent and systematic approach (Figure 1).

Figure 1: PRISMA flow diagram of the screening and selection process.



3 RESULTS

3.1 Balneotherapy

The pioneer of modern dermatology, Ferdinand von Hebra (1816–1880), an Austrian dermatologist, first observed the benefits of mineral water on psoriatic skin. However, he also noted that no place on Earth had a permanent reputation for

being highly effective in managing diseases [14]. Written documents describe the beneficial effects of sulfur and alkaline waters in treating psoriasis and eczema. The first extensive report on the effects of balneotherapy on psoriasis in Serbia. After Hydrotherapy, a significant decrease in the PASI was detected, associated with a significant reduction of interleukin-8 and TNF-α [17].

A common balneotherapy method is bathing in thermal mineral water. The health benefits depend on factors like temperature, mineral content, and other physical properties. For example, hot water can reduce inflammation and affect the immune system by releasing substances like β-endorphins, enkephalins, and irisin. β-endorphins and enkephalins help with pain and immune cell growth, while irisin supports metabolism and brain function. Hot water also widens blood vessels, increases blood flow, and lowers fibrinogen levels, which can improve blood clotting profiles [18].

3:1a Biochemical effects of DS spa therapy:

In vivo and in vitro studies have documented the biochemical effects of DS spa therapy. In vivo, significant increases in the serum levels of bromine, rubidium, calcium, and zinc have been shown in psoriatic patients after daily bathing in the DS for 4 weeks, which may result from penetration of water minerals through psoriatic skin; the beneficial effects observed have been attributed to the non-specific sedative effects of increased bromine serum levels. In vitro studies have shown increased mineral levels in psoriatic keratinocytes, which may play a role in cell proliferation and differentiation, as is already known for calcium or magnesium in cell culture [19].

3:2b Chemical effects of balneotherapy on psoriasis:

Magnesium helps balance certain cell messengers, which matters because excessive cell growth is a problem in psoriasis. It also blocks the production of some chemicals linked to the disease. Magnesium acts as a natural moisturizer by helping the skin hold water and supports healthy skin cell development. This makes the magnesium in DS water helpful for psoriasis in several ways. Using magnesium on the skin does not cause side effects. DS water also has a lot of bromide. Magnesium bromide and magnesium chloride can slow down the growth of skin cells in both psoriasis and healthy skin [20]. Table 1 shows the chemical effects of balneotherapy on psoriasis. Additionally, studies show the immunomodulatory effects of DS balneotherapy in an experimentally induced psoriasis model in mice. Experimental animals received thermo-mineral water treatment, which caused a downregulation of lesional mRNA levels of IL-17A and IL-23. This group also showed a significant reduction in serum IL-4 and IL-5 levels. Human studies in experimental models have supported these findings, though more systemic research is necessary [21].

3.2c Possible thermal effects of balneotherapeutic methods in the treatment of psoriasis:

In vitro and in vivo studies suggest that deep absorption of biologically active water-soluble minerals, inorganic and organic substances, is the basic mechanism responsible for improving the clinical outcomes. This is not due only to heat. In fact, minerals such as magnesium, sulfur, selenium, calcium, and zinc are directly related to skin structure, and regional changes may occur in SPA (Salus Per Aquam) sludge [22].

3:5 Thermal effects of balneotherapy on psoriasis-associated skin and gut microbes:

Studies examined thermal water treatment on the skin microbiome of patients with psoriasis and the potential benefits of drinking thermal water on the gut microbiome. The results indicated that, after balneotherapy, psoriasis-affected areas showed increased microbial diversity like healthy skin, which may contribute to reduced disease severity. Additionally, the gut microbiome of patients who consumed thermal water shifted to species associated with favorable metabolic health. These findings suggest that both topical and oral thermal water treatments may alleviate skin and systemic symptoms of psoriasis by modulating the skin and gut microbiome [23].

Table 1. Thermal effects of balneotherapy on psoriasis [20]

Type of Water	Most Abundant Chemical Elements	Beneficial Effects
Sulfated waters Sulfurous waters Bicarbonate waters	Magnesium, Sulfur	Skin regeneration, anti-inflammatory effects, and bactericidal activities
Iodo-Bromo-Saline waters Saline waters Carbonate waters	Calcium Manganese, Iodo, Bromo Potassium	Skin protection by improving natural defenses Antioxidant effects Hydrates the skin and enhances tissue elasticity
Arsenical-ferruginous waters	Iron and zinc	Oxygen replenishment to the cells of the skin

3:6 Effects of local application of sulfurous mineral water in home environment with psoriasis:

Sulfur, present in SMW (Sulfurous Mineral Water), primarily exists as sulfate and/or hydrogen sulfide (H2S), among other ions. Sulfur activity in the skin seems mainly related to its interaction with cysteine and its catabolites. Sulfurous mineral water exerts beneficial anti-inflammatory, keratoplastic, and antipruriginous effects and possesses antibacterial and antifungal properties.

H2S present in sulfurous mineral water acts primarily as an antioxidant and free-radical scavenger, which may trigger chronic inflammatory manifestations and related immunological factors. Exogenous H2S also reduces clonal growth, cell proliferation, and cell adhesion in human keratinocytes [24].

Endogenous H2S is an important gas in the body and plays a role in many processes, including chronic inflammation. Its role in psoriasis is not fully understood, but people with psoriasis often have lower levels than healthy individuals. Psoriasis is commonly treated with SMW at spas or thermal centers. Studies show that SMW treatments help improve skin lesions and also benefit patients' mental well-being, as spas provide a relaxing environment and a chance to connect with others facing similar challenges [24].

4 CLIMATOTHERAPY

Climatotherapy comprises alternative treatment methods employing the healing nature of air, temperature, humidity, barometric pressure, and light. Climatotherapy is a safe treatment option with proven benefits for psoriasis and has been shown to improve Quality of Life (QOL) of these patients [18].

4.1 Photoclimatotherapy and Selective UV Attenuation:

Regions at extremely low elevations, especially the DS basin (approximately 430 meters below sea level), benefit from a thicker atmospheric column and a unique aerosol/evaporation layer. This natural filtering reduces harmful short wavelength UVB rays while allowing safer, therapeutic wavelengths (approximately 311) to pass through. As a result, patients can tolerate longer periods of sun exposure with a lower risk of solar erythema (sunburn) [25].

4.2 Mineral Bathing effects:

High-salinity marine environments contain elevated concentrations of magnesium, calcium, silica, and potassium salts. Mainly, magnesium-rich mineral waters enhance skin barrier function, reduce cutaneous inflammation, and promote intracellular hydration [26].

DISCUSSION:

Psoriasis is a chronic, autoimmune condition that places a heavy physical and psychological burden on patients. The non-pharmacological modalities like balneotherapy and climatotherapy offer powerful, low-risk complementary benefits.

Psoriasis is among the diseases successfully treated with balneotherapy, and its therapy remains the subject of numerous studies, particularly those that combine balneotherapy with other therapeutic modalities. One study was conducted in Hungary, with satisfactory therapeutic results. The study included 80 patients using mineral waters; the PASI score and C-reactive protein (CRP) levels improved after 3 weeks [25]. Another study conducted in Rusanda Spa included 60 patients divided into two groups. The first group was treated with mineral waters, peloids, and calcipotriol, while the second group with calcipotriol. After a 3-week treatment, the first group decreased in PASI score by 59.45%, and the second group by 34.78% [27].

Many centers use DS salt solution soaks in combination with NB-UVB to treat psoriasis, particularly in continental Europe [28]. Leopoldine spa water is a therapeutic, mineral-rich thermal water sourced from the historic springs of Terme di Montecatini in Tuscany, Italy. This hot underground spring produces highly concentrated hypotonic water rich in sulfate, sodium, and chlorine, which has anti-inflammatory effects on psoriasis skin [29]. DS climatotherapy has a long-standing history, and Denmark was one of the first countries to test it in psoriasis patients [28].

In recent years, several therapeutic advances have improved the management of moderate to severe psoriasis, but some of these treatments may have side effects. Treatment choice depends on the patient's and the disease's characteristics (sex, age, comorbidities, extent of lesions, lifestyle modifications, and treatment history) [30].

The current review findings are limited, as the evidence relies heavily on small samples, lacks standardized treatment protocols, and, additionally, lacks long-term follow-up data. So, it is difficult to determine the sustained efficacy of these interventions. Also, high travel costs to access specific mineral springs are an important factor to be considered. Future research should prioritize large-scale populations with standardized protocols and long-term follow-up data, to validate the findings of the present review.

CONCLUSION:

The present review shows that combining balneotherapy and climatotherapy with dietary changes and meditation can provide physical and mental benefits in the cases of psoriasis. These treatments serve as effective, low-risk complementary treatments for psoriasis that can provide rapid clinical relief and improve overall QoL.

REFERENCE

1. Rajguru JP, Maya D, Kumar D, Suri P, Bhardwaj S, Patel ND. Update on psoriasis: a review. J Fam Med Prim Care. 2020;9:20-4. doi:10.4103/jfmpc.jfmpc_689_19.
2. Michalek IM, Loring B, John SM. A systematic review of worldwide epidemiology of psoriasis. J Eur Acad Dermatol Venereol. 2017;31:205-12. doi:10.1111/jdv.13854.
3. Moschella SL. Psoriasis. Pharmacol Ther. 1980;10:161-9. doi:10.1016/0163-7258(80)90012-1.
4. Zhang P, Wu MX. A clinical review of phototherapy for psoriasis. Lasers Med Sci. 2018;33:173-80. doi:10.1007/s10103-017-2360-1.
5. Kamiya K, Kishimoto M, Sugai J, Komine M, Ohtsuki M. Risk factors for the development of psoriasis. Int J Mol Sci. 2019;20:4347. doi:10.3390/ijms20184347.
6. Egeberg A, Griffiths CEM, Williams HC, Andersen YMF, Thyssen JP. Clinical characteristics, symptoms and burden of psoriasis and atopic dermatitis in adults. Br J Dermatol 2020;183:128–38. https://doi.org/10.1111/bjd.18622.
7. Fujita H, Gooderham M, Romiti R. Diagnosis of generalized pustular psoriasis. Am J Clin Dermatol. 2022;23:31-8. doi:10.1007/s40257-021-00652-1.
8. Singh S, Thirumalaiswamy A, Kharkar V, Mahajan S, Joshi R, Sharath SM. From clinic to microscope: a study of clinicopathological concordance in 5000 skin biopsies from a tertiary care center. J Postgrad Med. 2026;72:56-62. doi:10.4103/jpgm.jpgm_613_25.
9. Maravilla-Herrera P, Merino M, Alfonso Zamora S, Balea Filgueiras J, Carrascosa Carrillo JM, Delgado Sánchez O, et al. The social value of a PASI 90 or PASI 100 response in patients with moderate-to-severe plaque psoriasis in Spain. Front Public Health. 2023;11:1000776. doi:10.3389/fpubh.2023.1000776.
10. Thouvenin MD, Bacquey A, Babin M, Lestienne F, Lauze C, Gravier E, et al. Efficacy of Avène hydrotherapy on chronic pruritus in patients with plaque psoriasis. Dermatol Ther. 2023;13:3137-51. doi:10.1007/s13555-023-01047-2.
11. Ograczyk A, Miniszewska J, Kępska A, Zalewska-Janowska A. Itch, disease coping strategies and quality of life in psoriasis patients. Postepy Dermatol Alergol. 2014;31:299-304. doi:10.5114/pdia.2014.40927.
12. Das RP, Jain AK, Ramesh V. Current concepts in the pathogenesis of psoriasis. Indian J Dermatol. 2009;54:7-12. doi:10.4103/0019-5154.48977.
13. Guo J, Zhang H, Lin W, Lu L, Su J, Chen X. Signaling pathways and targeted therapies for psoriasis. Signal Transduct Target Ther. 2023;8:437. doi:10.1038/s41392-023-01655-6.
14. Liang Y, Sarkar MK, Tsoi LC, Gudjonsson JE. Psoriasis: a mixed autoimmune and autoinflammatory disease. Curr Opin Immunol. 2017;49:1-8. doi:10.1016/j.coi.2017.07.007.
15. Deng Y, Chang C, Lu Q. The inflammatory response in psoriasis: a comprehensive review. Clin Rev Allergy Immunol. 2016;50:377-89. doi:10.1007/s12016-016-8535-x.
16. Schamberg IL. Treatment of psoriasis at the Dead Sea. Int J Dermatol. 1978;17:524-5. doi:10.1111/j.1365-4362.1978.tb06192.x.
17. Even-Paz Z, Shani J. The Dead Sea and psoriasis. Historical and geographic background. Int J Dermatol 1989;28:1–9. https://doi.org/10.1111/j.1365-4362.1989.tb01299.x.
18. Huang A, Seité S, Adar T. The use of balneotherapy in dermatology. Clin Dermatol 2018;36:363–8. https://doi.org/10.1016/j.clindermatol.2018.03.010.
19. Galli E, Neri I, Ricci G, Baldo E, Barone M, Belloni Fortina A, et al. Consensus Conference on Clinical Management of pediatric Atopic Dermatitis. Ital J Pediatr 2016;42:26. https://doi.org/10.1186/s13052-016-0229-8.
20. Protano C, Vitali M, De Giorgi A, Marotta D, Crucianelli S, Fontana M. Balneotherapy using thermal mineral water baths and dermatological diseases: a systematic review. Int J Biometeorol. 2024;68:1005-13. doi:10.1007/s00484-024-02649-x.
21. Léauté-Labrèze C, Saillour F, Chêne G, Cazenave C, Luxey-Bellocq ML, Sanciaume C, et al. Saline spa water or combined water and UV-B for psoriasis vs conventional UV-B: lessons from the Salies de Béarn randomized study. Arch Dermatol. 2001;137:1035-9.
22. Levi-Schaffer F, Shani J, Politi Y, Rubinchik E, Brenner S. Inhibition of proliferation of psoriatic and healthy fibroblasts in cell culture by selected Dead Sea salts. Pharmacology. 1996;52:321-8. doi:10.1159/000139397.
23. Cacciapuoti S, Luciano MA, Megna M, Annunziata MC, Napolitano M, Patruno C, et al. The role of thermal water in chronic skin diseases management: a review of the literature. J Clin Med. 2020;9:3047. doi:10.3390/jcm9093047.
24. Sukenik S, Abu-Shakra M, Flusser D. Balneotherapy in autoimmune disease. Isr J Med Sci. 1997;33:258-61.
25. Huang A, Seité S, Adar T. The use of balneotherapy in dermatology. Clin Dermatol. 2018;36:363-8. doi:10.1016/j.clindermatol.2018.03.010.
26. Manara S, Beghini F, Masetti G, Armanini F, Geat D, Galligioni G, et al. Thermal therapy modulation of the psoriasis-associated skin and gut microbiome. Dermatol Ther. 2023;13:2769-83. doi:10.1007/s13555-023-01036-5.
27. Gálvez Galve JJ, Peiró PS, Lucas MO, Torres AH, Gil ES, Pérez MB. Quality of life and assessment after local application of sulphurous water in the home environment in patients with psoriasis vulgaris: a randomised placebo-controlled pilot study. Eur J Integr Med. 2012;4. doi:10.1016/j.eujim.2012.01.001.
28. Kudish AI, Evseev EG, Cohen G, Harari M. Ultraviolet measurements and photoclimatotherapy for psoriasis at the Dead Sea: 25 years of experience. Int J Environ Res Public Health. 2022;19:12364. doi:10.3390/ijerph191912364.
29. Kazandjieva J, Grozdev I, Darlenski R, Tsankov N. Climatotherapy of psoriasis. Clin Dermatol. 2008;26:477-85. doi:10.1016/j.clindermatol.2008.05.001.
30. Emmanuel T, Lybæk D, Johansen C, Iversen L. Effect of Dead Sea climatotherapy on psoriasis: a prospective cohort study. Front Med. 2020;7:83. doi:10.3389/fmed.2020.00083.

How to cite this article : Raghavi R, V. Deepa. Efficacy of Balneotherapy and Climatotherapy for Psoriasis: A Narrative Literature Review Paper. Indian J Integr Med. 2026; Online First.

Funding: None; Conflicts of Interest: None Stated