

Treatment of Psoriasis at the Dead Sea: Why, How and When?

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Climatotherapy at the Dead Sea is a highly effective treatment for psoriasis. In 1959, Arie Dostrovski and Felix Sagher of the Hadassah University Hospital in Jerusalem initiated a pilot study to detect whether bathing in the Zohar hot springs at the Dead Sea had any therapeutic benefit for psoriasis, eczema and fungal diseases [1]. In view of the marked improvement achieved in psoriasis, efforts were then concentrated on treating this disease. In that pilot study, sunbathing was not controlled, but subjects were inevitably exposed to the sun's rays for variable periods during the twice daily open-air sessions.

Over the past 25 years, the beneficial effect of Dead Sea climatotherapy on thousands of psoriasis patients has been reported in several publications and at international meetings [2-5]. Today, at the Dead Sea spa of Ein Bokek-Naveh Zohar, there are ten hotels, as well as six clinics that provide medical services to patients from many European countries and from Israel. Other, smaller spas exist along the lakeside, at Ein Gedi, Mitzpeh Shalem and Kalya, and one has also been established on the Jordanian side of the lake. The aim of this review is to summarize recent investigations at the Dead Sea, especially with regard to the properties of the local ultraviolet radiation and its use in the treatment of psoriasis.

In a retrospective study, Abels and Rose [6] reported on the demographic characteristics of 1,448 psoriasis patients and their response to climato-balneotherapy at the Dead Sea over a 4 year period. This group comprised 1,340 patients from more than 18 countries, and 108 Israelis. Their treatment protocol included increasing exposure to sunlight from several minutes up to a maximum of 6 hours per day (divided into morning and afternoon sessions), bathing in the Dead Sea up to a maximum of 1 hour per day, and the use of topical emollients. In their retrospective study, complete clearing was observed in 58% and marked improvement in an additional 30% of the patients. The foreign patients responded considerably better than Israelis due to their longer stay, 4 weeks vs. 2 weeks respectively. There was no relationship between the therapeutic response and the percentage of skin surface initially involved, nor was there any significant relationship with the rest of the recorded background data. In another study, which included 740 German psoriatic patients treated at the Dead Sea, 70% of the patients were completely cleared after 4 weeks [7].

Chronic, plaque-type psoriasis and guttate psoriasis seem to respond well to Dead Sea climatotherapy. Palmoplantar psoriasis usually improves but may require more than 4 weeks of treatment. Lesions on flexural areas also respond to climatotherapy. In contrast to UVB phototherapy and psoralen plus UVA treatment, at the Dead Sea solarium patients can more easily expose flexural areas to sunlight. Pustular palmoplantar psoriasis is less responsive. Climatotherapy is not suitable for patients with generalized pustular psoriasis, and erythrodermic patients must be treated with particular care. There is one reported case of psoriatic erythroderma that cleared following heliotherapy at the Dead Sea [8], and similar cases have been seen by one of the authors (Z.E-P) [Table 1]. It appears that psoriatic arthritis also improved at the Dead Sea, especially when treated with a combination of sun exposure, sea bathing and mud packs [9].

Table 1. Clinical response of different types of psoriasis to climatotherapy at the Dead Sea

Guttate psoriasis	Excellent
Chronic plaque type	Good to excellent
Flexural psoriasis	Moderate to good
Palmoplantar psoriasis	Moderate
Psoriasis of the scalp	Unresponsive
Erythrodermic psoriasis	Unresponsive
Pustular psoriasis	Contraindicated

Dead Sea sun vs. Dead Sea water in the treatment of psoriasis

Several factors have been suggested to explain the beneficial effect of the Dead Sea treatment on psoriasis. These include: exposure to the sun, Dead Sea water bathing, psychological relaxation, environmental factors, and Dead Sea mud for associated arthritis. Of these possible factors, exposure to sunlight and seawater bathing seemed to be the most important [10].

The Dead Sea is the lowest point on the earth's surface — about 400 meters below sea level. Together with the haze

UVB = ultraviolet B
UVA = ultraviolet A

of aerosols overhanging the lake, the additional atmospheric thickness attenuates the UV radiation, weakening the shorter UVB more than the longer UVA. Measurements with a narrow-band spectroradiometer indicate that the intensity of UVB radiation in the Dead Sea region is lower than that measured in the desert city of Beer Sheva, 315 m above sea level [11].

In 1996, a comparison of ultraviolet A and B radiation intensities in the Dead Sea region and Beer Sheva was conducted by Kushelevsky and Kudish [12]. Continuous monitoring by broad band UVA + UVB meters showed that the UVB intensity varied by a factor of 5 during the year (with lowest intensity in December), and UVA intensity by a factor of less than 3 (with lowest intensity in December) [12]. Results obtained over the last 3 years showed the monthly average attenuation rates for UVB and UVA to be 14.8%/1,000 m and 5.7%/1,000 m respectively [13]. These results are in the range of values reported previously for studies performed at high altitudes such as the Alps and the Andes [14]. The attenuation of UV radiation at the Dead Sea is attributed to scattering [13].

Using a narrow-band spectroradiometer, analysis of measurements at the Dead Sea and Beer Sheva during August indicate that the relative attenuation increases as the wavelength shortens. For UVB the relative intensity decreased from approximately 0.83 to 0.73 as the UVB spectrum was scanned from 320 to 295. For UVA the attenuation was smaller. The relative intensity decreased from 0.96 to 0.88, between 380 and 320 nm. Thus, the spectral range of UVB, most effective in the production of erythema and sunburn, undergoes the highest degree of attenuation [13].

Dead Sea water is known for its high mineral content — about 32% total salts [Table 2]. Magnesium salts comprise approximately 45% of these total salts. There are clinical data suggesting that immersion in the Dead Sea or a reconstituted bath salt solution for 28 days improves psoriasis [15]. In addition, cell culture studies and electron microscopic changes in psoriatic skin cells suggest that Dead Sea salts possess an antiproliferative effect [16]. Tissue culture experiments have shown that magnesium bromide and chloride significantly inhibit proliferation of dermal cells taken from involved psoriatic skin [17].

In a study to evaluate and compare the separate beneficial effects of Dead Sea sun and Dead Sea water in the treatment of psoriasis, Even-Paz and Efron investigated 81 psoriasis patients between March and November 1993 [18]. The patients were divided into three groups: some were treated by bathing in Dead Sea water in covered indoor pools for 4 weeks; others were treated by sun exposure only, at morning and afternoon sessions for a total daily exposure of 5.5 hours for 4 weeks; and the remainder were treated by a combination of both procedures. Clinical response was determined by assessing the median PASI percentage

PASI = Psoriasis Area Severity Index

Table 2. Mineral contents of the Dead Sea water (mg/L)

Chloride	212,400.0
Magnesium	40,650.0
Sodium	39,150.0
Calcium	16,860.0
Potassium	7,260.0
Bromide	5,120.0
Sulphate	470.0
Bicarbonate	220.0

improvement for each of the above groups. The improvement rate was 22.1% for those treated by sea only, 79% for the sun-only group, and 87% for the sun + water group. The authors concluded that exposure to Dead Sea sun is the major therapeutic factor. Secondly, exposure to Dead Sea water possibly enhanced the effect [18]. Within the groups having sun exposure, the results in different seasons revealed no difference between exposures in the spring, summer or autumn [18]. This prompted a second study to examine whether the accepted schedule of 6 hours sun exposure is more than required, at least in the summer [19]. Between July and August 1994, 45 psoriatic volunteers were given sun exposure of 3 hours, 4.5 hours or 6 hours daily. The median PASI percentage improvement was 92%, 89.2%, and 91.7% for each sun exposure time respectively. The authors concluded that 3 hours of daily sun exposure during these months is as effective as exposure of 4.5 and 6 hours [19].

In another study by the same authors, the effect of 3 hours of sun exposure was determined in a month-by-month comparison. The study group comprised 83 volunteer psoriatic patients who were given 4 weeks of treatment from mid-April to mid-December 1995 [20]. The median PASI percentage improvement was similar (75.5–85.9%) for each month from April to November. In December the improvement was 44.6%. The authors concluded that 3 hours of daily sun exposure is sufficient for spring, summer and part of autumn, but this is inadequate for November–December [20] [Table 3]. It remains to be determined whether a daily exposure of 3 hours in the summer is still more than required.

The correlation between the cumulative UVA and UVB doses of some treatment courses (3 hours of daily sun exposure for 4 weeks) at different times of the year, and the degree of clinical improvement, will enable better determination of the optimal sun exposure periods, as well as a better comparison with artificial UV lamp treatment.

More recently, monthly measurements taken between April and October of cumulative doses of UVB showed that

Table 3. Suggestive exposure time in different seasons

Winter	6 hours
Spring	3 hours
Summer	≤3 hours
Fall	3–6 hours

at the range between 1.8 and 4.1 j/cm^2 there was no significant difference in the median percent of PASI improvement; the improvement rate declined only in November–December, when the cumulative dose of UVB was 1.5 j/cm^2 [21].

Conclusions, recommendations and future prospects

Climatotherapy at the Dead Sea is a highly effective treatment for psoriasis. Generalized plaque-type psoriasis — which otherwise may require systemic medication like oral retinoides, methotrexate or cyclosporin — responds to treatment as well as do the milder forms, without the risk of major side effects that are associated with systemic medication. Compared to artificial UV therapy it appears that climatotherapy at the Dead Sea is as effective as PUVA and narrow-band UVB and better than broad-band UVB. It is superior to PUVA in that it obviates the need for psoralen as well as for recommended precautions required with PUVA therapy. The main advantage of this treatment over other therapies is the infrequency of side effects, which are usually banal and easily corrected. In addition, the relaxed atmosphere and restful environment bear some psychological benefits that seem to be long lasting. Preliminary clinical results suggest that climatotherapy at the Dead Sea may be a valuable alternative treatment for atopic dermatitis, vitiligo, and early mycosis fungoides (unpublished data).

The main potential deleterious effects of Dead Sea treatment are the long-term hazards of skin aging and the increased risk of skin cancer. The risk of developing long-term side effects may be lower at the Dead Sea due to the atmospheric weakening of UV radiation, especially UVB. Such a reduced risk, however, has not yet been proven and is an issue to be investigated in collaboration with research workers in countries to which psoriasis patients return. A multicenter study has already been scheduled in Israel to evaluate the prevalence of photodamage and skin cancer among psoriasis patients who have undergone repeated climatotherapy at the Dead Sea. It would also be of interest to compare the long-term side effects after Dead Sea treatments with those following photochemotherapy and phototherapy.

Continuous UVA and UVB monitoring of solar radiation at the Dead Sea and the use of personal UV dose detectors are mandatory to determine the optimal timing and duration of sun exposure. This would enable a comparison between Dead Sea and other therapies, as well as an evaluation of the comparative risk of long-term deleterious effects.

PUVA = psoralen plus UVA

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I respect faith, but doubt is what gets you an education.

Wilson Mizner