

Effect of the Dead Sea Climatotherapy for Psoriasis on Quality of Life

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ABSTRACT: **Background:** It is well known that quality of life is an integral part in the outcome evaluation process of psoriasis treatment. Very few studies, however, examined the effect of climatotherapy at the Dead Sea on quality of life of such chronically ill patients.

Objectives: To determine the effect of the Dead Sea climatotherapy on the quality of life of patients with psoriasis vulgaris and psoriatic arthritis.

Methods: A total of 119 patients participated in an observational prospective study carried out at the Deutsches Medizinisches Zentrum clinic, a medical skin care center specializing in climatotherapy. The patients completed questionnaires (Skindex-29) to quantify their quality of life at different time points: the day of arrival, the day of departure, and 3 and 6 months after the end of treatment.

Results: Marked improvement in the quality of life scores was measured between the time of arrival to time of departure and to 3 months after the end of treatment.

Conclusions: Dead Sea climatotherapy has a significant positive influence on the quality of life of patients with psoriasis vulgaris and psoriatic arthritis.

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KEY WORDS: climatotherapy, Dead Sea, psoriasis, quality of life, Skindex-29

Psoriasis vulgaris is a chronic relapsing disease with a prevalence ranging from 0.5 to 4.6% in various populations worldwide [1]. The disease affects not only physical status but also the patient's overall wellbeing, including the social and emotional aspects of life [2]. Psoriasis is a systemic disease with considerable disability, comparable to other major chronic illnesses such as cardiovascular disease and diabetes [3].

The PASI (Psoriasis Area and Severity Index) is a common tool for assessing disease severity [4,5], but it does not relate to

the patient's quality of life. Previous studies have demonstrated the importance of addressing quality of life in psoriasis due to its significant effect on patients' psychosocial wellbeing and functional capabilities [6]. In order to quantify the quality of life aspect of chronic disease such as psoriasis, several quality of life index methods have been constructed in the form of self-reporting questionnaires [7].

Climatotherapy at the Dead Sea is a known therapeutic option for psoriasis [8]. It takes place at the lowest inhabited place on earth at 419 meters below sea level. This low altitude, combined with the constant haze of salts and minerals, allows prolonged sun exposure without absorption of high doses of ultraviolet radiation; therefore, there is a lower risk of photo damage [9]. Additionally, Dead Sea climatotherapy allows for several other therapeutic advantages in patients with psoriasis: a) bathing in the Dead Sea, which is rich in minerals and salts, may induce an antiproliferative effect on diseased skin cells; b) a prolonged stay (4 weeks or more) in a vacation-like environment, including supervision by a professional multidisciplinary therapeutic team, has a psychological soothing effect; c) Social networking and support is provided by other patients suffering from the same chronic disease.

In this study we aimed to demonstrate and quantify the grade of improvement in the patients' quality of life measured before and after completion of Dead Sea climatotherapy.

PATIENTS AND METHODS

Patients participating in this study came to the Deutsches Medizinisches Zentrum clinic, located in the Lot Spa Hotel, Ein Bokek, at the Dead Sea, between March and November 2005. They were sent by their health insurance fund in Germany following the failure of other treatments or because of good clinical results during previous therapeutic stays. This prospective study included 119 psoriasis patients of German nationality above the age of 18 years. All participants signed individual written informed consent forms. The recruitment of this group of adult German patients, who did not personally pay for the journey or the treatment and were specifically prefunded for Dead Sea climatotherapy, might have reduced various forms of selection bias

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Figure 1. The Skindex-29 Dermatology Survey of Quality of Life (English version, SKINDEX-29® MMChren, 1997, All rights reserved)[10-12]

HOW OFTEN DURING THE PAST WEEK DO THESE STATEMENTS DESCRIBE YOU?					
	Never	Rarely	Sometimes	Often	All the time
1. My skin hurts	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
2. My skin condition affects how well I sleep	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
3. I worry that my skin condition may be serious	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
4. My skin condition makes it hard to work or do hobbies	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
5. My skin condition affects my social life	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
6. My skin condition makes me feel depressed	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
7. My skin condition burns or stings	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
8. I tend to stay at home because of my skin condition	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
9. I worry about getting scars from my skin condition	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
10. My skin itches	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
11. My skin condition affects how close I can be with those I love	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
12. I am ashamed of my skin condition	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
13. I worry that my skin condition may get worse	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
14. I tend to do things by myself because of my skin condition	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
15. I am angry about my skin condition	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
16. Water bothers my skin condition (bathing, washing hands)	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
17. My skin condition makes showing affection difficult	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
18. I worry about side effects from skin medications/treatments	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
19. My skin is irritated	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
20. My skin condition affects my interactions with others	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
21. I am embarrassed by my skin condition	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
22. My skin condition is a problem for the people I love	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
23. I am frustrated by my skin condition	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
24. My skin is sensitive	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
25. My skin condition affects my desire to be with people	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
26. I am humiliated by my skin condition	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
27. My skin condition bleeds	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
28. I am annoyed by my skin condition	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
29. My skin condition interferes with my sex life	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
30. My skin condition makes me tired	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅

such as exclusion of patients of lower socioeconomic status or inclusion of patients who came for recreational purposes only.

The DMZ clinic, situated at the Dead Sea, is a medical dermatology center specialized in climatotherapy for psoriasis and other skin diseases, as well as arthritis, and is managed by dermatology specialists and a qualified medical team (<http://www.dmz-medical-spa.com/>). Treatment at the DMZ clinic comprises the following:

- medical evaluation by a dermatologist, including medical history, sociodemographic details, physical examination and follow-up during the course of treatment
- a personalized climatotherapy program that includes gradual increase of exposure to sunlight
- sea bathing for 20 minutes twice a day
- topical treatments including emollients and/or salicylic acid specifically prescribed for each patient according to his/her skin condition
- nurse availability to help with any medical issue that might arise
- a relatively secluded, stress-free hotel and spa environment.

The study protocol, based on the above principles, was designed to provide each patient individually with a calculated therapeutic ultraviolet B radiation dose plan, while taking into consideration the patient’s skin phototype and the minimal erythema dose, which correlates with the patient’s sensitivity to ultraviolet radiation.

The patients’ parameters of quality of life were evaluated using the Skindex-29 dermatology survey [Figure 1]. This questionnaire was specifically designed to assess quality of life in patients with dermatological conditions. The Skindex-29 was previously tested and validated [10,11] and its German-language version, used in the current study, was also previously validated [12]. Permission to use the Skindex-29 in this study was obtained by E.K. from the original Skindex-29 author (Chren Mary-Margaret MD, personal communication, 2004) and the author of the German version (Augustin Matthias MD, personal communication, 2004).

Each question in the survey had a 5 point answer scale, ranging between “never” (0) and “all the time” (5); the lower the score (range 0–100) the better the patient’s overall quality of life. The overall quality of life score can be further divided into three subscales: the patient’s emotional state, symptom severity, and functioning state. Unlike the PASI score, the survey does not quantify physical symptoms but assesses the quality of life impact on the symptom severity subscale.

Patients completed the questionnaires at four follow-up time points: upon arrival, at the end of treatment (departure day), and 3 and 6 months after the end of treatment. The questionnaires on the arrival and departure days were com-

DMZ = Deutsches Medizinisches Zentrum
 PASI = Psoriasis Area and Severity Index

pleted at the DMZ clinic and the last two were completed in the patients' homes in Germany and were returned by post.

Severity of disease was assessed on arrival at the DMZ clinic by a dermatologist. The assessment was based on the previous treatment received at home and on the disease's skin involvement. The PASI was recorded only if the lesions covered more than 10% of the body surface area. PASI values were also obtained by the same dermatologist at the end of the treatment.

STATISTICAL ANALYSIS

Statistical analysis was performed using the paired *t*-test to evaluate quality of life scores before and after treatment and the ANOVA test for assessing the linear trend over the course of the follow-up. The Greenhouse-Geisser method was applied to calculate the *P* value for trend. All *P* value calculations were two-sided and considered statistically significant if < 0.05. Statistical analyses were performed using SPSS version 15.0 software (Chicago, IL, USA).

RESULTS

The main baseline characteristics of the patients are summarized in Table 1. A total of 119 patients arrived at the DMZ clinic for climatotherapy. Their mean age was 46.8 years; 71% of the patients were males; 61% suffered from psoriasis vulgaris (without any joint involvement) and 39% from psoriatic arthritis. Mean duration of treatment was 4.1 weeks. At the beginning of treatment (arrival day), 71 patients (60%) completed the questionnaires. The response rate gradually decreased at further follow-up points, namely the departure day and 3 and 6 months later [Table 2].

The overall Skindex-29 score decreased, indicating quality of life improvement, by a mean value of 22.8 points (*P* < 0.001) between arrival and departure times. Quality of life improvement was also measured between the overall mean score at arrival day and the mean scores obtained 3 and 6 months after the end of treatment (-9.2 points, *P* = 0.008 and -5.2 points, *P*

Table 1. Baseline characteristics of the 119 study patients with psoriasis

	Mean ± SD	n	%
Age (yrs)	46.8 ± 10.6	119	100
Male gender	–	85	71
Type of disease			
Psoriasis	–	73	61
Psoriatic arthritis	–	46	39
Treatment duration (weeks)	4.1 ± 0.8	119	100
Body mass index	28.3 ± 5.8	119	100
PASI*	13.7 ± 6.5	39	33
Overall quality of life score	49.6 ± 15.9	71	60

*PASI was calculated only if the lesions covered > 10% of the body surface area. PASI = Psoriasis Area and Severity Index

Table 2. Overall quality of life score at different follow-up time points

	Arrival day (n=71)	Departure day (n=70)	3 months after departure (n=35)	6 months after departure (n=23)
Overall score ± SD	49.6 ± 15.9	27.6 ± 19.4	38.8 ± 19.1	43.7 ± 22.2
Improvement from arrival day (%)*	–	-22.8 (45)	-9.2 (20)	-5.2 (11)
<i>P</i> value	–	< 0.001	0.008	0.28

*Paired analysis included only patients with complete scores at both compared time points

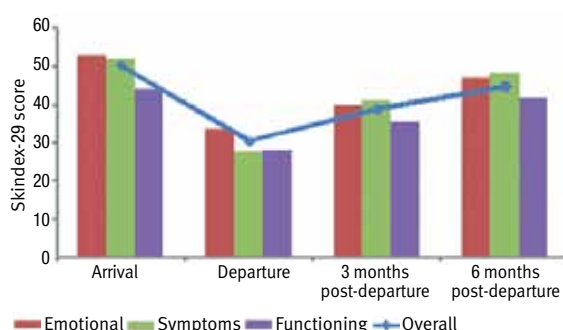
= 0.28, not significant, respectively; *P* for trend = 0.004) [Table 2]. Similarly, the quality of life score differences between arrival and departure times and between arrival and the 3 month follow-up point were statistically significant for the emotional, symptom, and functioning scores (data not shown).

The linear trend of change in quality of life over the entire study period, between arrival time and 6 months after departure, was significant for the overall quality of life score as well as for the three subscales [Figure 2].

Patients who were over 40 years old had significantly lower mean quality of life improvement than younger patients, ≤ 40 years of age, in the emotional scale (-18.5 ± 21.7 points vs. -36.0 ± 25.3 points, *P* = 0.01) and in the functioning scale (-15.1 ± 20.5 points vs. -27.7 ± 20.6 points, *P* = 0.03) between arrival and departure times. Patients who were obese (body mass index ≥ 30 kg/m²) had significantly lower mean quality of life improvement than non-obese patients in the emotional scale (-16.3 ± 21.2 points vs. -28.4 ± 24.8 points, *P* = 0.04) between arrival and departure times.

Mean PASI percent improvement, calculated as the difference between arrival and departure values divided by arrival value, reached 96.8%. The mean overall quality of life and PASI scores at departure time (27.6 ± 19.4 and 0.44 ± 0.77, respectively) had a Pearson correlation coefficient *r* of 0.27 (n = 26 pairs, *P* = 0.19).

Figure 2. Skindex-29 questionnaire scores of the overall, emotional, symptoms and functioning quality of life scales at the study follow-up time points*



*Overall score *P* for trend = 0.004, emotional score *P* for trend = 0.008, symptoms score *P* for trend = 0.001, functioning score *P* for trend = 0.01

No statistically significant difference in trends over the study period was observed between the overall quality of life score, as well as between the three subscale scores, of patients with psoriasis vulgaris and the corresponding scores of patients with psoriatic arthritis (data not shown).

DISCUSSION

Climatotherapy for psoriasis was established in recent years as a beneficial therapy that improves patients' physical condition [13,14]; it is also known to be beneficial for various other chronic illnesses such as those of rheumatic [15,16] and cardiovascular origin [17,18]. However, little has been documented on the aspect of patients' quality of life with regard to climatotherapy. In our study, an improvement in the quality of life of patients with psoriasis vulgaris and psoriatic arthritis who underwent climatotherapy at the DMZ clinic was observed.

A statistically significant improvement in the overall quality of life score was observed from the day of arrival to the day of departure and further to 3 months after the end of treatment by 45% and 20% respectively. These results represent a marked improvement in the quality of life of the participating patients.

The quality of life scores obtained 6 months after the end of treatment demonstrated a slight improvement as well. However, this improvement was not statistically significant, possibly due to the lower number of completed questionnaires at this time point.

Notably, two subgroups of patients had lower rates of quality of life improvement, particularly regarding the emotional aspect of quality of life. These patients were older than 40 or were obese. These patients could therefore benefit from lifestyle modification programs such as weight reduction intervention during their therapeutic stay at the Dead Sea in addition to the existing medical and climatotherapy interventions.

A significant improvement in the quality of life in parallel with a marked improvement in the physical skin condition was reported in our study as well as in others [14]. This composite improvement may pose a challenge for measuring the direct contribution of climatotherapy to quality of life versus that of medical treatment alone. In fact, a non-physical outcome of psoriasis, such as its effect on quality of life or depression [19], along with the difficulty to assess the ability of a given therapy to modulate these outcomes directly, can play a major role in the management and prognosis of any chronic morbidity. Further studies may be required to better understand the mechanisms involved in the complex and prolonged interactions between such interventions and outcomes. This concept in psoriasis was recently defined as the cumulative life-course impairment [20].

Our report and the accumulating medical research evidence could encourage patients and physicians to consider Dead Sea climatotherapy as a routine therapeutic option for psoriasis.

Studies with longer follow-up and larger sample size could further determine the magnitude of various long-term effects of climatotherapy at the Dead Sea on the quality of life.

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References

1. Lebwohl M. Psoriasis [Review]. *Lancet* 2003; 361: 1197-204.
2. Rapp SR, Exum ML, Reboussin DM, Feldman SR, Fleischer A, Clark A. The physical, psychological and social impact of psoriasis. *J Health Psychol* 1997; 2: 525-37.
3. Rapp SR, Feldman SR, Exum ML, Fleischer AB Jr, Reboussin DM. Psoriasis causes as much disability as other major medical diseases. *J Am Acad Dermatol* 1999; 41: 401-7.
4. Garduno J, Bhosle MJ, Balkrishnan R, Feldman SR. Measures used in specifying psoriasis lesion(s), global disease and quality of life: a systemic review. *J Dermatol Treat* 2007; 18: 223-42.
5. Feldman SR, Krueger GG. Psoriasis assessment tools in clinical trials. *Ann Rheum Dis* 2005; 64: 65-8.
6. Mease PJ, Menter MA. Quality-of-life issues in psoriasis and psoriatic arthritis: outcome measures and therapies from a dermatological perspective. *J Am Acad Dermatol* 2006; 54: 685-704.
7. De Korte J, Mombers FM, Sprangers MA, Bos JD. The suitability of quality-of-life questionnaires for psoriasis research: a systematic literature review. *Arch Dermatol* 2002; 138: 1221-7.
8. David M, Efron D, Hodak E, Even-Paz Z. Treatment of psoriasis at the Dead Sea: why, how and when? *IMAJ Isr Med Assoc J* 2000; 2: 232-4.
9. Kushelevsky AP, Harari M, Kudish AI, Hristakieva E, Ingber A, Shani J. Safety of solar phototherapy at the Dead Sea. *J Am Acad Dermatol* 1998; 30: 447-52.
10. Chren MM, Lasek RJ, Quinn LM, Mostow EN, Zyzanski SJ. Skindex, a quality-of-life measure for patients with skin diseases: reliability, validity and responsiveness. *J Invest Dermatol* 1996; 107: 707-13.
11. Chren MM, Lasek RJ, Flocke SA, Zyzanski SJ. Improved discriminative and evaluative capability of a refined version of Skindex, a quality-of-life instrument for patients with skin diseases. *Arch Dermatol* 1997; 133: 1433-40.
12. Augustin M, Wenninger K, Amon U, et al. German adaptation of the Skindex-29 questionnaire on quality of life in dermatology: validation and clinical results. *Dermatology* 2004; 209: 14-20.
13. Harari M, Novak L, Barth J, David M, Friger M, Moses SW. The percentage of patients achieving PASI 75 after 1 month and remission after climatotherapy at the Dead Sea. *Int J Dermatol* 2007; 46: 1087-91.
14. Halverstam CP, Lebwohl M. Nonstandard and off label therapies for psoriasis. *Clin Dermatol* 2008; 26: 546-53.
15. Sherman G, Zeller L, Avriel A, Friger M, Harari M, Sukenik S. Intermittent balneotherapy at the Dead Sea area for patients with knee osteoarthritis. *IMAJ Isr Med Assoc J* 2009; 11: 88-93.
16. Harari M, Dramsdahl E, Shany S, et al. Increased vitamin D serum levels correlate with clinical improvement of rheumatic diseases after Dead Sea climatotherapy. *IMAJ Isr Med Assoc J* 2011; 13: 212-15.
17. Gabizon I, Shiyovich A, Novack V, et al. Impact of descent and stay at a Dead Sea resort (low altitude) on patients with systolic congestive heart failure and an implantable cardioverter defibrillator. *IMAJ Isr Med Assoc J* 2011; 13: 402-7.
18. Schliamser JE, Amir O. The Dead Sea: good for the soul, good for the heart. *IMAJ Isr Med Assoc J* 2011; 13: 438-9.
19. Menter A, Augustin M, Signorovitch J, et al. The effect of adalimumab on reducing depression symptoms in patients with moderate to severe psoriasis: a randomized clinical trial. *J Am Acad Dermatol* 2010; 62: 812-18.
20. Kimball AB, Gieler U, Linder D, Sampogna F, Warren RB, Augustin M. Psoriasis: is the impairment to a patient's life cumulative? *J Eur Acad Dermatol Venereol* 2010; 24: 989-1004.