



## The Long Term Ability of Heliotherapy in Improving the Quality of Life and Alleviating Disease Activity in Patients with Psoriasis

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### ABSTRACT

**Background and aim:** Psoriasis is a chronic, multisystem inflammatory skin disease that adversely affects the quality of life. It is crucial to control disease activity and use all of the feasible therapeutic modalities to preserve the quality of life as much as possible. Heliotherapy uses natural sunlight in improving different skin conditions and represents the form of phototherapy. This study aims to assess the long-term effects of heliotherapy and compare it with outcomes of other research.

**Materials and methods:** A total of 27 patients participated in an observational study of 2-week heliotherapy conducted at the seaside of Montenegro. Disease activity and the quality of life were measured using PASI and DLQI scores at three points of time: before starting heliotherapy, after two weeks, and three months of heliotherapy.

**Results:** Mean PASI score before the treatment was 11,31. The results revealed a decrease in PASI values after 14 days of therapy by 30%, as well as a statistically significant decrease in PASI values after three months of therapy by 29% ( $p < 0.001$ ). Additionally, the present study has shown a reduction in DLQI score by 41.7% ( $p < 0.001$ ) comparing to baseline. However, three months after the heliotherapy DLQI score was reduced by 8,33% ( $p = 0.006$ ) comparing to the baseline, indicating that the score was returning to the pre-therapy values.

**Conclusion:** To conclude, two-week heliotherapy has shown satisfying, long-lasting effects in reducing PASI score and ameliorating disease severity, but it did not show beneficial effects in improving the quality of life in the long term.

### 1. Introduction

Psoriasis is a chronic inflammatory skin disease affecting 2-4% of the population.<sup>[1]</sup> However, psoriasis does not affect only skin, causing issues solely due to skin changes. It is well-established as an immune-mediated, hyperproliferative disease associated with the features of metabolic syndrome, psoriatic arthritis, obesity, and higher cardiovascular risk.<sup>[2-5]</sup> Since the skin is an organ visible to the others, it is obvious that psoriasis can cause physical and mental discomfort, especially when widely extended, more severe, and located on the exposed parts of the body.<sup>[6]</sup> Therefore, psoriasis has a significant negative effect on patients' quality of life, causing decreased productivity, impaired self-esteem, work absenteeism, financial burden. Patients frequently experience the feeling of stigma and embarrassment.<sup>[7-9]</sup> Studies have shown that the clearer the skin is, the better the quality of life is observed in psoriatic patients. The entails that there is a correlation between higher PASI improvement and improvement in the quality of life (abb. QoL).

<sup>[10-12]</sup> Successful therapy of psoriasis is addressed to alleviate physical, social, and psychological components of the disease. There are different treatment modalities for keeping the disease under control, but still no treatment for curing.<sup>[13]</sup> Heliotherapy (abb. HT), especially in heliomarinotherapy or heliothalassotherapy, comprises promoting a healthy lifestyle, taking the sunshine, and bathing in salty water. As a form of light-based therapy, HT can be compared with other light therapies, even those using artificial lights, rendering a similar method to other light therapies. It is a well-established treatment method in some Nordic countries, and they arrange group heliotherapy concepts each summer for psoriasis patients.<sup>[14]</sup> UVB radiation from natural or artificial sources induces apoptosis, alters cytokine profile, promotes immunosuppression, inhibits cellular proliferation, alters gene expression, and promotes vitamin D synthesis.<sup>[15]</sup>

There is enough proof indicating the immediate positive effects of HT in psoriasis patients. On the other side, the long-term effects of HT on the QoL

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and disease activity are still challenging, and studies have shown ambiguous results. The present study aims to assess the effect of HT on quality of life and disease severity three times and try to find how the assessed parameters are changing on shorter and longer runs. The results obtained in this study will be compared with the outcomes of already published studies, which assessed the effects of group HT on disease activity and QoL. This study assesses the effects of individual heliotherapy primarily, and the authors will try to find the correlation between the latter studies and the presenting one. In our knowledge, studies assessing the effects of heliotherapy for patients with any skin diseases have been conducted so far, neither in Montenegro nor in the surrounding countries. As far as we were able to search, this is the first study that considers individual HT programs. Since Montenegro is a country with plenty of sunshine days and no group organized HT, this study may help us to change existing practice in treating psoriasis without any form of light therapy.

## 2. Materials and methods

The study was planned to assess the effects of HT on patients with chronic plaque psoriasis. Before the study started, patients have been explained the plan and aims of the heliotherapy program. There were no changes in methodology after the onset of therapy. The patients included in the study were either from the seaside or spent a two-week summer holiday at the seaside, so they decided to sunbathe voluntarily according to their holiday times. Further inclusion criteria were long-term patients with satisfactory compliance and sufficient willingness to cooperate with a dermatologist and show up at follow-up checks. Initial and follow-up checks were carried out at the Department of dermatology, always by the same dermatologist. Patients were assessed before heliotherapy (Visit 1), after 14 days (the end of heliotherapy) (Visit 2), and three months after the end of heliotherapy (Visit 3). Since our heliotherapy concept entails individual HT, patients had appointments for Visit 1, 2, and 3 at different times, according to the period they chose to pursue HT. Exclusion criteria were photosensitivity, Fitzpatrick's skin photo-type I, family history of malignant skin diseases, administration of photosensitizing drugs, malignancies, non-controlled comorbidities, lack of compliance with both previous therapy and instructions regarding bathing and sun-tanning. All of the patients were aware of all the positive and negative effects of heliotherapy. We did not incorporate other components of group heliotherapy, such as meeting peers, exchanging experiences.

Patients with chronic plaque-psoriasis were exposed continuously to heliotherapy for 14 days (two weeks) from June to September of 2020. They attended heliotherapy individually, 3-4 hours daily, avoiding the hours of the highest radiation. The physicians` informed all of the patients about the side effects of HT, suggesting to cease HT if any occur and report to competent medical service. The sample comprised 27 patients with chronic plaque psoriasis. The sample size was determined according to the number of patients who met the criteria for both inclusion and exclusion. The tools we used were in the trial were Psoriasis Area Severity Index (PASI) score for following disease severity and Dermatology Life Quality Index (DLQI) score for following the QoL. Both tools are standardized and officially used in dermatology practice. PASI is a quantitative score for measuring the severity of lesions based on area coverage and the features of plaques. DLQI questionnaire is a 10-item questionnaire concerning patients` perception of the influence of skin disease on various aspects of life.<sup>[16, 17]</sup>

## Statistics

Statistical analyses were carried out using the SPSS program. Descriptive statistics were performed to analyze the mean, SD, and minimum and maximum score (range) of the variables. Categorical variables were expressed through frequency and percentage. Along with descriptive analyses, different tests were used for statistical comparison: ANOVA tests, Wilcoxon Sign Rank test, and Pearson's correlation coefficients.

## 3. Results

Twenty-seven patients completed the study; in other words, all of the patients enrolled at the beginning of the study. This implies that participants were carefully and precisely chosen, as well as well-prepared for the study. Their cooperation and willingness to participate were more than satisfactory. The participant flow is presented in Fig. 1.

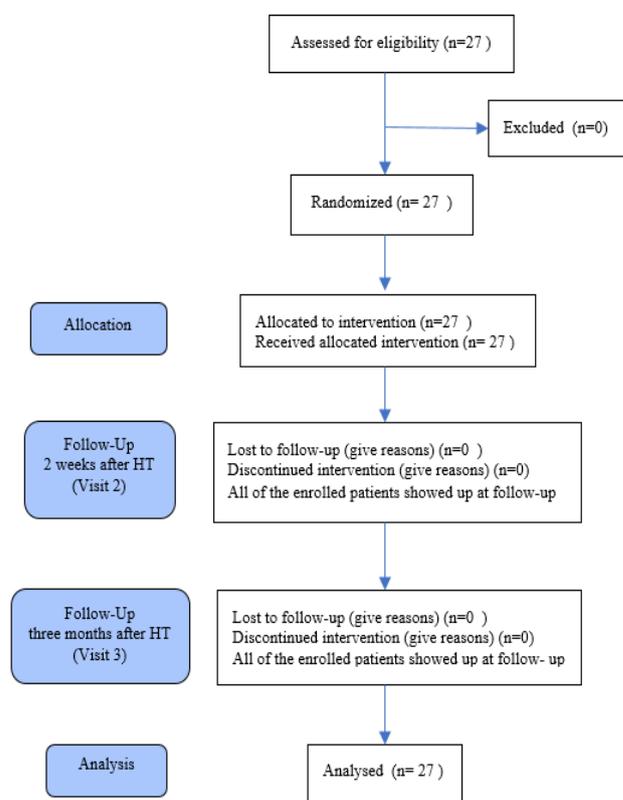


Fig. 1. Participant flow during the study.

## Characteristics of the sample

A total of 27 patients participated. The mean age of respondents was 39.59 years ( $\pm 8.106$ ). Seventeen patients (63%) were male, and the mean duration of disease was 7 ( $\pm 4.862$ ) years, ranging from 1 to 20. Furthermore, the mean BMI was 26.59 ( $\pm 2.664$ ), ranging from 22 to 33. Fitzpatrick's skin phototype III prevailed in our study. Two patients were on biological treatment (7.4% of our sample). Characteristics of the patients included in the sample are presented in Table 1.

**Table 1. Characteristics of the patients included in the study.**

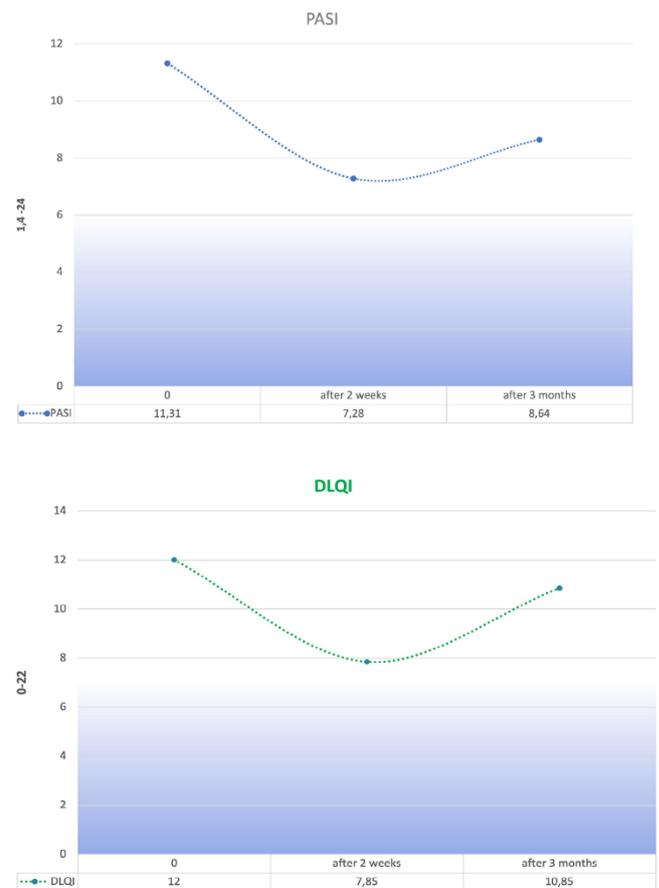
Gender	Number / percent
Male	17 ( 63 %)
Female	10 (37 %)
Age (range)	Mean ± SD
	39.59±8.106 (22-56)
BMI (range)	Mean ± SD
	26.59± 2.664 (22-33)
Duration of psoriasis in years, (range)	Mean ± SD
	7.56 ±4.862 (1-20)
Fitzpatrick's skin type	Number / percent
II	9 (33.3 %)
III	13(48.1 %)
IV	5 (18.5 %)
Previous therapy used for psoriasis	Percent of patients from our sample
Oral systemic therapy along with topicals	44.4 %
Biologics	7.4 %
Solely topical therapy	37.00 %
Something else	11.1 %

**Changes in disease activity**

Changes in PASI score were a clinical tool to assess disease activity. The mean PASI score before HT was 11.31, after two weeks 7.28, and the mean value of PASI score after three months was 8.6 (p<0.005). All the patients experienced a reduction in PASI scores, but none of the patients had total clearance. Comparing to baseline (Visit 1), there was a statistically significant decrease in PASI values after 14 days of therapy by 30% (Visit 2) (p<0.005). Also, the PASI score remained significantly reduced by 29% three months after the therapy compared to baseline (Visit 3) (p<0.005). ( Diagram 2 and Table 2).

**Changes in the quality of life**

The higher the DLQI score, the more impaired the quality of life. The mean DLQI score, the measure by ANOVA test, before starting HT was 12.00, after two weeks 7.85 (p<0.005), and after three months of HT, it was 10.85 (p=0.019). The study revealed a statistically significant decrease in DLQI after 14 days of therapy, showing DLQI score decreased by 41.7% (p=0.000). However, no statistically significant decrease in DLQI was found after three months of therapy compared to the baseline (p=0.006). ( Fig. 2 and Table 2).

**Fig. 2. Changes flow in disease activity and quality of life three times, measured by PASI and DLQI, respectively.****Table 2. Changing in PASI and DLQI values after 14 days and three months compared to baseline.**

PASI	Mean/ SD (range)	p	Z	r
Visit 1 (baseline)	11.31±4.6 (4.0-24.0)			
Visit 2	7.28±3.8 (1.4-17.0)	<b>0,000*</b>	-4,46	0.85
Visit 3	8.64±4.1 (2.0-18.0)	<b>0,000*</b>	-4,49	0.87
DQLI	Mean/ SD (range)	p	Z	r
Visit 1 (baseline)	12.00 ±5.29 (0-22)			
Visit 2	7.85/±4.34 (0-17)	<b>0,000*</b>	-4,46	0.85
Visit 3	10.85/±5.38 (0-20)	0,006	-2,72	0.52

Bolded values statistically significant. p-p value, r- Pearson's correlation coefficient, z-standardized normal deviate, SD- standard deviation.

#### 4. Discussion

Phototherapy, in all its variants, may induce remission of psoriasis and improve the QoL. However, studies examining the effects of heliotherapy on psoriasis have shown different remission periods and values of improvement regarding disease severity and quality of life. The present study showed that HT had improved both the PASI scores and quality of life in psoriasis patients. The mean baseline PASI value was 11.31, relatively close to the mean PASI or SAPASI (self-assessed PASI) score in previously conducted studies, indicating that patients have moderate to severe clinical form psoriasis. However, sunbathing therapy in those studies varied from two to four weeks and was pursued in large groups of patients.<sup>[15, 18-20]</sup> HT decreased the mean PASI score by 30% on Visit 2, comparing to the baseline PASI score (Visit 1) ( $p < 0.001$ ). They are a handful of studies that could support the immediate efficacy of HT on psoriatic lesions. A study conducted by Wahl A et al. (2015) has shown that the mean SAPASI score after three weeks of heliotherapy dropped from 8.6 to 1.6.<sup>[18]</sup> Furthermore, other studies<sup>[15, 19]</sup> have shown even better PASI improvements right after heliotherapy. In addition to that, a study assessing the effects of climatotherapy after one month showed the reduction of mean PASI score from 31.7 to 1.42 or 95.5% PASI improvement.<sup>[19]</sup> Another study assessing patients after four weeks of Dead Sea climatotherapy showed PASI improvement of 88%.<sup>[21]</sup> However, we expected higher improvement in PASI score, but PASI improvement of 30% only may be due to the shorter duration of HT and lack of group support among patients compared to other studies may be the limitation of the study. Nevertheless, it is undoubtful that heliotherapy has a short-term efficacy in improving disease severity.

PASI score remained significantly improved even at Visit 3, showing that PASI was reduced by 29% compared to Visit 1 ( $p < 0.001$ ). It is a statistically significant improvement comparing to baseline values, meaning that the effects of HT persisted for a certain period, and this result did not surprise us. Other studies have also proved significant PASI or SAPASI improvement after a three-month follow-up period, indicating lasting improvement in psoriasis disease severity.<sup>[14, 18]</sup> A study conducted by Snellman et al. showed that 4-week heliotherapy cleared psoriasis and alleviated joint symptoms after a six-month follow-up period.<sup>[22]</sup> In a study conducted by Harari M et al., the authors pointed out that 4-week climatotherapy has beneficial long-term effects on chronic plaque-type psoriasis, which are favorably compared to the effects obtained by artificial ultraviolet therapy. Furthermore, they concluded that UVB radiation delivered by natural light therapy is lower than the UVB radiation delivered from artificial sources.<sup>[19]</sup> On the other side, a study conducted by Wahl et al. found no long-term improvement in PASI scores after 4-week heliotherapy.<sup>[23]</sup> The benefits of light therapy are proved even by histopathological examination, suggesting a significant reduction in histopathological changes in psoriasis after PUVA phototherapy sessions and UVB-NB, which may apply to natural light therapy as well.<sup>[24]</sup> When it comes to the quality of life, HT has a favorable effect in improving the QoL. Our study showed that the mean DLQI score dropped from 12.00 (at visit 1) to 7.85 (at visit 2), confirming the immediate effect of HT on QoL. The positive short-term effect of HT on QoL is in correlation with other studies that have been conducted so far.<sup>[14, 18, 25]</sup> However, there was no long-lasting effect of HT on QoL after three months of HT. A study conducted by Emmanuel T et al. discovered no statistical significance between DLQI score at baseline and a couple of months after climatotherapy.<sup>[21]</sup> Furthermore, a study conducted by Karppinen et al. showed that DLQI scores have dropped to the baseline after a 3-month follow-up.<sup>[14]</sup> Other studies have used other scales for measuring the quality of life, for instance, Health Education Impact Questionnaire (heiQ-scale), The Skindex – 29.<sup>[18, 20]</sup> Unfortunately, these

studies also have not firmly proven a long-term improvement. The latest study conducted by Trostrup H et al. has reported that HT induces PASI 75 in one-fifth of patients at follow-up four to six months later. Furthermore, six of ten patients experienced an improvement in QoL, measured by DLQI. In this study, the initial mean PASI score and the PASI flow were similar to ours. Also, the DLQI score at the last follow-up seems similar to ours, pointing out that heliotherapy does not affect the quality of life in the long term, at least using the DLQI questionnaire.<sup>[26]</sup> Using statistical tools, we tried to find the correlation among the patient's age, the duration of psoriasis or BMI, and the PASI and DLQI score outcomes. No such correlation was confirmed. Unlike us, Kopel et al. found out that obese patients had a lower mean quality of life improvement than non-obese patients. Furthermore, they showed that over 40 years old had lower QoL improvement than the patients below 40.<sup>[20]</sup> Harari et al. also showed that older subjects had lower improvement outcomes, emphasizing that these findings should be confirmed on larger samples.<sup>[19]</sup> We could not prove these facts, maybe due to a small sample, but these findings should encourage younger people to take part in any forms of natural phototherapies and researchers to try to measure benefits. Heliotherapy at the Dead Sea or the Canary Islands is a standard treatment modality for psoriasis patients from North Europe.<sup>[21]</sup> Phototherapy is considered the third most common treatment modality after topical corticosteroids and complementary and alternative medicine. The percent of patients who have used climatotherapy at some point in the psoriasis treatment course is about 46% in the Middle East.<sup>[27]</sup> Since Montenegro is a Mediterranean country with plenty of sunshine days, without a cabin for artificial UV radiation in hospital settings, our patients benefit significantly from easily accessible heliotherapy. However, only a few patients use this advantage primarily due to physical discomfort or lack of financial means. It should be taken into consideration by health authorities to incorporate heliotherapy into national treatment programs. It has been proven that heliotherapy positively improves both disease severity and quality of life. However, the duration of the effects is still a challenging issue.

#### 5. Conclusion

Psoriasis is a chronic inflammatory disease that highly impacts patients' overall well-being. All of the studies that have been conducted so far have proven the positive effects of HT, which have mainly been conducted under controlled conditions (peer support, physicians' support, group physical activity.). The results regarding the lasting effects of group HT are still dubious. On the other side, our study has evaluated the effects of individual HT, where group encouragement was lacking. It may lead to weaker PASI improvement after 14 days of HT, comparing to other studies. Either way, the improvement was still statistically significant. The study results have shown that heliotherapy has significant efficacy in the long-term clearance of skin lesions. The QoL's has a less impressive impact than other research outcomes, at least under our study. Thus, our study proves that even individual HT could be beneficial for psoriasis patients. It is doubtless and certain that heliotherapy has positive effects on the course of disease activity, so the patients should be encouraged to pursue it under either controlled or less controlled conditions.

#### Conflict of Interest

The authors declared that there is no conflict of interest.

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## References

- [1] Parisi R, Symmons DP, Griffiths CE, Ashcroft DM. Global epidemiology of psoriasis: a systematic review of incidence and prevalence. *Journal of Investigative Dermatology*. 2013;133(2):377-85. <https://doi.org/10.1038/jid.2012.339>.
- [2] Gisondi P, Fostini AC, Fossà I, Girolomoni G, Targher G. Psoriasis and the metabolic syndrome. *Clinics in dermatology*. 2018;36(1):21-8. <https://doi.org/10.1016/j.clindermatol.2017.09.005>.
- [3] Jensen P, Skov L. Psoriasis and obesity. *Dermatology*. 2016;232(6):633-9. <https://doi.org/10.1159/000455840>.
- [4] Mathew C, Sridharan R, Sudhamani B. A study of the association of psoriasis with metabolic syndrome from a tertiary care centre in Kerala, South India. *IP Indian J Clin Exp Dermatol* 2021;7(1):18-23.
- [5] Blauvelt A, Chiricozzi A. The immunologic role of IL-17 in psoriasis and psoriatic arthritis pathogenesis. *Clinical reviews in allergy & immunology*. 2018;55(3):379-90. <https://doi.org/10.1007/s12016-018-8702-3>
- [6] Di Meglio P, Villanova F, Nestle FO. Psoriasis. *Cold Spring Harb Perspect Med*. 2014;4(8):a015354. doi:10.1101/cshperspect.a015354
- [7] De Korte J, Mombers FM, Bos JD, Sprangers MA. Quality of life in patients with psoriasis: a systematic literature review. *In Journal of Investigative Dermatology Symposium Proceedings* 2004;9(2):140-147. <https://doi.org/10.1046/j.1087-0024.2003.09110.x>.
- [8] Martínez-Ortega JM, Noguera P, Muñoz-Negro JE, Gutiérrez-Rojas L, González-Domenech P, Gurpegui M. Quality of life, anxiety and depressive symptoms in patients with psoriasis: A case-control study. *Journal of psychosomatic research*. 2019;124:109780. <https://doi.org/10.1016/j.jpsychores.2019.109780>.
- [9] González-Parra S, Daudén E. Psoriasis and depression: the role of inflammation. *Actas dermo-sifiliograficas*. 2019;110 (1):12-9. <https://doi.org/10.1016/j.ad.2018.05.009>.
- [10] Puig L, Thom H, Mollon P, Tian H, Ramakrishna GS. Clear or almost clear skin improves the quality of life in patients with moderate - to - severe psoriasis: a systematic review and meta - analysis. *Journal of the European Academy of Dermatology and Venereology*. 2017;31(2):213-20. <https://doi.org/10.1111/jdv.14007>.
- [11] Bruins FM, Bronckers IM, Groenewoud HM, van de Kerkhof PC, De Jong EM, Seyger MM. Association between quality of life and improvement in psoriasis severity and extent in pediatric patients. *JAMA dermatology*. 2020;156(1):72-8. doi:10.1001/jamadermatol.2019.3717.
- [12] Kwan Z, Bong YB, Tan LL, Lim SX, Yong AS, Ch'ng CC, et al. Determinants of quality of life and psychological status in adults with psoriasis. *Archives of dermatological research*. 2018;310(5):443-51. <https://doi.org/10.1007/s00403-018-1832-x>
- [13] Tristani-Firouzi P, Krueger GG. Efficacy and safety of treatment modalities for psoriasis. *Cutis*. 1998;61(2 Suppl):11-21.
- [14] Karppinen T, Ylianttila L, Kautiainen H, Reunala T, Snellman E. Empowering heliotherapy improves clinical outcome and quality of life of psoriasis and atopic dermatitis patients. *Acta dermato-venereologica*. 2015;95(5):579-82.
- [15] Osmancevic A, Nilsen LT, Landin-Wilhelmsen K, Søyland E, Abusdal Torjesen P, Hagve TA, et al. Effect of climate therapy at Gran Canaria on vitamin D production, blood glucose and lipids in patients with psoriasis. *Journal of the European Academy of Dermatology and Venereology*. 2009;23(10):1133-40. <https://doi.org/10.1111/j.1468-3083.2009.03245.x>.
- [16] Finlay AY, Khan G. *Dermatology Life Quality Index (DLQI)*—a simple practical measure for routine clinical use. *Clinical and experimental dermatology*. 1994;19(3):210-6. <https://doi.org/10.1111/j.1365-2230.1994.tb01167.x>.
- [17] Shankar V, Ghosh S, Ghosh K, Chaudhuri U. PASI and PQOL-12 score in psoriasis: Is there any correlation?. *Indian journal of dermatology*. 2011;56(3):287. doi: 10.4103/0019-5154.82482.
- [18] Wahl AK, Langeland E, Larsen MH, Robinson HS, Osborne RH, Polesie AL. Positive changes in self-management and disease severity following climate therapy in people with psoriasis. *Acta dermato-venereologica*. 2015;95(3):317-21. DOI: <http://dx.doi.org/10.2340/00015555-1939>.
- [19] Harari M, Novack L, Barth J, David M, Friger M, Moses SW. The percentage of patients achieving PASI 75 after 1 month and remission time after climatotherapy at the Dead Sea. *International journal of dermatology*. 2007;46(10):1087-91. <https://doi.org/10.1111/j.1365-4632.2007.03278.x>.
- [20] Kopel E, Levi A, Harari M, Ruzicka T, Ingber A. Effect of the Dead Sea climatotherapy for psoriasis on quality of life. *Isr Med Assoc J* 2013; 15: 99–102.
- [21] Emmanuel T, Lybæk D, Johansen C, Iversen L. Effect of Dead Sea Climatotherapy on Psoriasis; A Prospective Cohort Study. *Front Med (Lausanne)*. 2020;7:83. Published 2020 Mar 18. doi:10.3389/fmed.2020.00083
- [22] Snellman E, Lauharanta J, Reunanen A, Jansén CT, Jyrkinen-Pakkasvirta T, Kallio M, et al. Effect of heliotherapy on skin and joint symptoms in psoriasis: a 6-month follow-up study. *Br J Dermatol*. 1993 Feb;128(2):172-7. doi: 10.1111/j.1365-2133.1993.tb15147.
- [23] Wahl A, Mork C, Cooper B, Padilla G. No long-term changes in psoriasis severity and quality of life following climate therapy. *J Am Acad Dermatol* 2005; 52: 699–701.
- [24] Noronha-Neta MI, Picciani BLS, Niemeyer-Corbellini JP, Ramos-E-Silva M, Soares FA, Carneiro S. Quantification of histopathological changes in patients with psoriasis before and after phototherapy. *Photodermatol Photoimmunol Photomed*. 2019 Sep;35(5):354-359. doi: 10.1111/php.12492.
- [25] Mørk C, Wahl A. Improved quality of life among patients with psoriasis after supervised climate therapy at the Canary Islands. *J Am Acad Dermatol*. 2002 Aug;47(2):314-6. doi: 10.1016/s0190-9622(02)00066-x.
- [26] Trøstrup H, Riis PT, Heidenheim M, Bryld LE, Jemec GB. Long-term evaluation of climatotherapy for psoriasis. *Dermatol Ther*. 2020 May;33(3):e13432. doi: 10.1111/dth.13432.
- [27] Svendsen MT, Jeyabalan J, Andersen KE, Andersen F, Johannessen H. Worldwide utilization of topical remedies in treatment of psoriasis: a systematic review. *J Dermatolog Treat*. 2017 Aug;28(5):374-383. doi: 10.1080/09546634.2016.1254331.

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