

Psoriasis Treatment: Bathing in a Thermal Lagoon Combined with UVB, versus UVB Treatment Only

JON HJALTALIN ÓLAFSSON, BARDUR SIGURGEIRSSON and RANNVEIG PÁLSDÓTTIR

Department of Dermatology, University of Iceland, Reykjavik, Iceland

We have compared bathing in a thermal lagoon in Iceland, combined with UVB treatment, to UVB treatment only in an open comparative study. Twenty-three psoriasis patients bathed 3 times daily and were treated with UVB 5 times a week for 4 weeks. The control group was only treated with UVB 5 times a week for 4 weeks. Psoriasis Area and Severity Index (PASI) was used to estimate the severity of the disease. The mean PASI score in the bathing group decreased from 20.8 to 2.8 ($p < 0.01$). In the control UVB group, the PASI score decreased from 16.7 to 6.9. The percentage difference between the groups was significant after 1, 2, 3 and 4 weeks. Bathing in the lagoon combined with UVB was found to be a very effective treatment and better than UVB treatment in our control group. **Key words:** algae; brine; the Blue Lagoon; balneotherapy; mud.

(Accepted November 10, 1995.)

Acta Derm Venereol (Stockh) 1996; 76: 228-230.

J. H. Olafsson MD, Department of Dermatology, National University Hospital, Tverholt 18, IS-105 Reykjavik, Iceland.

A geothermal lagoon called the "Blue Lagoon" was formed in the Svartsengi (Black meadows) lava fields on the Reykjanes peninsula in Iceland in 1976. Two preliminary studies have indicated that bathing in the Blue Lagoon has some beneficial effect on psoriasis (1). In 1993 (2) a study where 26 psoriasis patients bathed 3 times daily for 3 weeks showed a significant reduction in Psoriasis Area and Severity Index score (PASI) (3), especially after the first 2 weeks. The scaling disappeared quickly, the lesions got thinner and the erythema decreased. It was deduced that additional treatment was needed to get even better results. As the lesions were thin and not scaling, UVB treatment seemed to be the ideal addition to bathing in the lagoon. Therefore this study was carried out, where bathing combined with UVB treatment was compared to UVB treatment alone.

MATERIALS AND METHODS

The Blue Lagoon

Since 1976 a power plant in Iceland has drawn fluid from wells drilled into a geothermal reservoir (4). The 240°C fluid is a mixture of 65% sea water and 35% fresh water. It is pumped up to the surface and discharged into a lava field at a temperature of 70°C. On cooling, the liquid becomes supersaturated with respect to silica, which then precipitates to form a white mud. The silica concentration in the lagoon water is about 135-140 mg/kg. The chemical composition of the fluid in the lagoon is given in Table I (5). The mean temperature in the lagoon is 37°C, the mean pH is 7.5 and the salt content 2.5%. The dominating algae in the lagoon are bluegreen algae called *Leptolyngbya ereby var. thermalis*, belonging to the *Cyanobacteria* species. These algae are not found under similar conditions anywhere else in the world. The only type of bacteria isolated from the lagoon is a gram-negative rod related to *Roseobacter*. No human coliform bacteria are isolated from the lagoon or grow in water from the

lagoon. No fungi or plants have been found or isolated from the lagoon (6).

Inclusion criteria

Patients aged 16-85 with plaque psoriasis or extensive guttate psoriasis of more than 1 year's duration, and with more than 10% of the body surface involved, were included. Minor arthritis was accepted. No active treatment for psoriasis was accepted, and treatment with other modalities had to be stopped 4 weeks prior to the start of the treatment. Erythroderma and pustular forms of psoriasis were excluded. Serious heart condition or any disease rendering the patients unable to bathe in hot water for 1 h 3 times a day was an exclusion criterion.

Patients

As it was impossible to select a large group of patients with extensive psoriasis in Iceland to be treated all at the same time, help was received from Germany. Twenty-five white Caucasians with psoriasis arrived from Germany to the treatment facilities. One was excluded from the start as he had almost no lesions and one chose to leave the study for personal reasons. Twenty-three patients (aged 17-64, median 46; 10 females and 13 males) entered the study after giving informed consent. All were treated at the same time. The mean duration of their psoriasis was 23 years (range 4-43 years). All had been treated for psoriasis in the previous year. The lesions were widely distributed, affecting the trunk and both upper and lower extremities in most cases.

Controls

Seventeen white Caucasians with psoriasis from Iceland (aged 17-81, median 43; 8 females, 9 males) entered the study after giving informed consent. The mean duration of their psoriasis was 21 years (range 2-60 years). All had received psoriasis treatment in the previous year. The lesions were widely distributed, affecting the trunk and both upper and lower extremities in most cases.

Treatment

The patients in the Blue Lagoon were treated all at the same time under a 4-week period, 3 times a day for 1 h at a time. They were advised to rub the silica mud on the skin lesions while bathing. A quick shower was taken afterwards. UVB treatment was given daily 5 times a week at the treatment facility. The control group was only

Table I. The composition (mg/kg of fluid) of the fluid in the Blue Lagoon: pH/temp°C 7.70/24

pH/temp°C	7.7/24°
SiO	137
Na	9280
K	1560
Ca	1450
Mg	1.41
CO ₂	16.5
SO ₄	38.6
H ₂ S	0.0
Cl	18500
F	0.14

Total dissolved solids mg/kg fluid: 31900.

treated with UVB, after taking a shower, 5 times weekly for 4 weeks at the University Hospital Outpatient clinic in Reykjavik. The treatment period for the control group was 4 months, as it was not possible to gather a large group at the same time. Moisturisers and emollients were permitted. The same UVB lamps (Philips TL 100W/01) were used on both groups and the same staff worked in both places.

Medical evaluation

The patients and the control group were examined before starting treatment and after 1, 2, 3 and 4 weeks. The severity of the disease was determined by the PASI score. Photographs of the psoriasis lesions were taken before, during and after the study.

Statistics

The means of the PASI scores between weeks and treatment groups were compared with the *t*-test. When the treatment groups were compared, the decrease in PASI score was calculated by percentage, so that the groups could be compared, as they had slightly different PASI scores at the start of the treatment. All tabulations and statistical analysis were performed with the SPSS™ statistical package.

Table II. Total PASI scoring during treatment expressed as mean (range)

	Bathing + UVB	UVB treatment
Week 0	20.3 (9.7–30.8)	16.7 (10.4–22.9)
Week 1	13.3 (6.3–20.4)	14.4 (9.5–19.2)
Week 2	10.0 (3.7–16.4)	12.1 (7.6–16.6)
Week 3	5.6 (1.4–9.9)	9.5 (5.5–13.4)
Week 4	2.8 (0–5.6)	6.9 (3.4–10.3)

RESULTS

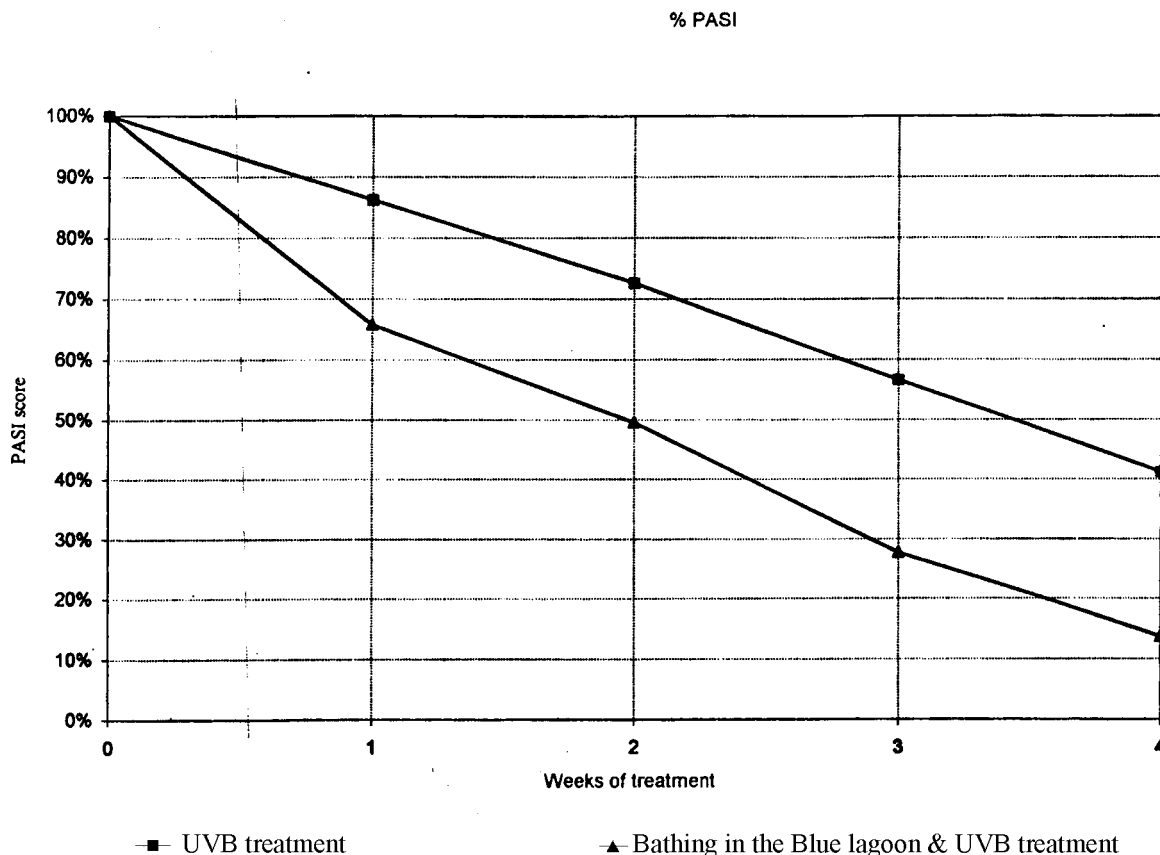
The PASI values during the study are seen in Table II. The mean PASI score fell significantly in both groups every week during the study. The decrease in PASI score was calculated by percentage, so that groups could be compared (Fig. 1). The difference between the groups was substantial and significant at all points. At 4 weeks 20/21 patients had an improvement rate of at least 75% in the combination group, but in the UVB group 75% improvement was seen in only 4/17. At that time psoriasis improved by less than 35% or in only 1/21 patients in the combination group but 12/17 in the UVB group.

Adverse effects

Approximately 50% of those in the combination group reported mild adverse effects. The majority involved the skin. These were described as mild stinging or itching during or shortly after bathing. This never interfered with the treatment and was not considered significant by most patients. Most patients noticed dry skin, which was easily remedied with emollients. None was withdrawn due to side-effects.

DISCUSSION

The first controlled study on the Blue Lagoon showed that the bathing has a beneficial effect on psoriasis(3), but it was not sufficient as a single treatment. As the scaling decreased very quickly along with rapid thinning of the lesions in the



first 2 weeks, it was concluded that UVB addition to the bathing would be beneficial. In this study the mean PASI score in the combination group decreased from 20.3 to 2.8 or 86% after 4 weeks. It seems evident from our results that bathing in the Blue Lagoon combined with UVB for 4 weeks has a very favourable effect on psoriasis and this effect is faster and better than in our UVB control group. The skin type of the two groups was similar, even if the mean PASI score before the treatment started was slightly lower in the control group than in the bathing group. This should not have any effect on the results. Many studies have shown that natural UV phototherapy and bathing in salt water have a beneficial effect on psoriasis (7, 8), but in the Blue Lagoon there are three noticeable differences compared to the usual UV thalassotherapy. The silica brine and the minerals of the lagoon are different from other areas in the world. The algae, *Leptolyngbya ereby var. thermalis*, are unique in this context and not found under similar conditions anywhere else. The third difference is that the natural sun in Iceland is not reliable for treating psoriasis except during a short period in the summer. It is possible that frequent hot baths in the lagoon may have a beneficial effect on psoriasis, but hot baths are very common in Iceland and many other countries and improvement of psoriasis in hot baths is not well documented. In addition, the control group in this study bathed every day in their homes and took a shower immediately before the UVB treatment was given. Silica mud has an abrasive effect when rubbed on psoriasis plaques. This can explain the early desquamation seen in the first study (2). However, the erythema decreased with the desquamation but did not increase, as might be expected, when the scaling decreased and the inflamed lesion became evident (9). The PASI score is a subjective measurement and as such not without drawbacks, but in lack of other more objective methods it has to be used. Most open studies are not as reliable as blinded studies but this could not be helped in our case. A control group who had been bathing in a hot bath for 1 h might have been better, but the controls on the other hand were instructed to bathe daily and shower before the UVB treatment. Most of the patients were quite pleased with the results of the treatment in the Blue Lagoon. In spite of the many treatment modalities available for psoriasis there is no treatment suitable for all patients. Some patients are generally opposed to the use of drugs or they may not tolerate the sun so other treatment modalities have to be explored. Psoriasis patients from many countries, seeking

alternative treatment modalities and balneotherapy, are already being treated in the Blue Lagoon. Therefore, bathing in the Blue Lagoon with its unique surroundings, with the addition of UVB light, could be an alternative treatment of psoriasis.

ACKNOWLEDGEMENT

We wish to thank the German dermatologists who selected the patients that participated in the treatment in Iceland, and the patients for participating.

Jon Orn Bjarnason, Ph.D., chemist at the Icelandic Energy Authority, gave valuable advice on the chemical composition of the lagoon. This study was supported by grants from the "Blue Lagoon Committee", a government appointed committee, The Geothermal Plant in Svartsengi, The Icelandic Health Corporation and the communities on the Reykjanes peninsula.

REFERENCES

1. Ingólfssdóttir V, Beck HJ, Sigurdsson G, Magnusson G. The effect of bathing in the Blue Lagoon on the skin disease psoriasis. (Icelandic). The Icelandic Medical Journal 1987; 19: 15.
2. Ólafsson JH, Sigurgeirsson B, Pálsdóttir R. The effect bathing in a thermal lagoon in Iceland has on psoriasis. A preliminary study. J Eur Acad Dermatol Venereol 1994; 3: 460-464.
3. Frederiksson T, Pettersson U. Severe psoriasis, oral therapy with a new retinoid. Dermatologica 1978; 157: 238-244.
4. Bjarnason JO. Svartsengi. Chemical monitoring 1980-1987. Orkustofnun (National Energy Authority of Iceland) 1988; Report OS-88001/JHD-01, 1-98 (Icelandic with English abstract.).
5. Hauksson T. Svartsengi. The chemical composition of thermal ground water and heated freshwater. Orkustofnun (National Energy Authority of Iceland) 1980; Report OS-80023/JHD-12, 1-38 (Icelandic).
6. Petursdóttir S, Kristjánsson J. The relationship between physical and chemical conditions and low microbial diversity in the Blue Lagoon geothermal lake in Iceland. FEMS Microbiology Ecology 1995, in press.
7. Molin L. Climate therapy for Swedish psoriatics on Hvar, Yugoslavia. Acta Derm Venereol (Stockh) 1972; 52: 155-160.
8. Abels DJ, Kattan-Byron J. Psoriasis treatment at the Dead Sea: a natural selective ultraviolet photo therapy. J Am Acad Dermatol 1985; 12: 639-643.
9. Snellman E, Lauharanta J, Reunanen A, et al. Effect of heliotherapy on skin and joint symptoms in psoriasis: a 6-month follow-up study. Br J Dermatol 1993; 128: 172-177.

B Sigurgeirsson MD PhD email: bsig@simnet.is