

ORIGINAL ARTICLES

Therapeutic Effectiveness of Psoralen-UV-A Bath Therapy In Psoriasis

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Abstract. *Introduction.* The use of psoralen baths with long-wave UV radiation, known as PUVA bath therapy, is useful in the treatment of psoriasis. The therapy is not associated with systemic adverse effects and the dose of UV-A radiation administered is lower. The objectives of this study aimed to identify the variables that influence the effectiveness of PUVA bath therapy and the duration of remission, as well as to determine factors that predict relapse. It also aimed to assess the effectiveness of a protocol using the minimal phototoxic dose and to compare two concentrations of 8-methoxypsoralen.

Patients and methods. Two hundred nine patients with moderate-severe plaque psoriasis attended between 1994 and 2000 were included in the study. The characteristics and therapeutic outcomes of the sample were recorded. Survival curves were plotted for the disease-free interval after a good response to treatment. A proportional hazard model was used to assess the factors that influence the duration of remission.

Results. Therapeutic outcomes were better in patients with greater photosensitivity ($p = 0.03$). Application of the minimal phototoxic dose protocol was not associated with greater phototoxicity during treatment. The median duration of remission was 7 months. Those patients who had previously undergone oral PUVA therapy and those who did not achieve a substantial reduction in the psoriasis area and severity index (PASI) score were at greater risk of relapse.

Conclusions. A lower final PASI extended the lesion-free period.

Key words: psoriasis, photosensitivity, photochemotherapy, psoralen-UV-A bath therapy, therapeutic effectiveness.

EFICACIA TERAPÉUTICA DEL BAÑO-PUVA EN PSORIASIS

Resumen. *Introducción.* El baño de psoralenos (P) e irradiación con ultravioleta de onda larga (UVA), conocido como baño-PUVA, es útil en el tratamiento de la psoriasis con la ausencia de efectos adversos sistémicos y una menor dosis de UVA administrada. El objetivo de este trabajo es identificar las variables que influyen en la efectividad del tratamiento con baño-PUVA y el período de remisión, así como determinar aquellas que permitan predecir la recidiva; valorar la efectividad de la prueba de fototoxicidad cutánea (DFM), y comparar dos concentraciones del 8-metoxipsoraleno (8-MOP).

Pacientes y métodos. Se incluyeron 209 pacientes afectados de psoriasis en placas moderada-grave visitados en el período 1994-2000. Se realizó un estudio descriptivo de las características y resultados terapéuticos de la muestra estudiada, y un estudio de supervivencia valorando el tiempo libre de enfermedad tras una buena respuesta al tratamiento. El análisis de riesgos proporcionales permitió evaluar qué factores influyeron en el período de remisión.

Resultados. Los pacientes con mayor fotosensibilidad mostraron los mejores resultados terapéuticos ($p = 0,03$). El protocolo en que se realizó la DFM no supuso más fototoxicidad durante el tratamiento. La duración del período de remisión fue de 7 meses en el 50 % de los pacientes. Aquellos pacientes que previamente realizaron terapia PUVA oral, y los que no consiguieron una reducción importante del *Psoriasis Area and Severity Index* (PASI), condicionaron un mayor riesgo de recidiva.

Conclusiones. Un PASI final reducido incrementa la duración del tiempo libre de lesiones.

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Palabras clave: psoriasis, fotosensibilidad, fotoquimioterapia, baño-PUVA, eficacia terapéutica.

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Introduction

Psoriasis is a chronic, recurrent inflammatory skin disease with an incidence in Spain of between 1.17% and 1.43%. In a total population of 40 million inhabitants, this implies that an estimated 470,000-570,000 people suffer from psoriasis.¹

Systemic photochemotherapy began in the 1970s, with oral 8-methoxypsoralen (8-MOP) and long-wave ultraviolet radiation (UV-A) supplied by high-intensity emission sources, denominated by the acronym PUVA.² As an alternative to oral PUVA therapy, a new photochemotherapy modality called PUVA bath therapy,³ in which UV-A radiation is applied following a bath containing psoralen diluted in the water at a temperature that allows the patients to remain in the bath for sufficient time to allow uniform application of the psoralen, thereby treating large affected areas. It has since been recognized as an important and effective therapeutic tool for treating psoriasis.^{4,5}

The Spanish Psoriasis Group establishes the severity of the disease according to the psoriasis area and severity index (PASI), whereby patients with a PASI of greater than 10 or with more than 10% of skin affected are classified as having moderate to severe psoriasis. Recently, Schmitt et al⁶ evaluated the severity of psoriasis according to the PASI score. In terms of the suitability of photochemotherapy in psoriasis, the Spanish Photobiology Group (GEF) considers oral PUVA to be the treatment of choice in severe plaque psoriasis, that is, with a PASI of greater than 20, and moderate plaque psoriasis (PASI, 10-20) that does not respond to topical treatment.⁷ PUVA bath therapy has been used in patients with a PASI of 10 or more.⁸

The objective of this study is to show the effectiveness of this therapeutic modality in patients with plaque psoriasis and to identify the variables that may affect the therapeutic response. Factors that affect the remission period and increase the probability of relapse were evaluated during follow-up and after treatment had finished.

Patients and Methods

Study Design

We performed a prospective descriptive study with a descriptive analysis of the personal characteristics of the patients and the therapeutic results. We performed a survival analysis in order to evaluate the disease-free interval after treatment had finished and a proportional hazards analysis to evaluate the variables that affected relapse.

Patients and Study Setting

We studied 209 patients for 72 months (1994-2000). During this period, 247 treatments were carried out at the phototherapy unit of the dermatology department of Pontevedra provincial hospital, Pontevedra, Spain. We included all patients suffering from plaque psoriasis with a PASI of greater than 10 and excluded patients receiving combined phototherapy and patients with other clinical forms of the disease.

Treatment with corticosteroids, vitamin-D derivatives, or retinoids was suppressed to give a 2-week wash-out period. The wash-out period was extended to 1 month for systemic treatment with methotrexate or retinoids and to 3 months in patients who had received different modalities of phototherapy (oral PUVA, PUVA bath, UV-B, or cyclosporine). None of the patients had previously received biological therapy.

The follow-up period began at the moment of the final treatment session and included patients whose PASI had fallen by over 50%. Relapse was defined as the date on which the patient presented an episode of psoriasis with a PASI of 50% of the initial PASI or higher. The follow-up period ended on 1 July 2002 for patients who did not suffer a relapse. For patients lost to follow-up due to other causes, such as change of address or death, the follow-up was censored at the last visit.

Therapeutic Procedure

Before starting treatment, 1 group of patients underwent a skin phototoxicity test to establish the minimum phototoxic dose (MPD); they received a bath with 8-MOP at 1 of the 2 established concentrations (0.5 and 3.75 mg/L) for 15 minutes at a temperature of between 27°C and 42°C. The patients then underwent irradiation of 5 areas of unexposed skin on the buttocks, each measuring 2 × 2 cm, with UV-A provided by a PUVA 180 L unit (Waldmann, Villingen-Schwenningen, Germany), with an irradiance of 10 mW/cm² and an emission spectrum of between 315 and 400 nm, with a peak at 365 nm. The MPD was defined as the dose (J/cm²) that induced perceptible erythema with a clearly defined outline. The initial dose was determined by the MPD or the phototype and the increments were made based on the previous dose (Table 1). The patients received 2 or 3 sessions per week and were supervised once a week or when they presented an adverse reaction. The therapeutic response was measured according to the reduction in the PASI; patients who did not improve (reduction in initial PASI, <30%) made up the poor response group, together with the patients whose condition worsened during treatment. Patients who obtained a good response

Table 1. Initial Dose and Increments According to Whether the Minimum Phototoxic Dose Was Determined or Not

		Initial Dose (J/cm ²)	Increments per Session or Every 2 Sessions
MPD	II	20% MPD	20% previous dose
	III-IV	30% MPD	30% previous dose
Phototype	II-III	0.25	50% previous dose
	IV	0.5	50% previous dose

Abbreviation: MPD, minimum phototoxic dose.

Table 2. Reduction in PASI at End of Treatment^a

Good response	30%-60%	60%-90%	90%-100%
	Moderate	Good	Excellent

^aAccording to Gómez M et al.⁸

(reduction in initial PASI, $\geq 30\%$) were classified in 3 categories: moderate, good, and excellent (Table 2).

To prepare the bath, we used crystalline 8-MOP (metoxaleno USP, Roic Farma, SA, Barcelona, Spain). The hospital pharmacy prepared a 1% solution of 8-MOP, with 90% alcohol at 96% and 10% propylene glycol. To obtain the concentration of 3.75 mg/L, 45 mL of the 1% solution of 8-MOP was diluted in 120 L of bath water. To obtain the concentration of 0.5 mg/L, 6 mL of the solution was diluted in the same volume of water.

The emission source for the treatment was supplied using a conventional phototherapy booth (PUVA-6001, Waldmann, Villingen-Schwenningen, Germany), equipped with 62 Sylvania FR74 T12/PUVA tubes (irradiance, 12-14 mW/cm²; continuous emission spectrum, 320-390 nm; maximum emission at 365 nm). The patients wore UV-protective glasses inside the booth and the men wore protection of the genital region consisting of black underwear.

Patients were administered an H1 antihistamine for the side effects inherent to the treatment (erythema, pruritus, xerosis, lentigo, edema, and pain) and, depending on the response, treatment was interrupted until the symptoms remitted. In the case of phototoxic erythema, the sessions were suspended until improvement was achieved and, depending on the number of session missed, the next session was started at the previous dose, 25%, or 50%. If 4 or more sessions were missed, treatment was restarted. Though no limit was established, if no improvement was observed over the course of a week following several sessions, treatment was terminated; treatment was also terminated in the event of patients presenting a severe phototoxic reaction.

Variables Studied During Treatment

The variable studied were age in years (difference between the date at starting treatment and the patient's date of birth), sex, phototype, age when psoriasis was diagnosed (difference between the date of diagnosis and the patient's date of birth), years of course of the disease (difference between the date at starting treatment and the date of diagnosis), family history, prior treatment with oral PUVA, whether the MPD test had been performed, initial dose according to MPD or patient phototype, 8-MOP concentration, initial PASI, number of sessions per week, total number of sessions, total cumulative dose, adverse reactions, and final PASI.

Statistical Analysis

A descriptive analysis of the study variables was undertaken and the Kolmogorov-Smirnov test was applied to evaluate the normality of the quantitative variables. In the bivariate analysis, the *t* test was used to compare means and the χ^2 and Fisher exact tests were used for the qualitative variables. Survival analysis was carried out using the Kaplan-Meier method. The log-rank test was used to compare survival curves for qualitative variables with 2 categories. The Cox proportional hazards regression model was used to evaluate adjusted risks. The dependent variable was disease-free interval. Independent variables included were those that showed statistical significance ($P < .05$) in the bivariate analysis or those with clinical relevance. Statistical tests were carried out using the SPSS statistical software package, version 15.0.

Results

The study included 209 patients. Table 3 shows the description of personal characteristics.

Women were diagnosed at an earlier age compared to men, a result at the limit of statistical significance ($P = .05$). There was no inter-sex difference in disease duration ($P = .86$) or age at start of treatment ($P = .06$).

There was no difference between sexes in the initial PASI ($P = .08$) or final PASI ($P = .54$). An excellent response was obtained by 68.9% of patients.

Table 4 shows the variables referring to treatment characteristics. The phototoxicity test was carried out on an equal proportion of patients with each phototype ($P = .44$).

Adverse reactions appeared in 55.7%, whereas 44.3% showed no adverse reactions. Adverse reactions were more frequent in low phototypes ($P = .03$): adverse reactions were presented by 71.1% of patients with phototype II,

Table 3. Demographic Characteristics of the 209 Patients

Characteristics	Number of Patients (%)
Sex	
Men	119 (56.9)
Women	90 (43.1)
Age, y	
Mean (SD)	44.20 (15.32)
Age at diagnosis, y	
Mean (SD)	26.09 (15.58)
Disease duration, y	
Mean (SD)	18.11 (11.39)
Phototype	
II	45 (21.5)
III	125 (59.8)
IV	39 (18.7)
Family history	
Yes/no	128 (61.2)/81 (38.8)
Previous oral PUVA	
Yes/no	82 (39.2)/127 (60.8)
No. previous PUVA baths	
0	133 (63.6)
1	48 (23.0)
2	16 (7.7)
3	8 (3.8)
4	4 (1.9)

Table 4. Treatment Characteristics

Treatment Characteristics	Number (%)
Initial PASI	
Mean (SD)	25.79 (8.59)
MPD	
Yes/no	88 (42.1)/121 (57.9)
Psoralen concentration	
3.75 mg/L	153 (73.2)
0.5 mg/L	56 (26.8)
Initial dose based on phototype, J/cm ²	
Mean (SD)	0.46 (0.37)
Initial dose based on MPD, J/cm ²	
Mean (SD)	3.14 (1.32)
Maximum dose, J/cm ²	
Mean (SD)	6.97 (4.47)
Total cumulative dose	
Mean (SD)	68.03 (53.32)
Weekly sessions	
2 sessions	57 (27.3)
3 sessions	152 (72.7)
Total number of sessions	
Median (range)	18 (2-42)
Adverse reactions, yes/no	
Erythema, yes/no	118 (56.5)/91 (43.5)
Pruritus, yes/no	69 (33.0)/140 (67.0)
Xerosis, yes/no	67 (32.1)/142 (67.9)
Lentigo, yes/no	33 (15.8)/176 (84.2)
Edema, yes/no	15 (7.2)/194 (92.8)
Pain, yes/no	10 (4.8)/199 (95.2)
Final PASI	
Mean (SD)	7 (3.3)/202 (96.7)
Mean (SD)	4.5 (11.34)

Abbreviations: MPD, minimum phototoxic dose; PASI, psoriasis area and severity index.

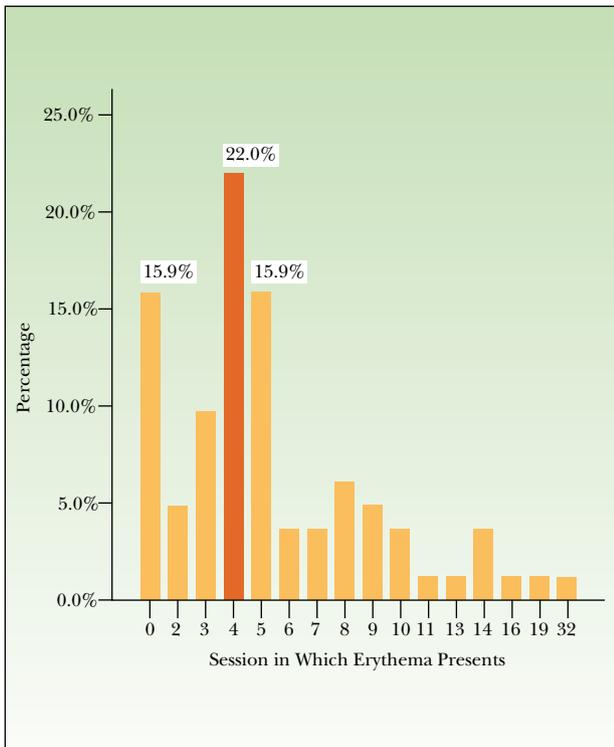


Figure 1. Session in which erythema presents.

49.6% of patients with phototype III and 61.5% of patients with phototype IV. The relative risk (RR) of presenting adverse reactions was 1.43 for phototype II compared to phototype III (95% confidence interval [CI], 1.11-1.85); the RR for phototype III compared to phototype IV was 0.81 (95% CI, 0.59-1.09), and the RR for phototype II compared to phototype IV was 1.16 (95%CI, 0.85-1.58). The most common adverse effect was phototoxic erythema (33.0%), followed by pruritus (32.1%), both occurring in the 4th session (Figures 1 and 2) Lentigo presented in 15 patients (7.2%) and PUVA edema in 10 patients (4.8%) with an initial PASI of higher than 20, with the exception of 1 patient. Seven patients (3.3%) experienced skin pain, which was accompanied by erythema in 6 of them. Patients who underwent the phototoxicity test presented more adverse reactions ($P=.03$), but this difference was only statistically significant for pruritus and xerosis ($P<.01$ and $P<.01$, respectively).

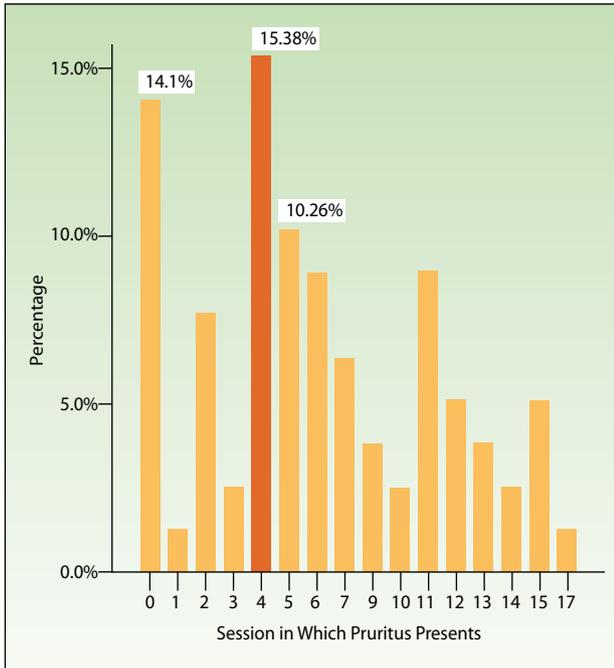


Figure 2. Session in which pruritus presents.

Table 5. Personal Characteristics of the Group of Patients Who Underwent the Skin Phototoxicity Test at Both Concentrations

	MPD + 0.5 mg/L	MPD + 3.75 mg/L	P
Number (%); men: women	48 (23); 31:17	40 (19.1); 24:16	.65
Phototype: II; III; IV	7; 32; 9	9; 25; 6	.60
Age at start of treatment (SD)	44.12 (14.7)	44.8 (14.37)	.82
Age at diagnosis (SD)	25.21 (14.53)	23.77 (13.15)	.62
Disease duration, y (SD)	18.90 (10.53)	21.03 (11.49)	.36
Family history, yes/no	30/18	27/13	.62
Previous oral PUVA, yes/no	21/27	12/28	.18
No. previous PUVA baths, 0;1;2;3;4	25; 12; 4; 4; 3	25; 9; 3; 2; 1	.33
Initial PASI (SD)	28.87 (9.02)	29.78 (9.93)	.65

Abbreviations: MPD, minimum phototoxic dose; PASI, psoriasis area and severity index.

Patients who underwent the test to determine the MPD were analyzed according to the concentration used (3.75 and 0.5 mg/L of 8-MOP). Table 5 shows the number of patients in each group and the statistical

significance for the different personal variables. The analysis of the treatment variables showed that the MPD was not significantly lower at the higher concentration ($P=.11$); nevertheless, the initial UV-A dose was higher with the protocol at the concentration of 0.5 mg/L ($P=.01$), though there was no difference in the total cumulative dose of UV-A ($P=.54$) or in the total number of sessions ($P=.32$). Adverse reactions presented in 29 patients (50.9%) in the group with the lower concentration and in 28 patients (49.1%) in the group that used the maximum concentration ($P=.34$). Erythema showed no difference between the different concentrations ($P=.08$); the mean (SD) number of episodes per session was 6.74 (4.85) in the group with the concentration of 3.75 mg/L and 3.67 (2.55) in the other group; the difference was statistically significant ($P=.02$). Pruritus also appeared later in the group using the maximum concentration (session 8.42) than in the group using the minimum concentration (session 6.55) ($P=.17$).

A good response was obtained by 194 patients (93.3%), 14 patients (6.7%) showed worsening or did not achieve a reduction of more than 30% of the PASI, and 1 patient abandoned the treatment. Patients who were diagnosed at an earlier age achieved better results from the treatment, though the difference was not significant ($P=.08$). The group of patients who presented a lower threshold in the skin phototoxicity test obtained a better response ($P=.03$). There was no difference in response according to the severity of the psoriasis ($P=.33$). In the subgroups studied, we observed that there was a greater reduction in the PASI of patients in the group who used the higher concentration, though the difference was not significant ($P=.09$). The response to treatment was similar in both groups ($P=.44$).

Analysis of the therapeutic response in terms of patient characteristics showed a poorer response in the group that had previously received oral PUVA ($P=.01$; RR, 4.24 [95% CI, 1.16-19.05]).

Adverse reactions were more frequent in patients who did not respond to treatment ($P=.02$; RR, 5.09 [95% CI, 1.08-47.69]). Erythema presented more frequently and earlier in patients who obtained a poor response ($P=.30$). Pruritus also presented earlier in the group with a poor response ($P=.01$) (Figure 3).

The follow-up included 187 patients (108 men and 79 women). The patients who achieved a reduction in the PASI of greater than 50% comprised 38 patients with phototype II, 116 with phototype III, and 33 with phototype IV.

Figure 4 shows the time, in days, during which patients remained in remission. The median time without relapse was 209 days (95% CI, 174-244 days). Seventy-five percent of patients were free from the disease for at least 73 days. Only 25% were free from disease for more than

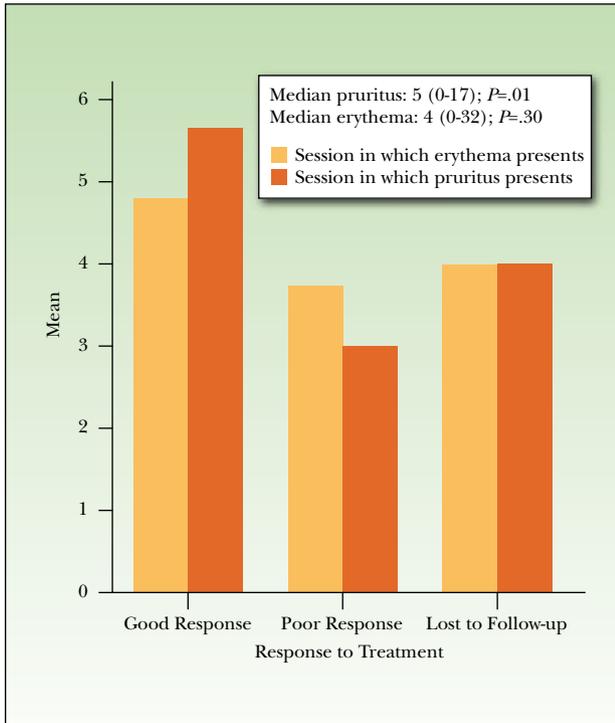


Figure 3. Association between therapeutic response and moment in which erythema and pruritus present.

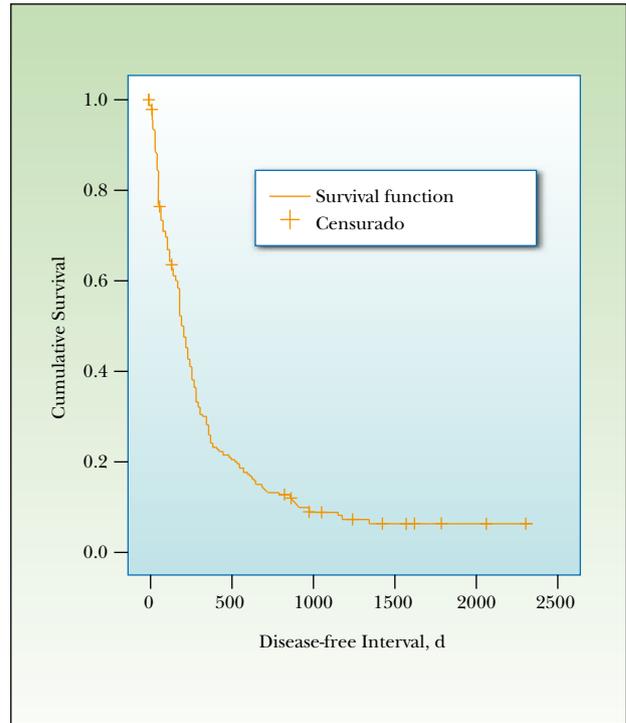


Figure 4. Survival curve of the 187 patients in follow-up.

376 days. Men presented a significantly higher survival rate than women ($P=.01$) (Figure 5). Analysis of survival according to whether patients had previously received oral PUVA showed that the group that had previously received this treatment spend fewer days in remission ($P=.00$) (Figure 6).

The variables included in the Cox proportional hazards regression model were those that showed statistical significance in the bivariate analysis (sex, age at diagnosis, previous oral PUVA therapy, adverse reaction, erythema, and final PASI). The variables that significantly affected the risk of relapse were having previously received oral PUVA therapy and the final PASI. Patients who had previously been treated with oral PUVA showed an increase in relapse of 63.2% (range, 18.3%-125.2%). For every unit increase on the PASI, the risk of relapse increased by 12.7% (95% CI, 1.067-1.191) (Table 6).

Discussion

The PUVA bath is considered to be an effective treatment modality in psoriasis and the result are comparable to those of oral PUVA therapy.⁹ The British Photodermatology Group published a document in 2000 confirming that all comparative studies of oral PUVA and PUVA bath therapy show similar efficacy.¹⁰ Nevertheless, specific aspects of the procedure such as the possible effect of the

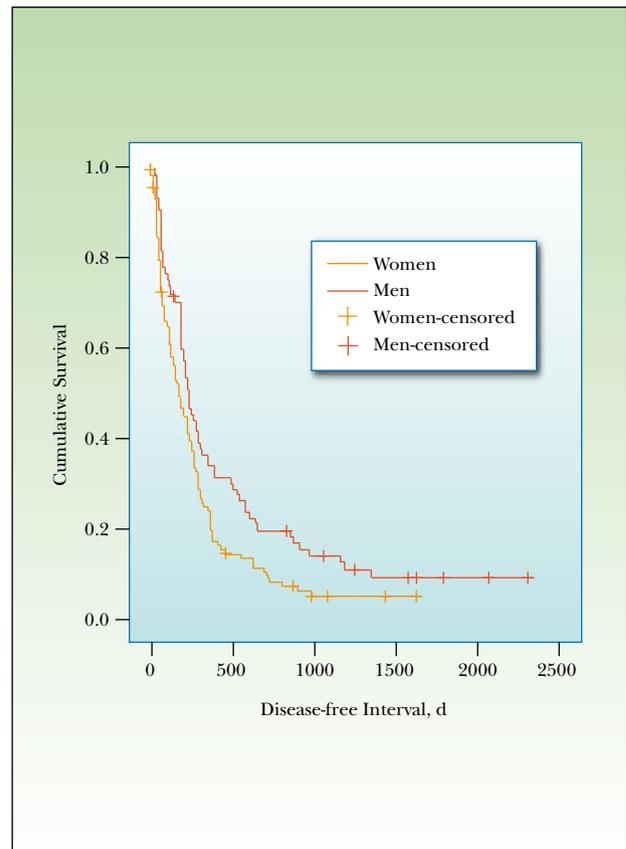


Figure 5. Survival curve by sex.

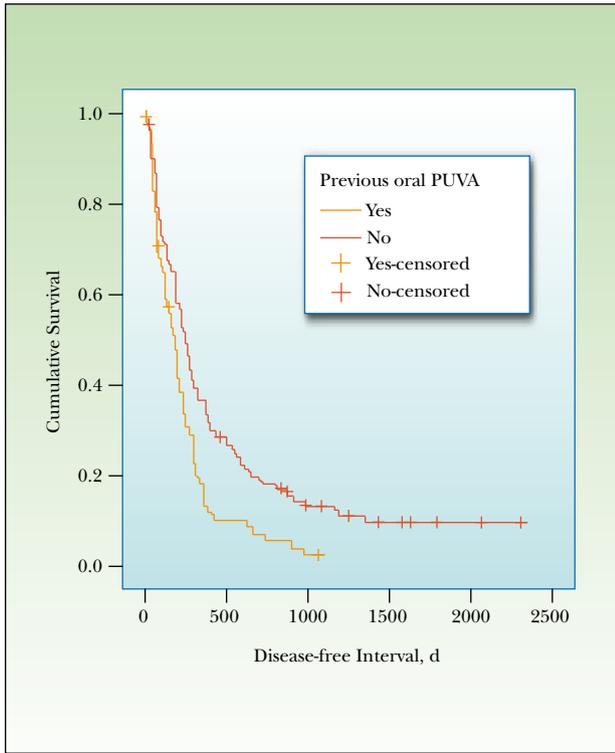


Figure 6. Survival curve according to whether previous oral PUVA therapy was received or not.

Table 6. Predictive Variables for Relapse (Cox Proportional Hazards Regression Model)

	Exp (B)	P	95% CI for Exp (B)	
			Upper	Lower
Oral PUVA	1.632	.003	1.183	2.252
Final PASI	1.127	.000	1.067	1.191

Abbreviation: PASI, psoriasis area and severity index.

concentration of 8-MOP in the bath water, water temperature, duration of the bath, the appropriate interval between ending the bath and exposure to UV-A radiation, and whether the phototoxicity test is necessary continue to be studied.

The predominant phototype in our study was Fitzpatrick phototype III. We observed a high incidence (61.2%) of family history of psoriasis. In the literature, the rate of family history of psoriasis varied between 4.4% and 90.9%.¹¹ In studies carried out in Spain, Ferrándiz et al¹² found an incidence of 40.7%, which is considerably

lower than that of our study and probably represents the real incidence in the autonomous community of Galicia.

Psoriasis can manifest at any age, though the age at which it is diagnosed is difficult to establish as the patient may not recollect the exact date. A study carried out in Spain¹² determined a mean age at diagnosis of 29.1 years; this figure is close to the mean age in our study (26.0 years). At the time of receiving treatment, our patients had had the disease for a mean of 18.1 years, with severe forms of psoriasis defined by an initial PASI of greater than 20. It would thus appear that diagnosis at a young age and the number of years patients have suffered from the disease tend to indicate these more severe forms. These results agree with those of Henseler and Christophers,¹³ who confirmed the link between the years of the course of the disease and expression of the disease; the results also agree with those of the study by Ferrándiz et al¹² as they show severe psoriasis in patients diagnosed before the age of 30 years who, therefore, have had the disease for a long time.

Our study showed that patients responded similarly to the treatment, independently of severity. Identical results were reported by Yones et al¹⁴ with oral PUVA therapy, as their patients achieved a similar response, regardless of severity at the start of treatment. We highlight this finding because we can argue that the reduction in the PASI with the different PUVA modalities (oral PUVA and PUVA bath therapy) would be independent of the severity of the psoriasis.

The phototoxicity test was not performed on all the patients in our study because it was not included in the pre-1998 protocol. We began to determine the MPD in our department in 1998, encouraged by the groups of experts who extolled its advantages.¹⁵ The manifest discrepancy between phototype and erythema threshold for UV-B, UV-A and PUVA has been the subject of debate for some years¹⁶ and it has been accepted that phototype is not a sufficiently reliable indicator of photosensitivity to be used in determining the PUVA bath dose.^{10,17,18} Determining the MPD is essential in this modality¹⁹ and has become widespread since the treatment began to be used, despite the increased requirement in terms of personnel and time.^{10,20} Recently, Finnish authors confirmed that the test is essential for establishing the initial UV-A dose and even improves the therapeutic response.²¹ It has not been possible to predict the increase in photosensitivity, peculiar to this modality, either by phototype or by the other phenotypic characteristics of the patient.^{18,22}

Our study included 2 homogeneous groups who underwent the test using both concentrations of 8-MOP. Patients who used the maximum concentration of psoralen obtained a lower initial dose, thereby corroborating the direct correlation between the concentration of psoralen

and photosensitivity.²³⁻²⁵ Furthermore, the group of patients who used the higher concentration achieved a lower final PASI that, though not statistically significant ($P=.09$), might provide support for the results of previous studies that did find a correlation between the concentration of psoralen and a significant reduction in the initial PASI.²⁶

It was of considerable importance to show that the patients with a lower phototoxicity threshold, and hence with higher photosensitivity, obtained a better therapeutic response as this result once again corroborated the evidence for a direct correlation between photosensitivity and an effective response shown by other authors.^{21,27-29}

A factor that had a negative effect on the therapeutic response in our study was having previously received oral PUVA therapy; this finding disagrees with the only study that showed no effect of this variable on efficacy.¹⁴

The total cumulative dose was high in comparison with other studies.^{17,21,26} However, the total number of sessions was similar in both the protocol based on phototype and the protocol in which the initial dose was based on the result of the phototoxicity test. The results agreed with those of previous studies, regardless of whether the initial dose of UV-A was determined according to phototype⁸ or MPD.²⁰ We found no studies in the literature that suggest an appropriate total number of sessions to obtain the greatest therapeutic efficacy. Cooper et al²⁰ observed that more than 20 sessions increased the total cumulative dose, and a higher figure would indicate a poor therapeutic response.³⁰

Adverse reactions had a negative effect on the response; the most common adverse effect was phototoxic erythema, coinciding with previous findings.³¹ It was of considerable importance to show the effect of this adverse reaction on therapeutic response, though this was of borderline significance ($P=.07$); it was the only adverse effect able to prevent completion of the treatment within a reasonable length of time or with the expected efficacy. We found no studies in the literature on the effect of phototoxic erythema due to PUVA bath on therapeutic efficacy. We have corroborated the fact that this adverse effect presented in the early sessions due to delayed and additive phototoxic responses³² and that it was therefore more common in the first 5 treatments.^{19,31,33} We found that the earlier it presented, the poorer the therapeutic effect, as with pruritus, though, in this case, the link was statistically significant. The simultaneous presentation of both reactions, together with skin pain suggested that, as with erythema, pruritus and pain during treatment could be explained by a photosensitivity mechanism.³⁴ We confirmed that erythema appeared more frequently in patients with phototype II and was a risk factor compared to patients with phototype III.^{35,36} Patients with phototype II should undergo the phototoxicity test in order to prevent erythema.³⁷

Having confirmed that undergoing the phototoxicity test in this modality of photochemotherapy did not increase erythema and in light of the literature to date, we believe that its use in PUVA bath therapy is clearly justified.

Bleaching was achieved in 68.9% of the patients in our study; Vongthongsri et al²⁶ achieved a rate of 76% with the maximum 8-MOP concentration, whereas Spanish authors⁸ obtained a rate of 57% and English groups obtained rates of 61%³⁰ and 85%.³³

In the follow-up, 50% of our patients remained in remission for approximately 7 months. According to our review of the literature, the mean time in remission for patients who underwent PUVA bath therapy ranged between 4,⁴ 8,⁹ and 12 months.³⁸ We found no large differences in comparison with oral PUVA therapy, for which the mean remission duration was 12 months according to Collins et al,³⁹ 6 months according to Karrer et al,⁹ and 8 months according to Yones et al.¹⁴

We found that prior treatment with oral PUVA therapy reduced remission duration and increased the risk of relapse. Male sex was also associated with a shorter remission duration, though there is no clear explanation for this. Bleaching and a lower final PASI were associated with a lower relapse rate; this result is exceptional and has not been reported in the literature. In conclusion, an excellent therapeutic response would contribute to patients remaining in remission for longer without requiring any therapy.

Conflicts of Interest

The authors declare no conflicts of interest.

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