

Efficacy of Bath PUVA in the treatment of Palmoplantar Hyperkeratosis

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ABSTRACT

Background: Palmoplantar hyperkeratosis, or palmoplantar keratoderma, is a combination of skin conditions that are characterized by excessive thickening of the skin, mainly on the soles and palms. There are various treatment methods for keratoderma, and one of those methods are treatment through bathwater PUVA. It is a type of photochemotherapy.

Objective of the study: The aim of the study was to observe the efficacy of bath PUVA treatment for palmoplantar hyperkeratosis.

Methodology: This randomized clinical trial study was conducted at the Department of Dermatology and Venereology, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh. The study duration was 6 months, from September 2007 to February 2008. A total of 30 patients presented with palmoplantar hyperkeratosis were enrolled in this study through random sampling method following the inclusion and exclusion criteria.

Results: Majority of participant (33.3%) were from the age group of 31-40 years. The mean \pm SD age was 38.40 ± 10.89 years, and the age range of the participants was 20-58 years. 70% of the participants were male, 83.3% were from low socioeconomic class, and 36.7% were businessmen respectively. Histopathological diagnosis revealed that 52% patients had psoriasis, 33% had nonspecific dermatitis, and 10% patients had chronic inflammatory dermatitis. Gradual improvement was observed from baseline to 8 weeks follow-up in regards to palmoplantar surface area involvement, erythema, and hyperkeratosis. 46.7% of the participants reported skin tenderness, and 93.3% have a burning sensation and no other side effects.

Conclusion: Bath PUVA may be an effective option in the treatment palmoplantar keratosis particularly of psoriatic patients. A mild form of nonspecific dermatitis may be treated with bath PUVA.

Keywords: Hyperkeratosis, Keratosis, Keratoderma, PUVA

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INTRODUCTION

Palmoplantar hyperkeratosis is a condition in which the palms and soles produce an excessive amount of keratin. It is a collection of conditions marked by abnormal thickening of the skin on the palms and soles, rather than a single disorder. They have traditionally been classified as either hereditary or acquired, and they were distinguished by mode of inheritance, presence of transgradiens (defined as a continuous extension of hyperkeratosis beyond the palmar and/or plantar skin), co-morbidities with other symptoms, and epidermal involvement, which can be diffuse, focal, or punctate^{[1],[2]}.

Palmoplantar hyperkeratosis is a common disease in dermatological practice. There are three clinical patterns of palmoplantar hyperkeratosis; diffuse, focal, and punctate. The palms and soles undergo a high level of physical stress in everyday use. To resist

the mechanical traumas, the palmoplantar region is equipped with highly specialized proteins such as keratin^{[3],[4]}. Keratins are a group of proteins that form the intermediate filament cytoskeleton of epithelial cells which are important for structural integrity. In keratoderma, excessive production of normal or altered keratin on the palms and soles is found. This excessive production of keratin leads to palmoplantar hyperkeratosis (PPH). Palmoplantar hyperkeratosis (PPH) and palmoplantar keratoderma (PPK) are often used interchangeably in many works of literature, but some authors define keratoderma as the non-hereditary and non-frictional hyperkeratosis.^[1] Both hereditary and non-hereditary hyperkeratosis or keratoderma are caused by abnormal gene mutation, specifically in the keratin genes^[5]. Keratin 1 mutations have been documented in patients with epidermolytic and non-epidermolytic keratodermas. It is a common problem in dermatology.

A great number of people in Bangladesh are suffering from Palmoplantar hyperkeratosis produced by various kinds of disturbance in the daily activities of an individual. PPH is prevalent globally, but the incidence is higher in third-world countries. PPH may develop in anyone irrespective of age and gender. An exact cause of palmoplantar hyperkeratosis is unknown. It may be associated with many cutaneous and systemic diseases. The treatment modalities of palmoplantar hyperkeratosis are topical (like salicylic acid, steroid etc.) and systemic (like retinoid, PUVA etc.). But little effect is achieved by topical preparation and systemic therapy. Though effective in some cases, they need long-time therapy and have various side effects like hepatotoxicity, bone marrow suppression etc. For these unsatisfactory outcomes, we choose bath PUVA (psoralen plus ultraviolet-A radiation), a photo-chemotherapy used as a treatment regimen for palmoplantar hyperkeratosis. Fischer and Alsins developed the Bath PUVA, in which psoralen derivatives such as trimethoxypsoralen or methoxsalen are dissolved in a warm water bath.^[6] Delivery of psoralens by bath prevents systemic adverse effects associated with oral PUVA like hepatotoxicity, photocarcinogenesis, cataract formation and a generalized photosensitization, lasting for 24 hrs requiring photoprotection^[6]. Bath PUVA has the advantage of selective and shorter photosensitization leading to a significantly lower

cumulative UVA exposure. Furthermore, it avoids typical variation in large inter-individual differences in the gastrointestinal tract absorption of psoralens. A Large Scandinavian study demonstrated that bath PUVA with trimethoxypsoralen bears only a low risk after a long time of usage^[7]. The present study was to determine the efficacy of Bath PUVA in the treatment of Palmoplantar hyperkeratosis, which would provide another treatment option for palmoplantar hyperkeratosis.

METHODS

This study was conducted at the Department of Dermatology and Venereology, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh. The study duration was 6 months, from September 2007 to February 2008. A total of 30 patients clinically diagnosed with palmoplantar hyperkeratosis were selected through a random sampling method following the inclusion and exclusion criteria. Informed written consent was obtained from each participant, and ethical approval was obtained from the ethical review committee of the study hospital. The diagnosis was made on a clinical basis and the severity of PPH was measured by assessing the percentage of the involved body surface, degree of erythema, scaling, and induration of the lesion. Patient data were recorded in a predesigned structured questionnaire. Information was collected by taking a clinical history and clinical examination. At the baseline visit, a complete clinical history was taken. Patients were instructed to report every 14 days interval for 8 weeks to observe the efficacy and side effects of bath PUVA.

Inclusion Criteria

- All patients diagnosed with palmoplantar hyperkeratosis irrespective of etiology.
- Patients between the age of 10 to 60 years.

Exclusion Criteria

- Pregnancy
- Patients with known hypersensitivity to ultraviolet rays.
- Patients following other medications for PPH
- Affected with other chronic diseases like hypothyroidism.

RESULTS

Among the participants of this study, majority (33.3%) were from the age group of 31-40 years. The mean \pm SD age of the participants was 38.40 ± 10.89 years, and the age range of the participants was 20-58 years.

Table I: Distribution of the participants by Age (n=30)

Age(year)	Frequency	Percent	Mean \pm SD(Range)
20-30	8	26.7	38.40 \pm 10.89(20-58)
31-40	10	33.3	
41-50	8	26.7	
51-60	4	13.3	
Total	30	100.0	

Table II: Distribution of the participants by various demographic characteristics (n=30)

Demographical characteristics	Frequency	Percent
Sex		
Male	21	70.0
Female	9	30.0
Socioeconomic status		
High	4	13.3
Middle	25	83.3
Low	1	3.3
Occupation		
Service	6	20.0
Housewife	9	30.0
Student	3	10.0
Retired	1	3.3
Business	11	36.7

Table III: Distribution of participants by palmoplantar surface area involvement at different follow-up periods (n=30)

Observation	Period	Palmoplantar surface area involvement		
		None	25-50%	50-75%
Baseline	-	-	24(80.0)	6(20.0)
2 weeks	-	-	24(86.7)	4(13.3)
4 weeks	-	13(43.3)	17(56.7)	-
6 weeks	-	29(96.7)	1(3.3)	-
8 weeks	4(13.3)	26(86.7)	-	-

At baseline, 80% of the participants had 50-75% of palmoplantar surface area involvement, and 20% had 75-100% involvement. After the start of treatment, gradual improvement was observed among the participants, and by the 8th week, 86.7% of the participants had <50% of surface area involvement, and 13.3% had no palmoplantar surface area involvement.

Table IV : Distribution of participants by erythema at different follow-up periods (n=30)

Observation	Period	Erythema		
		None	Mild	Moderate
Baseline	-	-	28(93.3)	2(6.7)
2 weeks	-	3(10.0)	26(86.7)	1(3.3)
4 weeks	-	23(76.6)	7(23.3)	-
6 weeks	1(3.3)	29(96.7)	-	-
8 weeks	28(93.3)	2(6.7)	-	-

At baseline, most of the participants (93.3%) had moderate erythema levels, and 6.7% had severe erythema. This improved gradually, and week 4, 76.6% had mild erythema, 23.3% had moderate erythema and none had severe erythema. By week 8, most of the participants (93.3%) had no erythema, and only 6.7% (n=2) had mild erythema. 38.40 ± 10.89

Table V : Distribution of participants by hyperkeratosis at different follow-up periods (n=30)

Observation Period	Hyperkeratosis			
	None	Mild	Moderate	Severe
Baseline			26(86.7)	4(13.3)
2 weeks		1(3.3)	26(86.7)	3(10.0)
4 weeks		19(63.3)	10(33.3)	1(3.3)
6 weeks		29(96.7)	1(3.3)	
8 weeks	12(40.0)	18(60.0)		

At baseline, 13.3% had severe and 86.7% had moderate hyperkeratosis. At week 2, 10% had severe, 86.7% had moderate and 3.3% had mild hyperkeratosis. By week 8, no participants had moderate or severe hyperkeratosis, only 60% had mild hyperkeratosis, and 40% had no hyperkeratosis at all.

Table VI : Distribution of the patients by histopathological types and final prognosis of participants (n=30)

Prognosis	Histopathological types		
	Psoriasis (n=16)	Nonspecific Dermatitis (n=11)	Chronic inflammatory Dermatitis (n=3)
Excellent	3(18.8)	1(9.1)	0(.0)
Good	6(37.5)	0(0)	0(0)
Poor	7(43.8)	10(90.0%)	3(100.0)

Histopathological diagnosis revealed that 52% patients had psoriasis, 33% had non-specific dermatitis, and 10% had chronic inflammatory dermatitis. Among the psoriasis cases, 43.5% had a poor outcome, 37.5% had good outcome and 18.8% had excellent outcome at cessation of the study. Among the 11 non-specific dermatitis cases, 1 had excellent and 90% had poor outcomes. All 3 patients with chronic inflammatory dermatitis revealed poor outcomes at the cessation of the study.

Table VII: Distribution of the patients by side effects (n=30)

Side effect	Frequency	Percent
Skin tenderness	14	46.7
Burning	28	93.3

The present study participants were observed with side effects like marked erythema, pruritus, or blistering. 93.3% of the participants reported of burning sensation after completion of the medication, and 46.7% had skin tenderness.

DISCUSSION

This clinical trial was conducted to observe the efficacy of bath PUVA in the treatment of palmoplantar keratosis. Thirty patients with palmoplantar keratosis were treated with Bath PUVA in this study. Out of all patients 21 (70.0%) were male and 9 (30.0%) were female. Male and female ratio was 7:3. Our finding of sex distribution was comparable with a 1997 study.^[10] Eight (33.3%) respondents of series were within 31 to 40 years age range followed by 26.7% within 20-30 years, 26.7% within 41-50 years and 13.3% within 51 to 60 years age range. Mean age of the patients was 38.4 years with a standard deviation of +10.89 years. All patients were within 20-58 years' age range. The mean age of the study was almost similar to the mean age of Wahab et al., which was 35.06 years.^[11] Within socioeconomic groups, 25 (83.3%) patients were from middle class families, followed by 4 (13.3%) from upper class and 1 (3.3%) from lower class families. Maximum (36.7%) patients of the present study group were businessman, followed by 9 (30.0%) housewives, 6 (20.0%) service holders, 3 (10.0%) students and 1 (3.3%) retired. At baseline 24 (80.0%) patients had 50 to 75% involvement in palmoplantar surface area and

the remaining 6 (20.0%) had 75 to 100.0% involvement. After start of bath PUVA treatment, gradual improvement was observed from baseline to 8 weeks onward. At the first follow-up after 2 weeks of being given bath PUVA, 26 (86.7%) patients had 50-75% involved surface area and 4 (13.3%) had 75-100% involvement. By the follow-up at 8 weeks, no palmoplantar surface area involvement was observed in 4 (13.3%) patients, followed by 26 (86.7%) who had only 25-50% involvement. At baseline 28 (93.3%) patients had moderate erythema, and the remaining 2 (6.7%) had severe erythema. After 8 weeks of treatment, 28 (93.3%) patients had no erythema and only 2 (6.7%) had mild erythema. In regards to hyperkeratosis, at baseline, 26 (86.7%) patients had moderate hyperkeratosis and rests 4 (13.3%) had severe hyperkeratosis. After 8 weeks of treatment, 12 (40.0%) patients had no hyperkeratosis and 18 (60.0%) had mild hyperkeratosis. Histopathological diagnosis was done to determine the histopathological types of hyperkeratosis. It was observed that 16 had psoriasis, 11 had nonspecific dermatitis, and 3 had chronic inflammatory dermatitis. Ultimate improvement was calculated by taking baseline and final follow-up scores. By considering clinical assesment only four (13.3%) patients had excellent improvement (3 psoriatic and I nonspecific dermatitis patient), six (20.0%) had good (all were psoriatic patients) and 20 (66.7%) (7 psoriatic, 10 nonspecific dermatitis, and 3 chronic inflammatory dermatitis patient) had poor improvement. These findings were much different from the findings of other studies, where bath PUVA treatment led to much higher rates of excellent outcomes.^{[10],[12],[13]} Hyperkeratotic dermatitis displayed the poorest responding rates in this study. Unwanted side effects such as erythema, pain, blistering or patchy hyperpigmentation were not observed in any of the patients. Among the 30 patients, 28 (93.3%) had complained of burning sensation, and 14 (46.7%) complained of skin tenderness during the treatment period. No gross side effects such as erythema, tanning, etc. were observed in the study, which was similar to by Wahab et al.^[11]

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

CONCLUSION

The treatment with bath PUVA may be an effective option in the treatment palmoplantar keratosis particularly of psoriatic patients. A mild form of nonspecific dermatitis may be treated with bath PUVA. Although improvement was observed in this study after bath PUVA treatment, this improvement was much slower than other global studies' findings.

Considering the findings of this study compared to other similar studies further longitudinal studies with large sample sizes may be conducted.

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