

Comparison of two modalities of phototherapy, narrowband UV-B and PUVA in the treatment of psoriasis: A study from Western Uttar Pradesh

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Abstract

Introduction: PUVA (psoralen + UV-A) has been used since long time ago in psoriatic patients, which has some adverse effects. Phototherapy in form of Narrowband UVB is advancement in the treatment of psoriasis and it has been found to be same efficacious and having lesser side effects than PUVA.

Aim: The study was aimed to compare NBUVB and PUVA in chronic plaque psoriasis in terms of their efficacy and adverse effects.

Methods: The study included 43 cases of chronic plaque psoriasis which were randomly divided into two groups. Patients were examined for body surface area involvement and PASI scoring. Narrow-band UV-B phototherapy was given to one group and the other group received PUVA therapy thrice-weekly for a duration of 3 months. Then they were compared for clearance of lesions and side effects.

Results: Both groups showed decrease in the PASI scoring by at least 75%. It was observed that lesser number of treatment sessions and fewer days were required for clearance of the lesions in PUVA group than the group receiving NBUVB therapy. But in NBUVB group, mean cumulative clearance dose and adverse reactions were significantly lower. The percentage of patients maintaining remission at six months were more in PUVA group as compared to NBUVB group.

Conclusion: Both modes of phototherapy are useful in psoriasis. Patients got clearance of the lesions faster in the PUVA group but the side effects were markedly less in the NBUVB group.

Keywords: Narrow-band UV-B, Psoralen UVA, Plaque psoriasis.

Introduction

Psoriasis is a chronic inflammatory recurrent skin disease. There are several factors contributing to the disease like autoimmunity, genetic susceptibility and various environmental factors. Psoriasis is characterized by hyperproliferation of keratinocytes and dermal inflammation. Interaction among the immune system, T cells and inflammatory chemical mediators are responsible for emergence of the disease.

Phototherapy is a well known treatment for psoriasis since long time. It involves exposure of the skin to ultraviolet rays of a particular wavelength i.e. 280-320 nm. Effects of ultraviolet radiation in clearing psoriasis was established by Dr. William Goeckerman in 1925,¹ while in 1950, Dr John Ingram used Ultraviolet B as a treatment of psoriasis in combination with coal tar.² Broadband UVB radiations in 1970 were found to be effective in mild psoriasis.³ In 1980, narrowband radiation was discovered which was having a narrower spectrum wave length, this was more effective in the treatment of psoriasis.⁴ NBUVB belongs to UV radiation in 311 nm spectrum.⁵

In the 20th century, various photo therapies have been used as a treatment of psoriasis. PUVA is a gold standard treatment of psoriasis. It has been proven more efficacious than broadband UVB phototherapy,⁶⁻⁹ but only a few studies are there comparing PUVA and NBUVB and they have shown that there is increased risk of skin cancers in long term with PUVA as compared to NBUVB¹⁰⁻¹³ These studies have also

shown that NBUVB has same therapeutic effect as PUVA but with lesser side effects.¹⁴⁻¹⁸ As little data is available in our region of Western Uttar Pradesh for comparison of the two therapies PUVA and NBUVB, this prompted us to do this study in our department.

Methods

Study was conducted in Lala Lajpat Rai Memorial Medical College, Meerut. Total 43 patients of psoriasis attending the outpatient department between the duration of July 2016 and Nov 2017 were enrolled.

In all cases, diagnosis was confirmed histopathologically, showing decreased to absent granular cell layer, focal parakeratosis, micromunro abscess in stratum corneum, test tube like rete ridges and dilated tortuous capillaries in dermal papilla.¹⁹ The duration of therapy was kept 3 months or reduction in the PASI score by seventy five percent or more.

Inclusion criteria involved patients of chronic plaque psoriasis with at least 25% body surface area involvement. Patients above 65 years or below 15 years were excluded from the study. Pregnant and lactating women, patients with history suggestive of photosensitivity, polymorphic light eruption, kidney or liver diseases, any skin cancer or patients on immunosuppressive or any treatment for psoriasis in last four weeks were excluded from the study.

After detailed clinical examination, PASI score was calculated for every patient. These patients were randomly divided into two groups of 21 and 22 patients.

Group I with 21 patients were given NBUBV phototherapy with initial starting dose of 280 mj/cm².^{18,20,21} Group II with 22 patients were given trimethoxy psoralen at a dose of 0.6 mg /kg bodyweight at least 2 hrs prior to UVA exposure with a dose of 2 j/cm² in type IV to V Indian skin type.^{18,22,23}

In both groups, phototherapy was given thrice weekly on alternate days. On each subsequent visit, the dose of irradiation was increased by 20 % of the previous dose. A close monitoring of the side effects in form of redness, burning, itching or pigmentation was recorded. If patients ever complained of persistent erythema i.e. redness persisting for more than 24 hrs or burning or blister formation at the site of exposure, the irradiation dose was decreased by 50% of the burning dose which is then further increased by 10% in next visit. Proper protection for eyes and genitalia was taken before irradiation.

All the patients were followed by the same clinician to avoid inter-observer variation. PASI score was calculated at 4th, 8th and 12th week. Remission was considered if there was 75% or more reduction in PASI score.²⁴ Results were statistically analyzed.¹⁶ Patients who achieved clearance were followed up for 12 months.

Results

We studied 43 patients, out of which 21 patients received NBUBV phototherapy (Group-I) and 22 patients received PUVA therapy (Group-II). The maximum number of patients in both groups were in

21-40 years age group. The minimum age was 15 years and the maximum was 65 years. The mean age of NBUBV group was 34.6 years and for the PUVA group, it was 36.7 years. The difference in mean age of two groups was not statistically significant ($P > 0.05$). So, as far as age was concerned, the two groups were comparable. NBUBV group included 14 males and 7 females, while PUVA group included 14 males and 8 females. So there was male preponderance in both the groups.

The duration of disease in NBUBV group ranged between 6 months to 25 years while in PUVA group, it was between 6 months to 28 years.

In the NBUBV group, PASI score before starting the therapy was in the range of 5.10 to 11.61 (mean, 6.23 \pm 2.13 SD), while in the PUVA group, it was in the range from 4.9 to 11.34 (mean, 5.9 \pm 2.17 SD). This difference in PASI score of two groups was not statistically significant ($P > 0.05$). So, our patients in both groups were also comparable in terms of PASI scoring.

In both groups, patients achieved >75% clearance at the end of 3 months of therapy. In patients receiving NBUBV therapy, post treatment PASI score ranged from 0 to 2.6 (mean, 1.31 \pm 0.95), while in patients receiving PUVA, it ranged from 0 to 2.4 (mean, 1.34 \pm 0.69). The difference in post treatment PASI scoring between the NBUBV group and the PUVA group was not statistically significant ($P > 0.05$) [Table 1].

Table 1: Comparison after 3 months of therapy

	NBUBV		PUVA	
	Range	Mean	Range	Mean
PASI scoring	0-2.6	(1.31 \pm 0.95)	0-2.4	(1.34 \pm 0.69)
Treatment sessions	12-32	(17.4 \pm 4.2)	7-27	(12.6 \pm 4.79)
Days to clear	44-90	(64.0 \pm 15.09)	36-84	(50.2 \pm 21.72)
Mean cumulative Clearance dose(J/cm ²)	1.2		7.5	
Maintenance of remission at 6 months	No. of patients	percentage	No. of patients	percentage
	9/21	42.8%	14/22	63.3%

For clearance of psoriatic lesions, the mean cumulative dose required in the NBUBV group was 1.2 J/cm² while in PUVA group, it was 7.5 J/cm². The cumulative clearance dose was statistically significantly lower in the NBUBV group than in the PUVA group ($P < 0.05$) [Fig. 1a,1b] and [Fig. 2a,2b]



Fig.1a: Before NBUVB therapy;

Fig. 1b: After NBUVB therapy

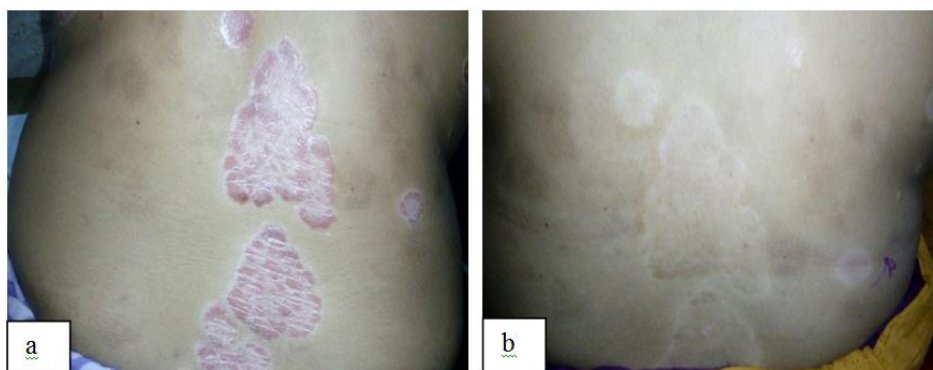


Fig. 2a: Before Psoralen UVA therapy

Fig. 2b: After Psoralen UVA therapy

The number of treatments required for clearance of psoriatic lesions in patients receiving NBUVB phototherapy ranged from 12 to 32 (mean, 17.4 ± 4.2), which were statistically significant more ($P < 0.05$) than the number of treatments required for clearance of psoriatic lesions in patients receiving PUVA, which ranged from 7 to 27 (mean, 12.6 ± 4.79). The number of days to clear psoriasis in patients who were on NBUVB therapy (range, 44-90 days; mean, 64.0 ± 15.09) was also higher than in the PUVA group (range, 36-84 days; mean, 50.2 ± 21.72). The difference was statistically significant ($P < 0.05$).

After 6 months of treatment, number of patients maintaining clearance in the PUVA group (14/22; 63.3%) were more than the patients undergoing NBUVB therapy (9/21; 42.8%) ($P < 0.05$).

Grade-I erythema was seen in all patients of both groups. Grade-II erythema was seen only in 65% patients of PUVA group while in 37% patients of NBUVB group. Nausea and vertigo was seen in 60% patients of PUVA group, while in the NBUVB group, only 25% developed nausea and vertigo. Headache was seen in 70% patients of PUVA group while only 35% patients in the NBUVB group experienced headache. Diffuse hair fall was noticed more in patients with PUVA group (62%) as compared to NBUVB group (28%).

Discussion

Psoriasis is a chronic inflammatory immune mediated genetic disorder that arises due to imbalance in the cytokine expression and more TH1/TH17 induced inflammatory response.^{25,26} As a consequence of it, the proliferative activity of basal keratinocytes is increased leading to hyperproliferation of keratinocytes and other pathological changes.

The mechanism of action of UV related phototherapy is by augmentation of apoptosis of inflammatory cells and keratinocytes, inhibiting TH1/TH17 stimulated effector response thus reducing the proliferative activity of basal keratinocytes.²⁶

Phototherapy in form of PUVA has its proven role in the treatment of psoriasis. The new advancement in this field is the development of narrowband phototherapy which is better than PUVA as it has lesser side effects and requires lesser dose for clearing the disease. NBUVB has its advantage that it can be given in patients who have been on drugs like methotrexate or retinoids, and it is safer to be given in pregnant women and children and in patients with liver related side effects. Also, there is convenience of giving NBUVB as no prior drug administration is required like PUVA therapy.

After three months duration, all the patients in both groups got clearance of the disease and there was no statistical difference in the PASI score between two groups, these findings match with the findings of Dayal et al.,¹⁸ who also showed that at the end of three months

there was no statistical difference in the PASI scoring between the two groups.

The cumulative dose to clear the disease in NBUVB group was significantly lower as compared to PUVA group. Our findings match with the study conducted by Gordon et al.,¹⁴ and Dayal et al.,¹⁸ who studied 100 and 60 patients respectively and found that the disease cleared at less dose (total cumulative dose) in NBUVB group.

The number of treatment sessions required for clearance in the PUVA group were statistically lesser in number than that required in the NBUVB group ($P < 0.05$), our this finding is similar to the finding as reported by Gordon et al.,¹⁴ and Dayal et al.,¹⁸ who have shown that clearance of psoriasis was faster with fewer number of treatments in significantly greater proportion of patients using PUVA as compared to NBUVB.

In our study, it was found that the number of days required for clearance in the PUVA group were statistically lesser in number than that required in the NBUVB group ($P < 0.05$) and these findings were contrary to the findings by Markham et al.,¹⁵ who found it to be equal, it may be probably due to difference in the number of sessions per week for NBUVB and PUVA. It was two days in a week for PUVA and three days in a week for NBUVB in the study of Markham et al.,¹⁵ but in our studies, it were three days in a week in both groups.

In our study, the observation that at six months the more number of patients maintained remission in PUVA group as compared to NBUVB group, matches with the studies by Yones et al.,²⁷ who studied 93 patients and found that at 6 months more number of patients were still in remission who were treated with PUVA (68%) than the patients undergoing NB-UVB therapy (35%).

Erythema was seen in both groups. Nausea, headache giddiness and generalized hair fall were found to be more common in PUVA group, it may be due to tri methoxy psoralen. Markham and Collins,²⁸ and Dayal et al.,¹⁸ also mentioned less side-effects with NBUVB as compared to PUVA in the treatment of chronic plaque psoriasis.

Conclusion

At the end of 3 months of therapy patients of chronic plaque psoriasis in both the groups i.e. NBUVB and PUVA achieved total or near total clearance of the disease. The response was faster in PUVA group, with significantly lesser number of treatment sessions and they required lesser number of days to clear psoriasis and maintained remission in more number of patients at 6 months. But the mean cumulative clearance dose to clear psoriasis and the side effects were lower in the NBUVB group than in the PUVA group.

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