

**COMPARATIVE STUDY OF ORAL METHOTREXATE, NARROW-BAND ULTRAVIOLET-B AND COMBINATION OF BOTH ORAL METHOTREXATE AND NARROW-BAND ULTRAVIOLET-B IN CHRONIC PLAQUE PSORIASIS****\*<sup>1</sup>Rohit Kataria, <sup>2</sup>Manish Meena, <sup>3</sup>Durgesh Sonare, <sup>4</sup>Gauri Vats, <sup>5</sup>Rekha Servi and <sup>6</sup>Vinod Jain**

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**INTRODUCTION**

Psoriasis is a common, chronic, disfiguring, inflammatory and proliferative condition of the skin, in which both genetic and environmental influences have a critical role.<sup>[1]</sup> The most characteristic lesions consist of red, scaly, sharply demarcated, plaques present particularly over extensor surfaces and scalp.<sup>[1]</sup> The disease is enormously variable in duration, periodicity of flares and extent. It has a bimodal age of onset affecting both males and females equally. Psoriasis is of unknown etiology with distinct cutaneous lesions, though a clinical diagnosis is easy to make, is difficult to treat satisfactorily.<sup>[1]</sup>

The impact of psoriasis on quality of life is significant because of its chronicity and prevalence (upto 2% of population).<sup>[2]</sup> Pruritus is the main symptom in patients of psoriasis. In surveys, the majority of psoriatic patients indicate a serious impairment in their quality of life and they also feel that the current treatment, although often effective, do not provide a satisfactory long term cure.

In general, the simpler and potentially less toxic therapies are tried first, including phototherapy with tar and ultraviolet B radiation. Other therapies must be considered if<sup>[1]</sup> cumulative amount of phototherapy becomes excessive with respect to potential toxicity,<sup>[2]</sup> psoriasis becomes unresponsive to these therapies and<sup>[3]</sup> psoriasis is life threatening or incapacitating physically, emotionally or economically. In these circumstances, agents such as methotrexate or PUVA or NBUVB when used properly, can produce good to excellent clinical benefit with minimal side effects. Patient instruction is vital to successful therapy at home or as an outpatient. Prolonged remissions are possible.

So, in view of availability of many modalities of treatment it is worthwhile to study and compare the effects of - Oral methotrexate, NBUVB and combination of both in the most common type chronic plaque psoriasis, which would add to the future trends in the management of the same and would help the suffering patients.

**AIMS AND OBJECTIVES**

To know and compare the efficacy and safety of Oral Methotrexate alone, NBUVB alone and combination of

both Oral Methotrexate and NBUVB in the treatment of chronic plaque psoriasis.

**MATERIALS AND METHODS**

Ninety patients of chronic plaque psoriasis attending the skin department from November 2015 to October 2016 were included in the study. The ninety patients were consecutively selected and allocated according to inclusion and exclusion criteria which are mentioned below into three groups, group A, B and C exhibited to Oral methotrexate, NBUVB, combination of both Oral methotrexate and NBUVB respectively.

Patients with normal Liver function, Renal function, hemogram willing for treatment, investigations and regular follow up are included in the study after taking consent.

Pregnancy, lactation, children, abnormal liver function or renal function, excessive alcoholism, photo aggravated psoriasis, previous cutaneous malignancy, patients with photosensitivity disorders like SLE etc, patients unsure about attending treatment schedule regularly, patients who failed to come for followup after initial therapy were excluded.

Initially a detailed history regarding the age of onset, the duration of illness, past modalities of treatment, family history of the disease, other triggering factors, occupation were taken. A detailed cutaneous and systemic examination was done in all the patients. Complete haemogram, urine for albumin, sugar and microscopy, skin biopsy, blood sugar, liver function test,

renal function test were done in all the patients before initiation of therapy.

The patients were explained regarding the duration of treatment, the need for regular followup to therapy clinic and probable side effects that could be encountered during treatment. Investigations were done periodically to observe for any systemic involvement and the response to treatment was evaluated every week by PASI Score and also the patients were observed clinically for any cutaneous or systemic side effects.

Ninety patients were consecutively selected and allocated into three groups, thirtyeach Viz group A. B and C. Exhibited to Oral methotrexate, NBUVB, combination of both Oral methotrexate and NBUVB.

In group A, initial dose of 7.5 mg per week was given in 3 equal divided doses spaced at 12 hours apart and dose was gradually increased by 2.5 mg/week to a maximum of 15 mg/week, till PASI achieves 75 or for 12weeks whichever was first. Liver biopsy was not done in these cases, because of normal liver chemistry, history and physical examination and the total cumulative dose of 1.5 gm was not given in these cases.

In group B, Minimal Erythema Dose (MED) was done using six test doses (200, 280, 390, 550, 770, 1100 mj/cm). Result was read after 24 hours.

The chamber consists of NBUVB lamps with a built in dosimetry which will help to measure the irradiation of the unit continuously. Patients were given protective eye glasses and genitalia were covered.

In group C, three weeks prior to NBUVB phototherapy, oral methotrexate was given 15mg per week in three equal divided doses spaced at 12 hours apart ,then NBUVB given as per protocol in group B ,along with methotrexate as per protocol group A.

In all the three groups duration of therapy was 12 weeks or till the patients achieved PASI 75 (75% reduction in the base line PASI Score), whichever was earlier, subsequently patients were either tapered or put on maintenance therapy and monitored accordingly.

All patients in all three groups were examined at each visit up to three months. PASI scoring was carried before initiation of therapy then at 4 weeks, 8 weeks and 12 weeks of therapy. The patient was considered in remission when there was 75% reduction in the baseline PASI score.

In all the three groups the standard topical therapy was emollients in the form of liquid paraffin and soft paraffin.

Complete blood cell counts, renal function test, liver function test were performed every four weeks while patients were taking oral treatment.

### Outcome measures

PASI 75 (it means 75% reduction in original PASI)

Cumulative dose

Assessment of side effects of each modality/ group

### Statistical analysis

Results were expressed as Mean±SD and number and percentages.

One way ANOVA was used for multiple group comparisons and unpaired t test for two groups comparison.

Categorical data was analyzed by chi square test.

## OBSERVATION AND RESULTS

In the present study, ninety patients of chronic plaque psoriasis attending the skin department from November 2015 to October 2010 were included. Patients were distributed into 3 groups randomly each group consisted of 30 patients, group A treated with Oral methotrexate, group B with NBUVB and group C with combination of both Oral methotrexate and NBUVB.

Among 1,98,722 patients attending dermatology outpatient department, 2977 were of psoriasis during the study period which accounted for an incidence of 1.5% of the total dermatology patients. Demographic data in all the three groups was non significant.

**Table 1: Aggravating factors.**

	Group A n (%)	Group B n (%)	Group C n (%)
Seasonal variation	24(80)	24(80)	29(96.6)
No seasonal variation	6(20)	6(20)	1(3.3)
Stress	19(63.3)	18(60)	18(60)
No stress	11(36.6)	12(40)	12(40)

In all the three groups in majority of the patients there was seasonal variation in the disease. That was exacerbation of disease in winter and remission of disease in summer.

In all three groups stress factor was associated with exacerbation of disease.

**Table 2: Previous treatment.**

	Group A n (%)	Group B n (%)	Group C n (%)
Allopathic	13(43.3)	2(6.6)	5(16.6)
Ayurvedic	1(3.3)	1(3.3)	-
Both	6(20)	12(40)	12(40)
Nil	10(33.3)	15(50)	13(43.3)

Previous treatment history was found in all the three groups but it was slightly more in group A.

**Table 3: Habits.**

	Group A n (%)	Group B n (%)	Group C n (%)
Alcohol	9(30)	8(26.6)	7(23.3)
Smoking	6(20)	8(26.6)	10(33.3)
Both	6(20)	4(13.3)	4(13.3)
Nil	9(30)	10(33.3)	9(30)

Majority of the patients were known alcoholic and smokers.

**Table 3: Pasi Measurement.**

	Groups	Baseline	PASI AT 4	PASI AT 8
		PASI	Weeks	Weeks
A	MEAN±SD	35.7±6.8	26.8±5.8	16.8±4.4
B	MEAN±SD	34.8±4.5	27.3±3.5	16.2±3.4
C	MEAN±SD	36.6±5.9	27.4±4.6	11±3.0
ANOVA	F*	.71	.15	23.33
	P	.50	.86	<0.05
Difference Between Groups**	A vs B	Not significant	Not significant	Not significant
	A vs C	Not significant	Not significant	<0.05 significant
	B vs C	Not significant	Not significant	<0.05 significant

\*One Way ANOVA \*\* Unpaired t – test

The baseline PASI Score in all the three groups was almost equal but it was slightly higher in group C and it showed significant reduction ( $P < 0.05$ , Significant) at the

end of 8 weeks in group C (Oral methotrexate and NBUVB) as compared to group A and group B.

**Table 4: Time taken for pasi 75 in weeks.**

Groups	Time Taken Taken For Pasi 75 In Weeks		
	MEAN±SD	Median	Range
A	10.5±0.9	10	9-12
B	10.4±1.3	10.5	8-12
C	8.3±0.7	8	7-9
ANOVA	F*	45.21	
	P	<0.01, Significant	
Difference Between Groups**	A vs B	Not significant	
	A vs C	<0.01, Significant	
	B vs C	<0.01, Significant	

\*One Way ANOVA \*\* Unpaired t – test

In the study time taken for PASI 75 (75% reduction in the baseline PASI Score) in group A was 9-12 weeks with mean of 10.5 weeks, in group B it was 8-12 weeks with mean of 10.4 weeks and in group C it was 7-9

weeks with mean of 8.3 weeks, so it showed there was a significant ( $P < 0.01$ , Significant) and faster achievement of PASI 75 in group C as compared to patients who were included in group A and group B.

**Table 5: Average no. of sittings required in three groups.**

Groups	Average Number Of Sittings Required	
	MEAN±SD	Range
A	10.5±0.9	9-12
C	8.4±0.7	7-9
A vs C	$t^* = 10.5$	-
	P < 0.01, Significant	
B	31.2±3.9	24-36
C	16.2±2.0	12-18
B vs C	$t^* = 18.67$	-
	<0.01, Significant	

\*Unpaired t – test

Average number of sittings of oral methotrexate required in group A was 9-12 with mean of 10.5 but in group C average number of sittings required was 7-9 with mean of 8.4, which was significantly less ( $P < 0.01$ , Significant) compared to group A.

Average number of sittings required for NBUVB in group B was 24-36 with mean of 31.2 but in group C average number of sittings of NBUVB required was 12-18 with mean of 16.2, which was significantly less ( $P < 0.01$ , Significant) compared to group B.

**Table 6: Cumulative dose required for PASI 75.**

Groups	Cumulative Dose	
	MEAN±SD	Range
A (mg)	144.7±16.6	127.5-172.5
C (mg)	117.5±9.9	97.5-127.5
A vs C (mg)	Mean Difference =27.5 t* =7.70 P <0.01, Significant	
B (mj/cm <sup>2</sup> )	24659±2352	21273-28768
C (mj/cm <sup>2</sup> )	13609±3507	7084-18458
B vs C (mj/cm <sup>2</sup> )	Mean Difference =11050 t* =14.33 P <0.01, Significant	

\*Unpaired t – test

The cumulative dose of oral methotrexate required to achieve PASI 75 in group A was 127.5-172.5 mg with mean of 144.7 mg and in group C it was 97.5-127.5 mg with the mean of 117.5 mg, So significantly less ( $P < 0.01$ , Significant) cumulative dose of methotrexate was required to achieve PASI 75 in group C as compared to group A.

The cumulative dose of NBUVB required to achieve PASI 75 in group B was 21273-28768 mj/cm<sup>2</sup> with the mean of 24659 mj/cm<sup>2</sup> but in group C it was 7084-18458 mj/cm<sup>2</sup> with the mean of 13609 mj/cm<sup>2</sup> i.e. significantly less ( $P < 0.01$ , Significant) cumulative dose of NBUVB was required in group C compared to group B.

**Table 7: Side effects in three groups.**

Side Effects	GROUP A n (%)	GROUP B n (%)	GROUP C n (%)
Present	23(76.6)	18(60)	10 (33.3)
Absent	7 (23.3)	12 (40.0)	20 (66.7)
Erythema	-	10 (33.3)	5 (16.7)
Headache	4 (13.3)	-	2 (6.7)
Malaise	10 (33.3)	-	1 (3.3)
Nausea	9 (30.0)	-	2 (6.7)
Pruritis	-	8 (26.7)	2 (6.7)

The side effects in group A were malaise in 33.3%, followed by nausea 30% and headache in 13.3%, overall 76.6% patients encountered with side effects. In group B the most common side effect was erythema which was seen in 33.3% of patients followed by pruritus in 26.7% of patients, overall side effects were seen in 60% cases in group B. Side effects were encountered higher in group

A patients (76.6%) as compared to group B (60%) and were significantly less (33.3%) ( $P < 0.05$ , Significant) in patients who were treated in group C as compared to group A and group B.

Side effects	Groups compared	Significance*
(Present vs absent)	A vs B	P = 0.17, Not significant
	A vs C	P < 0.05, Significant
	B vs C	P < 0.05, Significant

\*Chi square test

Side effects were encountered higher in patients who were treated in group A as compared to group B but side effects were significantly less ( $P < 0.05$ , Significant) in patients who were treated in group C as compared to group A and group B.

**Table 8: Relapse in weeks.**

Groups	Relapse time in weeks	
	MEAN ± SD	RANGE
A	9 ± 1.6	6-12
B	9.1 ± 1.8	6-12
C	10.3 ± 1.9	8-12
ANOVA	F* = 5.99 P <0.05, Significant	
Difference Between Groups**	A vs B	Not significant
	A vs C	P <0.05, Significant
	B vs C	P <0.05, Significant

\*One Way ANOVA \*\* Unpaired t – test

The relapse time was 6-12 weeks with mean of 9 weeks in patients who were treated in group A, which was almost same in group B, but in group C it was prolonged to 8-12 weeks with mean of 10.3 weeks which was significant ( $P < 0.05$ , Significant) compared to group A and B.

## DISCUSSION

The incidence of psoriasis in our hospital was 1.5% which is almost similar to observation made by Mehta et al<sup>[3]</sup> and Inderjeet et al<sup>[4]</sup> who observed the incidence of psoriasis as 1.5% and 1.4% respectively.

Out of 90 patients, 85% of patients showed seasonal variation in the disease, this was exacerbation of the disease in winter and remission in summer. This is in concurrence with observation made by Faber et al<sup>[5]</sup> which showed 89% cases.

Inderjeet et al<sup>[4]</sup> observed remission in summer in 40% patients, no variations in 46% of the patients and remission in winter in 13.5% of cases. The variations in seasons can be attributed to the prevailing weather conditions in the particular area.

In our study out of 90 patients, 61.10% patients stress factor was associated with the exacerbation of disease. This correlates with the study of Fortune et al.<sup>[6]</sup>

The disease can cause a reactive depression in the patient, which could further exacerbate psoriasis.<sup>[7]</sup> Stress being a key exacerbator or trigger for disease, but how psychological stress exacerbates or triggers psoriasis is poorly understood.<sup>[8]</sup>

The study included cases resistant to various other modalities of treatment. The patients had tried topical medications like steroids, emollients, white petroleum jelly, keratolytics and ayurvedic preparations. Current study, showed that 22.2% of cases had taken allopathic medications and 2.2% cases had taken ayurvedic treatment and 33.3% both allopathic and ayurvedic preparations. As our hospital being a referral hospital most of the patients come after trying other modalities of treatment at peripheral level.

Majority of the patients i.e. 26.6% of patients were alcoholic, 26.6% were smokers and 15.5% were both. This correlates with the studies of Poikolainen K *et al*<sup>[9]</sup> and Gupta *et al*<sup>[10]</sup> which showed heavy drinkers tend to have more extensive and inflamed disease. So excess drinking is undoubtedly also a consequence of the disease and leads to treatment resistance and reduced therapeutic compliance.

The baseline PASI Score in all the three groups was almost equal but it was slightly higher in group C and it showed significant reduction ( $P < 0.05$ , Significant) at the end of 8 weeks in group C (Oral methotrexate and NBUVB) as compared to group A and group B.

In group A Mean $\pm$ SD base line PASI Score was 35.7 $\pm$ 6.8, in group B Mean $\pm$ SD base line PASI Score was 34.8 $\pm$ 4.5 and in group C Mean $\pm$ SD base line PASI Score was 36.6 $\pm$ 5.9, so there was no significant difference in all the three groups at baseline level but severity of involvement was more in all the three groups.

In group A Mean $\pm$ SD PASI Score at the end 4 weeks was 26.8 $\pm$ 5.8, in group B Mean $\pm$ SD PASI Score at the end 4 weeks was 27.3 $\pm$ 3.5, In group C Mean $\pm$ SD PASI Score at the end 4 weeks was 27.4 $\pm$ 4.6, so this was also almost matching in all the three groups.

In group A Mean $\pm$ SD PASI Score at the end 8 weeks was 16.8 $\pm$ 4.4, In group B Mean $\pm$ SD PASI Score at the end 8 weeks was 16.2 $\pm$ 3.4, In group C Mean $\pm$ SD PASI Score at the end 8 weeks was 11 $\pm$ 3, so there was not much difference in PASI Score at the 8 weeks in group A and B but there was significant reduction as compared to baseline PASI Score in group A and group B.

In group A versus group C there was the significant reduction in group C in PASI Score at the end 8 weeks as well as same significant difference ( $P < 0.05$ , Significant) was seen in group B versus group C.

So there was a faster reduction in PASI Score at the end of 8 weeks in group C as compared to group A and

group-B.

In this study time taken for PASI 75 (75% reduction in the baseline PASI Score) in group A was 9-12 weeks with mean of 10.5 weeks, this is in concurrence with the study of Dhir *et al*.<sup>[11]</sup>

In group B it was 8-12 weeks with mean of 10.4 weeks, which correlates with the observation which is made by Dayal *et al*.<sup>[12]</sup>

In group C it was 7-9 weeks with mean of 8.3 weeks so it showed there was significant ( $P < 0.01$ , Significant) and faster achievement of PASI 75 in group C as compared to patients included in group A and group B. This correlates with the study of Paul *et al*<sup>[13]</sup> which showed clearance in all 26 patients in a mean of 7 $\pm$ 1.5 weeks with combination therapy. It is also consistent with the study of Asawanonda *et al*.<sup>[14]</sup>

Average number of sittings of oral methotrexate required in group A was 9-12 with mean of 10.5, this correlates with the study of Dhir *et al*<sup>[12]</sup> but in group C average number of sittings required was 7-9 with the mean of 8.4, which was significantly less ( $P < 0.01$ , Significant) compared to group A and this is consistent with the various available studies.<sup>[13,14]</sup>

Average number of sittings required for NBUVB in group B was 24-36 with mean of 31.2 but in group C average number of sittings of NBUVB required was 12-18 with mean of 16.2, which was significantly less ( $P < 0.01$ , Significant) compared to group B and this correlates with other studies.<sup>[13,14]</sup>

The cumulative dose of oral methotrexate required to achieve PASI 75 in group A was 127.5-172.5 mg with mean of 144.7 mg and this is in concurrence with the study of Dhir *et al*<sup>[12]</sup> and in group C it was 97.5-127.5 mg with the mean of 117.5 mg, So significantly less ( $P < 0.01$ , Significant) cumulative dose of methotrexate was required to achieve PASI 75 in group C as compared to group A, is consistent with various available studies.<sup>[13,14]</sup>

The cumulative dose of NBUVB required to achieve PASI 75 in group B was 21273-28768 mj/cm<sup>2</sup> with the mean of 24659 mj/cm<sup>2</sup> but in group C it was 7084-18458 mj/cm<sup>2</sup> with the mean of 13609 mj/cm<sup>2</sup> i.e. significantly less ( $P < 0.01$ , Significant) cumulative dose of NBUVB was required in group C as compared to group B.

In this study the cumulative dose of NBUVB was higher in group B (Mean cumulative dose 24659mj/cm<sup>2</sup>) as well as in group C (Mean cumulative dose 13609mj/cm<sup>2</sup>) as compared to various studies.<sup>[12-14]</sup> This could be due to the most of the patients in all the three groups were encountered had baseline PASI Score towards higher side and with Fitz Patrick skin types V and VI, so higher doses were required.



But significantly lower cumulative dose of both Oral methotrexate and NBUVB was required in group C as compared to group A and group B which correlates with other available studies.<sup>[13,14]</sup>

In this study the side effects in group A were malaise in 33.3%, followed by nausea 30% and headache in 13.3%, overall 76.6% patients encountered with side effects. Dhir et al<sup>15</sup> found nausea, vomiting, mild to moderate headache in 7% of patients on the day of administration of the drug, 3 patients each experienced pain abdomen, diffuse alopecia, loss of appetite and giddiness.

Dooren et al<sup>12</sup> in their observation of 113 patients over a period of 22 years in a dosage of 15 mg/wk with a mean duration of therapy of 8 years and 11 months found abnormal liver function tests, which is attributable to the longer duration and higher cumulative dose.

In group B the most common side effect was erythema which was seen in 33.3% of patients followed by pruritus in 26.7% of patients, overall side effects were seen in 60% cases in group B, The higher incidence of erythema and pruritus could be attributed to higher doses were required and comparatively prolonged phototherapy exposures in these groups of the patients.

In group C side effects encountered were erythema in 16.7%, headache 6.7%, nausea 6.7%, pruritus 6.7% and malaise 3.3%, overall side effects encountered in group C were in 33.3% of the patients because lower cumulative dose was required of methotrexate and NBUVB. This is in concurrence with the various studies done earlier.<sup>[13,14]</sup>

In the study side effects were controlled with symptomatic treatment and stoppage of treatment was not required. In the present study as the dosage of methotrexate was comparatively small, the incidence of side effects was very minimal and did not require stoppage of therapy in any of the patients.

So the Side effects were encountered higher in patients included in group A as compared to group B, but they were significantly less ( $P < 0.05$ , Significant) in patients who were included in group C as compared to group A and group B, this could be explain by lower cumulative dose was required of methotrexate as well as NBUVB when both were given in combination as in group C. This is consistent with observations made by Paul et al<sup>[13]</sup> and Aswanonda et al.<sup>[14]</sup>

For the patients included in group A relapse time was 6-12 weeks with mean of 9 weeks and which was almost same for group B also, but in group C it was prolonged to 8-12 weeks with mean of 10.3 weeks which was significantly ( $P < 0.05$ , Significant) prolonged as compared to group A and B. There are no studies available to compare this parameter.

## CONCLUSION

Though there are wide number of modalities available for the treatment of psoriasis it is a challenge to treat chronic plaque psoriasis in view of its extensive nature and chronicity.

Combination therapy of oral methotrexate and NBUVB is found to be most feasible from the economic point of view as well as the side effects profile and patient compliance.

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