NARROW BAND ULTRAVIOLET B (NB-UVB) "PHOTOTHERAPY" In The Treatment Of Psoriasis, Prospective Clinical Study In Qatar

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ABSTRACT:

NB-UVB phototherapy alone was used to treat 20 patients with moderate to severe psoriasis (PASI score more than 10). Patients were of different age groups, skin types and nationalities. All patients tolerated the treatment and had complete remission of psoriasis after NB-UVB therapy.

All patients had psoriasis affecting extensor surface of upper and lower extremities and trunk with more than one site involvement. This study showed that::

* The mean duration of NB-UVB phototherapy was 46.6 days.
* The mean dose per session was 1.21 J.
* The mean number of sessions was 17.7
* The mean total cumulative dose (TCD) was 25.13 Joules.
* The mean dose for initial response was 0.5 J.
* The mean dose for maximal improvement was 1.73 J.
* The mean number of sessions for maximal improvement was 14.8 sessions.
* NB-UVB phototherapy had no effect on all laboratory tests.
* Treatment was convenient for all patients.

Aim of work :

The main aim of this study is to evaluate the efficacy and results of NB-UVB Phototherapy in the treatment of psoriasis and to specify the particulars of such treatment especially the mean effective dose, (mean dose /session), and the mean values of each of minimal improvment dose, maximal improvement dose, maintenance dose, total number of sessions, duration of treatment in weeks and total cumulative dose. One of the aims is to record side effects and any laboratory abnormal values during the course of this treatment in these patients. Another aim is to compare the result of NB-UVB with those of PUVA in some patients and to find out any relation between response to treatment and factors such as age, skin type, duration and previous treatment.

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Introduction:

By convention, ultraviolet light is divided into UVA (320 to 400 nm; long wave, black light), UVB (290 to 320 nm; middle wave, sunburn), and UVC (100 to 290 nm; short wave, germicidal). UVB delivers a high amount of energy to the stratum corneum and superficial layers of the epidermis and is primarily responsible for sunburn, suntan, and skin cancers. It produces tanning more efficiently than UVA. It is most intense when the sun is directly overhead between 10 a.m. and 2 p.m. UVB is absorbed by window glass. Prior exposure to UVA enhances the sunburn reaction from UVB [1].

Three types of phototherapy and two forms of photochemotherapy are now available for treatment of more than 40 diseases of the skin. Broadband ultraviolet B (UVB) phototherapy and UVA plus oral psoralen photochemotherapy (PUVA) therapy are most widely available while there has been increased interest in topical PUVA therapy. Narrow-band UVB (NB-UVB) phototherapy and UVA-1 phototherapy offer potential for the future [2].

Narrow band UVB virtually eliminates superfluous and harmful UV by emitting only wavelengths of 311-312 nm and eliminating UV Wavelengths below 311 nm so patients are exposed safely to higher intensities and longer exposure times thus getting maximum benefit from phototherapy[3].

Narrow-band ultraviolet B light (UVB) is a new form of therapy for psoriasis, but its mechanism of action is unknown.

In a bilateral comparison clinical study, daily exposure of psoriatic plaques to broad-band UVB (290-320 nm) or 312-nm UVB depleted T cells from the epidermis and dermis of psoriatic lesions. However, 312-nm UVB was significantly more depleting in both tissue compartments [4]. TL-01 inhibited the activity of both Th1 and Th2 subsets while not altering plasma antibody concentrations [5].

Generally speaking the indications of NB-UVB are almost those of BB-UVB, but because of the safer margin, NB-UVB is considered as a new field opened for many therapeutic trials and it is expected to an ever increasing list of indications in the near future.

As in photochemotherapy NB-UVB may be used to treat or to prevent a disease. Diseases that may benefit from NB-UVB are psoriasis[6], atopic eczema[7,8], vitiligo[9,10], small plaque parapsoriasis and early MF[11,12],

prurigo nodularis[13], subcorneal pustular dermatosis (Sneddon-Wilkinson Disease)[14,15], pruritic folliculitis of pregnancy[16], and pityriasis rubra pilaris[17]. Diseases that may be prevented by NB-UVB are photodermatosis[18], hydroa vacciniforme[19], and erythropoietic protoporphyria[20].

PATIENTS AND METHODS:

Twenty-two patients with moderate to severe psoriasis (PASI score more than 10) underwent NB-UVB phototherapy. All were started on NB-UVB alone, without any adjunct or combind specific antipsoriatic therapy. Other non-specific treatments such as emollient antihistamines and occasional topical steroids were allowed and registered. An evaluation sheet was completed for each patient .

These patients were given NB-UVB phototherapy alone, using whole body machine from Daavlin Corporation. This machine emitted NB-UVB radiation ranging from almost 310 nm to 312 nm with a peak of 311 nm.

All patient were tested for minimal erythema dose (MED). Tests were performed with a range of radiation in relation to skin type as shown in (Table-1). Doses of NB-UVB were given according to (MED). The initial dose for all patients was 70% of MED, while subsequent doses were adjusted according to patient tolerance and response, but as a common rule subsequent doses were given by adding 10% of previous dose in skin type one and two and increments were reduced by 1% each subsequent treatment from the tenth session, and by adding 15% of previous dose in skin type three to six, where increment were also reduced by 1% each subsequent treatment from the fourteenth session. This schedule of doses was followed unless there was response or any undesirable side effect throughout the course of treatment in these patients who have different types of the skin. So the dose of NB-UVB was increased each session according to the tolerance of the patient by not more than 15% of previous dose and was reaching near minimal tolerated erythemal dose. The intention was that each patient should undergo a schedule that involved a clearing phase with sessions three times a week until the psoriasis was controlled at which time the frequency of the sessions would be reduced to a suitable maintenance level in relation to doses and frequency of sessions.

Results:

None of the 22 patients gave a positive family history of Psoriasis. Two patients were excluded as they developed erythrodermic psoriasis shortly after NB-UVB therapy was started.

Seven patients (35%) were above the age of 40 years; fifteen (65%) were younger, giving a mean age of 31.5 years. The eldest patient was 53 years. None of the patients was below 7 years.

The patients were of eleven different nationalities (Table-2) with skin types varying from 2 to 6 on the Fitzpatrick scale (Table-3), with majority of patients being type four.

The duration of the disease varied from six month to 40 years (Table 4), mean duration 140.7 months (almost 11.7 years).

All twenty patients (100%) had guttate lesions nineteen patients (95%) had both guttate and plaque lesions at the same time. None had pustular, erythrodermic, arthropathic psoriasis or palmoplantar psoriasis (Table-5).

Lesions were present on various parts of the body including extensors, upper and lower extremities, trunk, scalp, nails and face. The commonest sites affected were extensor surfaces of upper extremities that were affected in all patients. Also patients had more than one site or location affected, majority of patients had scalp, trunk, upper and lower extremities involvement, non of the patients had mucous membrane or palmoplantar involvement (Table-6).

The majority of the patients underwent NB-UVB phototherapy treatment were suffering from moderate to severe psoriasis. Mean PASI score was 16. Fourteen patients (70%), had moderate psoriasis with PASI Score ranging from 10–20. In four patients (20%) PASI Score was more than 20. Only two patients (10%) had mild psoriasis with PASI score less than 10 (Table-7).

The mean duration of treatment with NB-UVB phototherapy was 46.6 days (2.7 months), the shortest duration of treatment was 20 days and the longest duration was 135 days (20-135 days) using a mean dose/session of 1218 mj (80-2853 mj /session). Mean dose per session in relation to skin type is shown in (Table-8). Mean dose per session in relation to severity of psoriasis is showen in (Table-9).

Mean number of sessions to complete treatment is 17.7 (10-38 sessions). with no relation to the duration of the disease, skin type, nor location of lesions,

Mean total cumulative dose (TCD) was 25139 mj (797-92170 mj).

Generally the treatment was tolerated well with only six patients (30%) complaining of pruritis. Generalized

tanning was noticed in two patients (10%) , while erythema was not observed in any patient . Non of the patients complained of frank burn but five patients (25%) complained of variable feeling of burning sensation. The development of new lesions at site of exposure was registered in two patients (10%), (Table-10).

All patients showed complete remission of psoriasis after variable NB-UVB phototherapy doses and number of sessions.

Doses necessary for an initial detectable improvement were recorded and it was found that the mean dose for initial response was 536 mj (230-1081mj).

The mean number of sessions for earliest response was 3.4 sessions (1-9 sessions). Nine patients (45%) started to respond after the second session.

The mean dose for maximal improvement was 1735 mj (246-5000mj) and the mean number of sessions for maximal improvement was 14.8 sessions (7-38 sessions) (Table 11).

It was noticed that the smaller the lesion the better and faster the response and the larger the lesion the slower the response, regardless skin type duration of psoriasis, sex, nationality or age of the patient.

Occasional use of topical steroids was reduced during and after treatment in all patients.

Patients were encouraged to use emollients freely and frequently but not shortly before irradiation and most continued to do so and the use of emollients was reduced in all patients after but not during or before treatment.

It seems that NB-UVB phototherapy had no effect on CBC, liver function tests, kidney function tests, serum triglyceride level, serum cholesterol level, ANA and Anti DNA. Although some of these patients had, prior to NB-UVB therapy abnormal values. All these high values were unchanged during or after treatment.

The treatment was inconvenient for two patients only (10%) because of working hours and/or duty responsibility, while all others attended without facing any professional problem. On the other hand this type of treatment was more convenient for the clinic because it consumes relatively shorter time than PUVA therapy.

Discussion:

On reviewing the literature we found that the publications related to NB-UVB are concentrated in the past four years with dominance in the year 2000 (Table-12). The literature reviewed is lacking information similar to what is included in table 11 showing particulars of NB-UVB. Only three studies can be compared to the present work. The first was done by Picot-E In 1992 [21] whose study was conducted on 53 patients with psoriasis treated by narrow-band UVB phototherapy where, most patients responded after 20 sessions with a mean cumulative dose of 20.19 +/- 2.7 J/cm2 (our mean number of sessions was 17.7 and mean total cumulative dose was 25.13j). Some of his patients had an additional treatment of 6 sessions[21].

The second was a retrospective study comparing PUVA and NB-UVB phototherapy as shown in (Table 13) [22].

The third study conducted by Grundmann [23] shows that NB-UVB doses in treatments of atopic dermatitis are markedly lesser than those used in the treatment of psoriasis and reported a mean cumulative dose of 9.2 J/cm2 (our study: 25.13 J in psoriasis) for 19 sessions. (Our study: 17.7 sessions in psoriasis).

NB-UVB is superior to BB-UVB in reversing psoriasis at suberythemogenic doses when given three times per week [24].

NB-UVB offers a significant therapeutic advantage over BB-UVB in the treatment of psoriasis, with faster clearing and more complete disease resolution. The erythema response to NB-UVB treatment was significantly more intense and persistent compared with BB-UVB. Considerably more necrotic keratinocytes were observed in histopathological sections of skin treated with NB-UVB after a single 2.0-minimum erythema dose exposure. Treatment should be coupled with obligate minimum erythema dose testing to NB-UVB and close clinical observation during dose increases [25].

NB-UV-B is comparably as effective as PUVA and, given the lack of photosensitizer-related adverse reactions can be considered as first-line treatment for plaque-type psoriasis [26]. Gordon-PM concluded that when PUVA given twice weekly is more effective for psoriasis than narrow-band UVB phototherapy [27].

De-Berker found that Psoralen-NB UVB treatment of psoriasis is as effective as conventional PUVA [28].

On the other hand NB-UVB exposure after oral methoxsalen has been shown to achieve a greater therapeutic response in psoriasis than NB- UVB exposure given without psoralen [28].

Further more Combination of 311 nm exposures enhances the phototoxic and therapeutic activities of bath-PUVA [29].

NB-UVB was not only compared with topical and systemic psoralen but also was compared with retinoids in three groups study which showed that Re-PUVA was the most effective therapy with 100% satisfactory clear-

ance rate group. In the etretinate-TL-01 group, there was a 93% success rate, but TL-01 monotherapy had an 80% success rate [30].

Clinical trials of the treatment of psoriasis were identified from the medical literature, and the reported rates of clearance were compared. The percentage of patients who experienced complete clearing of their psoriasis varied with the different monotherapy treatments from 2% with Tazarotene gel to a maximum of 86% with NB-UVB. Despite the availability of novel treatments for psoriasis, complete clearing of psoriasis is obviously not a realistic expectation of topical treatment. Phototherapy and systemic therapy provide greater improvement [31].

NB-UVB alone is an effective treatment in psoriasis, but to increase the efficacy it was tried by many authors in combination with other topical and systemic antipsoriatic treatments. Bourke-JF found that the combination of UVB and calcipotriol is a safe, effective treatment for chronic plaque psoriasis [32].

Brands et al found that Calcipotriol ointment does not improve the treatment outcome with low-dose narrow-band UVB phototherapy[33].

Storbeck et al concluded that the application of dithranol provided a substantial additional therapeutic effect of NB-UVB phototherapy[34].

Also Carrozza-P concluded that in wide spread psoriasis, treatment with narrow-band UVB (311 nm) combined with dithranol is safe and effective, allowing reduction of the cumulative irradiation dose[35].

Tazarotene combined with narrow-band UVB phototherapy promotes more effective, faster clearing of psoriasis compared with UVB (311-nm) monotherapy[36].

Although our patients underwent NB-UVB phototherapy alone, all of them cleared on this monotherapy.

It was noticed that mean dose per session (MD/S) was variable from skin type to another. Skin type 2 responded to the lowest MD/S, while skin type 5 responded to what exceeds 10 times the (MD/S) compared to that of skin type 2.

This observation needs a larger number of patients and further evaluation, although nothing has been published yet with or against this observation.

Regarding the development of erythrodermic psoriasis in two of our patients, Both patients, were tested for MED and were started 70% of MED, increment per session was not more than 15% of previous doses. One of them was given the same dose without increment for six sessions out of nine. Both patients were given mean dose/session that equals or very near to MED. Both patients developed erythrodermic psoriasis in the sixth session (Table 14). One of these two patients had a history of two courses of PUVA treatments which resulted in complete clearance of his extensive psoriasis. The development of erythroderma in these two patients seems to be coincidental because of the following:

1- All safety precautions were taken
2- These patients were treated with relatively low doses.
3- Relative short duration of treatment.
4- Previous history of improvement on photochemotherapy in one of them.
5- Finally on reviewing the literature there was not a single case report about the development of erythrodermic psoriasis following NB-UVB phototherapy. Further follow up and more recent review of literature is needed for evaluation of this query possible side effect either to proof or to rule out.

Table -1
Range of MED in relation to skin type

Skin type	Range of MED in mj
1	50 - 300
2	100 - 400
3	150 - 500
4	200 - 600
5	250 - 700
6	300 -800

Table – 2
Showing the percentage – Nationalities of treated patients

Number of Pls	% of Patients	Nationality
5	25 %	Qatari
4	20 %	Indian
2	10 %	Iiran
2	10 %	yemen
1	5 %	Palestinian
1	5 %	Jordanian
1	5 %	Bangladish
1	5 %	Pakistani
1	5 %	Phillipine
1	5 %	Indonesian
1	5 %	USA

Table - 3
Showing the percentage of patients in relation to their skin type.

Number Of Pt.S	Percentage	Skin Type
11	55 %	4
4	20 %	3
2	10 %	5
2	10 %	6
1	5 %	2

Table - 4
Percentage of patient in relation to duration of psoriasis

Number Of Pt.S	Percentage	Duration
1	05 %	Less than a year
5	25 %	1-5 years
7	35 %	6-10 years
3	15 %	11-15 years
4	20 %	16-20 years or more

Table - 5
Different types of psoriasis and number of patients affected:

In	Percentage	Type of psoriasis
20 pt.s	100%	Guttate lesions
19 pt.s	95%	Guttate and Plaque
No pt.s	00%	Arthropathic or erythrodermic or pusrular, or P P P alone or in combination
4 pt.s	20%	Nails
3 pt.s	15%	Face

Table - 6
Distribution of lesions and the affected sites considering that all patients had more than one site affected at the same time:

In	Percentage	Affected sites
20 pt.s	100 %	Upper extrem. mainly extensor
20 pt.s	100 %	lower extremities mainly extensor
20 pt.s	100 %	Trunk
18 pt.s	90 %	Scalp
4 pt.s	20 %	Nails
3 pt.s	15 %	Face
0 pt.s	00 %	Palms or soles or mucous membrane

Table - 7
showing pretreatment PASI score:

Number of pt.	Percentage of pt.	Type of psoriasis	PASI score
4	20 %	Severe	More than 20
14	70 %	Moderate	Between 10-20
2	10 %	Mild	Less than 10

Table – 8
Mean dose per session in relation to skin type:

Skin type	Mean dose /session (MJ/S)*
2	209
3	1068
4	1000
5	2642
6	1839

* MJ/S = millijoule per session

Table 9
Mean dose per session in relation to severity

Type of psoriasis	Mean dose /session (J/S) *
Severe	10.9
Moderate	10.2
Mild	7.77

* J/S = Joules per session

Table 10: Registered side effects in NB-UVB

Number of pt.	Percentage of pt.	Side effect
6	30%	Pruritus
2	10%	Generalized tanning
5	25%	Variable feeling of burning sensation
2	10%	New lesions (Koebnerisation)
non	0	Eyrythema or frank burn

Table 11
Shows the Mean values resulted in this study:

	Mean	Minimum	Maximum
Initial improvement session	3.4 session	1.0 session	9.0 session
Initial improvement dose	536.0 mj	230.0 mj	1081.0 mj
Max. improvement session	14.8 session	7.0 session	38.0 session
Max. improvement dose	1735.0 mj	246.0 mj	5000.0 mj
No. of sessions	17.7 session	10.0 session	38.0 session
Total cumulative dose	25139.0 mj	797.0 mj	92170.0 mj
Mean dose /session	1218.0 mj	80.0 mj	2852.0 mj
Duration of treatment in days	46.6 days	20.0 days	135.0 days

(Table-12)
Number of NB-UVB publication in the past 13 years:

Number of NB-UVB publication	Year
19	2000
13	1999
13	1998
13	1997
2	1996
4	1995
1	1994
16	From 1988 To 1993 (6 Years)

Table 13
Shows comparision of mean values resulted in this study with those resulted in PUVA treatment of psoriasis in our department:

	NB-UVB	PUVA	
Mean Initial improvement session	3.4	3.6	(2-10)
Mean Initial improvement dose	536.0 mj	6.29j	(103-12j)
Mean Max. improvement session	14.8	13	(5-27)
Mean Max. improvement dose	1735.0 mj	6.29j	(103-12j)
Mean No. of sessions	17.7	18	(9-44)
Mean Total cumulative dose	25139.0 mj	202.9j	(70-663j)
Mean dose /session	1218.0 mj	10.5 j	(5.3-12.6j)
Mean Duration of treatment	46.6 days	10w	(4-36 w)

(Table-14).

Pt. No.	MED mj NB-UVB	NO. of sessions	MD/S mj	Duration of NB-UVB RX	History of PUVA
1	600	6	552	15 days	Improved on 2 PUVA courses
2	600	9	721	20 days	No history of Puva

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