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ORIGINAL ARTICLE

Comparison of efficacy of narrow band ultraviolet b phototherapy with emollients in uremic pruritus patients at tertiary care hospital.

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ABSTRACT… Objective: To compare mean pruritus score (5 -d itch score) between Narrow Band UVB verses topical emollients in patients of uremic pruritus. **Study Design:** Quasi-Experimental Study. **Setting:** Departments of Dermatology and Nephrology, Sahiwal Teaching Hospital Sahiwal. **Period:** March to August 2024. **Methods:** A total of sixty patients of end-stage renal disease on hemodialysis having uremic pruritus with 5-d itch score >15 were selected and randomly divided into two groups through lottery method. Group A patients were treated with twice weekly sessions of Narrowband UVB Phototherapy and Group B with emollients (liquid paraffin and white soft paraffin mixed in 1:1) applied topically on body twice daily. Patients of both groups were assessed after treatment at 12 week by using 5-D itch score at baseline and 12 week. **Results:** Majority of the patients belonged to 36 to 55 years of age and female gender outnumber male among study participants in both groups. The final 5D itch score decreased from baseline was recorded in both groups, but significant mean decrease in 5D itch more than half (53%) from its baseline was seen in group A patients treated with narrowband UVB phototherapy (10.76±3.25) compared to group B treated with emollients (4.23±2.95).Intergroup comparison results showed a statistically significant difference between the mean 5 D itch scores of both groups. (p-value <0.001). **Conclusion:** Narrow band UVB phototherapy is more effective as compared to emollients in the treatment of Uremic pruritus.

Key words: Emollients, Phototherapy, Pruritus, Ultraviolet Therapy.

INTRODUCTION

Uremic pruritus or pruritus associated with chronic kidney disease is frequent and most irritating symptom seen in patients with advanced or end stage kidney disease affecting patient's quality of life.[1] It has variable clinical presentation and may be paroxysmal or persistent, generalized or localized.[2] Prevalence rate of moderate to severe uremic pruritus is 58 % as reported in different studies carried out globally.[3] Uremic pruritus is more commonly seen in males.[4]

Pathophysiology of uremic pruritus is not exactly known but postulated mechanisms include increase in total number of mast cells in the skin, high levels of histamine, blood urea nitrogen, calcium, phosphate and hyperparathyroidism.[3] Xerosis, dysregulation of peripheral nerves and imbalance between endogenous opioid kappa and meu receptors also has been implicated in causation of uremic pruritus.[5,6] Changes in immune system leading to release of different cytokines (IL-2 ,IL-31) has been reported in a study carried out by Sutaria N et al.[7]

Various treatment modalities available for uremic pruritus have shown variable results. Topical therapies include emollients, topical calcineurin inhibitors (tacrolimus), topical capsaicin, topical anesthetics. Oral anti-histamines, opioid antagonists (naltrexone), gabapentin, ondansetron, thalidomide, mirtazapine, mast cell stabilizer and dupilumab are included among systemic therapies.[7] Narrow Band UVB Phototherapy used for refractory uremic pruritus patients especially on hemodialysis.[8]

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Treatment of uremic pruritus at times becomes a difficult task as most of the patients suffering from chronic pruritus associated with CKD are unresponsive to topical and systemic therapies. Topical emollients with high water content are used widely to treat dry skin and shows 75% improvement in patients of uremic pruritus.[3] It has also been observed in multiple studies that Narrow band UVB Phototherapy is a safe and effective treatment option for generalized pruritus as well as in pruritus refractory to other topical and systemic therapies.[3] In the study carried out by Samer et al 36% patients showed very good response(>75% reduction in 5-D itch score), 47% patients showed good(50-75% reduction) and only 17% of patients showed poor response (<25% reduction in 5-D itch score) when exposed to NB UVB.[9] Narrow band UVB was found more effective in treating uremic pruritus as compared to topical emollients as mean pruritus score after narrow band UVB was 1.9 ± 0.4 and after topical emollients was 8.8 ± 0.7 reported in the comparative study conducted by Sherjeena et al.[10]

Suggested mechanism of Narrow Band UVB in treatment of uremic pruritus is inactivation of circulating pruritogenic substances, formation of photo products that relieve pruritus, suppression of histamine release, decrease in nerve fiber density and peripheral nerve fiber activation and immunosuppressive effects as it attenuates differentiation of T-helper 1 cells and decrease the production of cytokines (IL-2).[3,7,8]

The rationale of conducting this study was availability of limited data regarding the comparison of narrow band UVB phototherapy verses topical emollients for uremic pruritus patients in our country. The two methods had been used and studied individually but data regarding their comparison was still deficient in our population. Narrow Band UVB is a safe and cost effective treatment modality as it is available in most of the public sector teaching hospitals of Pakistan. Furthermore, we wanted to compare results of this study with previous studies carried out internationally.

METHODS

A quasi experimental study was conducted after taking approval from Sahiwal Teaching Hospital Ethical Review Board (56/IRB/SLMC/SWL) and Research Evaluation Unit of the College of Physicians & Surgeons (CPSP/REU/DER-2022-143-1478), in the Department of Dermatology and Nephrology from March to August 2024. Sixty patients of end-stage renal disease (eGFR < 15mL/min)[11] on hemodialysis having uremic pruritus with 5-d itch score >15 were enrolled through non probability sampling technique and informed written consent was taken. Sample size was calculated using WHO calculator with 5% level of significance, 80% power of study and taking mean pruritus score after NB UVB as 1.9 ± 0.4 and after topical emollients as 8.8 ± 0.7 in uremic pruritus.[10] These patients were randomly divided into two groups through lottery method. Group A patients were treated with Narrow band UVB Phototherapy and Group B with emollients. Patients were between 18 to 60 years of age and both genders. Patients with history of photosensitivity, cutaneous malignancy, photo dermatosis, pruritic due to other systemic disease and epilepsy were excluded.

Demographic data and detailed history was taken. General physical and systemic examination was performed and all data were recorded on a performa and relevant investigations were carried out. Narrow band UVB Phototherapy was given twice weekly sessions to group A patients at starting dose of 70 % of minimal erythema dose with subsequent 10 -20 % increments from previous dose in every session and therapy was stopped if no response seen after 10 sessions of phototherapy. Simple emollients in the form of liquid paraffin and white soft paraffin mixed in 1:1 were given to group B for topical application on body twice daily. Patients of both groups were assessed after treatment at 12 week by using 5-D itch score at baseline and 12 week.

The 5D itch scale, validated in various studies, accurately assesses pruritus intensity over time. It covers five domains: degree, duration, direction, disability, and distribution. The first three domains have one item each, while the disability domain

has four. Items in these domains use a 5-point Likert scale. The distribution domain includes 16 itch locations, comprising 15 body parts and one clothing or bandage contact point. Scores for each domain are calculated separately and then summed for a total 5-D score, ranging from 5 (no pruritus) to 25 (most severe pruritus).[12]

Uremic pruritus was defined as daily or near-daily occurrence of itch that spans large bilaterally symmetrical surface areas. It does not exhibit a dermatomal pattern and there is no associated primary skin lesion.[3]

Data was collected and analyzed by using SPSS version 27. Quantitative data such as age, duration of pruritus, baseline 5-D itch score and post treatment 5-D itch score were presented as mean and standard deviation and qualitative data such as gender were expressed as frequency and percentage. Outcome variables of both groups were compared for difference. Comparison of both groups was done by means of final 5-d itch score calculated by using independent sample t-test. P value of less than 0.05 were considered significant.

RESULTS

In both treatment groups, majority of the patients belong to 36 to 55 years of age (46.5% in group A & 46.6% in group B). Female gender predominance were seen in both groups (57% in group A and 67% in group B). (Table-I)

The mean duration of pruritic in group A was 5.93±6.22 months which was almost same as in group B (5.30 ±6.17 months). While the duration of hemodialysis was slightly longer in group A patients as depicted in Table-II.

The final 5D itch score decreased from baseline in both groups, but a significant mean decrease in 5D itch more than half (53%) from its baseline was observed in group A patients treated with Narrowband UVB phototherapy (10.76±3.25) compared to group B treated with emollients (4.23±2.95).Intergroup comparison showed a statistically significant difference between the mean 5 D itch scores of both groups. (p-value <0.001).(Table-II) (Figure-1)

Variables		Group A	Group B
	Age Groups	N(%)	N(%)
Age (years)	15-35 years	13(43.5%)	10(33.3%)
	36-55 years	14(46.5%)	14(46.6%)
	56-75 years	3(10%)	6(20.1%)
Gender	Male	13(43%)	10(33%)
	Female	17(57%)	20(67%)

Table-I. Demographic variables

Variable	Group A	Group B	P-Value
	Mean ± SD	Mean ± SD	
Duration of pruritus (Months)	5.93±6.22 Months	5.30±6.17 Months	0.694
Duration of hemodialysis (Months)	29.00±21.51 Months	27.97±20.09 Months	0.848
Baseline 5D itch Score	20.00±2.03	19.66±1.93	0.518
Final 5D itch score	9.23±2.92	15.43±3.05	<0.001
Mean difference in baseline & final score	10.76±3.25	4.23±2.95	<0.001
P values are calculated by using independent sample t-test			

Table-II. Comparison of different variables between two groups

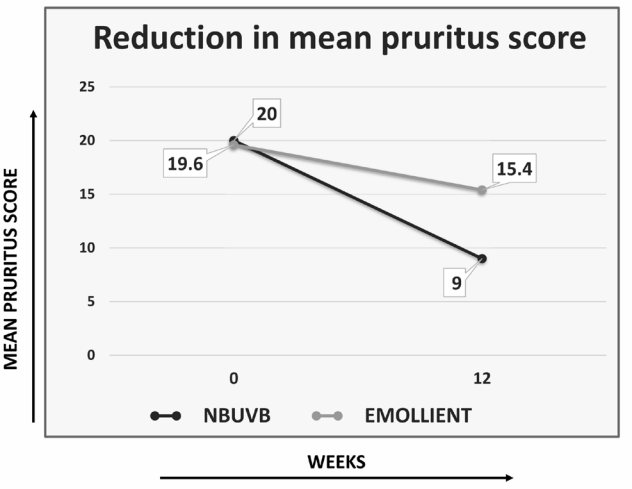

Figure-1. Reduction in mean pruritus score

DISCUSSION

Chronic kidney disease-associated pruritus or uremic pruritus is a distressing symptom reported by chronic kidney disease patients, posing significant challenge in its management due to complex underlying pathophysiology and variable response to treatment. Despite the wide range of treatment options, a complete cure remains elusive. Narrowband Ultraviolet B phototherapy and emollients are two distinct approaches, each having its own mechanism of action and clinical implications.

In current study, majority of patients belong to age from 35 to 56 years. These findings were in concordance with previous studies finding of prevalence of disease in fourth and fifth decade with mean age ranging from 42 to 56 years.[2,14,15] Female gender preponderance was reported in both group participants of our study which is consistent with the results of existing literature.[9,14,15] In present study, the mean duration of hemodialysis in study participants was much shorter (29 months) as compared to the studies carried out in the past demonstrated longer durations ranging from 5.5 years to 8.4 years.[14,15] This disparity can be attributed to different patient demographics and treatment protocols.

In our study, Narrow band UVB phototherapy demonstrated superior efficacy as compared to emollients in reduction of pruritus in patients with end stage renal disease. The baseline mean scores were 20.00±2.03 and 19.66±1.93 in narrowband UVB group and emollient group respectively at baseline. At 12-week post treatment the mean scores reduced to 9.23±2.92 and 15.43±3.05. These findings highlighted that 5D itch score reduced in both groups but more reduction was noticed in Narrow band UVB group which was proved to be statistically significant (p- value 0.0001) The superior efficacy of narrow band UVB can be attributed to its immunomodulatory effect which alter the inflammation and cytokines related to pathogenesis of pruritic. While emollients primarily restore the skin barrier dysfunction without altering the underlying immunological processes.

Likewise, narrowband UVB Phototherapy was found to be effective in uremic pruritic patients in the study conducted by Dhaher et al. The baseline mean 5D itch score was 19.53+3.0, which reduced to 10.71+3.9 at 10th week. They followed the patients to 20th week and further reduction in the mean score to 7.59 ± 5.8 was observed.[9] In contrast, in our study participants follow up visits were done for 12th week. Longer follow-up periods explicated the sustained anti-pruritic effect of narrowband UVB.

Sharjeena et al in their study compared narrowband UVB Phototherapy with emollients in the treatment of uremic pruritic patients. In this study, visual analogue scale instead of 5D itch score was utilized to demonstrate and compare the itch severity. The results were in concordance with the findings of our study. They reported superior efficacy of narrow band UVB (reduction of VAS from 9.1 to 1.9) as compared to emollients (reduction of VAS 9.1 to 8.8).[10]

Similarly, effectiveness of narrowband UVB therapy in chronic kidney disease-associated pruritus has been demonstrated in the study conducted by Shabi et al. They used a 10 point numerical rating scale to determine the severity of pruritus and reported 85% reduction in initial numerical rating score in 93% of patients at 12th week. Thus, greater efficacy of narrowband UVB in alleviating the pruritus associated with chronic kidney disease had been observed with various pruritus or itching severity scales.[14]

Narrow band UVB Phototherapy was found to be effective in treating uremic pruritus patients when compared with various treatment modalities. Equivalent results were also reported by El Mulla et al, when they compared narrowband UVB with oral pregabalin. Although both groups showed reduction in 5D itch scores but narrowband UVB showed better results with a reduction of mean 5-D itch score from 15.40±4.25 at baseline to 9.0 ± 4.46 at 12th week.[15]

Sapam et el. endorsed narrowband UVB therapy as add-on to peritoneal dialysis in refractory uremic pruritus patients with end stage renal

disease. The average Visual Analogue Score in their study at baseline was 7.75±1.02 which reduced significantly to 3.14±1.59 at the end of 12 weeks. (p-value < 0.05).[16]

Consistent results were reported in the comparative study of narrowband UVB vs antihistamine plus emollients (as control group) carried out by Mohamed et al. in uremic pruritus in CKD patients. Results of study demonstrated that mean difference of 5D itch score between pretreatment and post treatment was more (4) in narrow band UVB Phototherapy group as compared to control group (0.93). Although statistically significant reduction in 5d itch score after treatment in both groups were observed.[17]

The variation in study designs, patient population and outcome measures across existing literature limits the generalizability of the results and emphasizes the need for large, well-controlled trials to establish standard protocols.

Narrowband UVB has emerged as a highly effective treatment modality in controlling symptoms of uremic pruritus especially in refractory cases in various studies confirming its efficacy through decrease in itch scores and patient-reported outcomes. The therapeutic benefits are largely attributed to its ability to modulate immune responses and the reduction of inflammatory processes leading to a sustained response. However, the need for specialized equipment and regular follow-ups can limit its accessibility in certain settings. While emollients offer partial relief and used only in mild disease can be a better choice in terms of cost-effectiveness.

CONCLUSION

Narrow band UVB phototherapy is more effective compared to emollients in the treatment of Uremic pruritus.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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1	**Humaira Kousar:** Conception & design of study, acquisition, analysis, drafting of manuscript, final approval, proof reading.
2	**Zahid Rafiq:** Conception and design of study, analysis, interpretation of data, critical revision of manuscript, final approval, proofreading of study, maintaining accuracy or integrity of the whole work.
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4	**Amina Mehmood:** Design of study, collection of data, final approval of study, maintaining accuracy or integrity of study.
5	**Faizan Alam:** Design of study, collection of data, final approval of study, maintaining accuracy or integrity of study.