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Narrowband Ultraviolet B (NB-UVB) Phototherapy in Psoriasis: A Retrospective Study

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ABSTRACT

Background: Psoriasis with higher Psoriasis Area and Severity Index (PASI) scores correlate with impaired quality of life. Assessing narrowband ultraviolet B (NB-UVB) phototherapy as a new therapy option in Indonesia is necessary to find the most effective treatment for psoriasis patients. **Purpose:** To determine the usage of NB-UVB phototherapy and the therapy response in psoriasis patients. **Methods:** This retrospective descriptive observational study was conducted at Dr. Soetomo General Academic Hospital Surabaya in March 2019-November 2020. The variables were collected through medical records. **Result:** A total of 28 patients were obtained at this study. Psoriasis type plaque/vulgaris were found in 92.9% of the patients. The patients mostly started with PASI score >10 with the initial dose of NB-UVB phototherapy is 260 mJ/cm^2. The most common initial phototherapy frequency is 3 times per week (53.6%). The latest dose and frequency distribution was varied in each subject. The mean total number of sessions was 31.54 ± 20.549. Patients were also administered various combination therapy. The majority of patients had missed NB-UVB phototherapy sessions and the phototherapy dose needed to be reduced (57.1%). The achievement of PASI-75 (treatment success) was mostly achieved by subjects that went through 40-60 sessions of phototherapy and subjects with psoriasis type plaque/vulgaris. **Conclusion:** The achievement of PASI-75 was found to be low (17.5%), influenced by multiple factors such as the total number of NB-UVB phototherapy sessions, combination therapy, dose of NB-UVB phototherapy, frequency of NB-UVB phototherapy, and the level of patient compliance to therapy.

Keywords: psoriasis, phototherapy, NB-UVB, PASI, human and disease.

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BACKGROUND

Psoriasis has been found to be one of the most common chronic inflammatory skin diseases.[1] Psoriasis is often characterized by epidermal hyperplasia, increased arthritis risk, cardiovascular morbidity, and psychosocial burdens.[2] Overall prevalence data of psoriasis in Indonesia is not available. However, the findings at a tertiary hospital in Indonesia, Dr. Soetomo General Academic Hospital Surabaya, showed an increase in the number of psoriasis vulgaris patients by 1.8% from 2016 to 2017.[3]

Psoriasis has a bad impact on quality of life, measured through the Dermatology Life Quality Index (DLQI) score for psoriasis patients, averaging 6-20 (moderate-to-severe). The higher the Psoriasis Area and Severity Index (PASI) score indicates worse quality of life and impairment in work disability.[4] PASI is more often used in patients who will undergo phototherapy and systemic therapy.[5] The impact to quality of life is due to physical and emotional impairments that is associated with psoriasis.[4] With successful therapy, the quality of life of psoriasis patients can improve.[5] Psoriasis therapy used in

Indonesia now includes topical treatment, phototherapy/photochemotherapy, systemic treatment, and biologic agents.[6]

The psoriasis therapy is said to be successful if it reaches PASI-75 (reduction in PASI score by 75% from the initial score) and is said to be failed if it does not reach PASI-50. PASI between 50 and 75 with a DLQI <5 is considered successful and a DLQI >5 is considered a failure. Until now, psoriasis therapy has only been able to achieve remission. Psoriasis can recur after a while or if inflammation occurs. Thus, existing therapies are only able to achieve remission and extend the period of remission as long as possible. It is necessary to find the most effective treatment for psoriasis patient to achieve the goal of successful therapy.[6]

Narrowband ultraviolet B (NB-UVB) is one type of psoriasis phototherapy with a wavelength of 311–313 nm, that when compared with other phototherapy namely psoralen-ultraviolet A (PUVA) is considered safer with less side effects and less cutaneous carcinogenic risk.[7] Narrowband ultraviolet B (NB-UVB) is a type of psoriasis phototherapy that currently lacks data of efficacy in Indonesia. It is a new therapy at Dr. Soetomo General Academic Hospital Surabaya that was started in 2019. This study aims to determine the usage of NB-UVB phototherapy and the therapy response in psoriasis patients to provide better service for patients.

METHODS

A retrospective observational study was done using data obtained from medical records of psoriasis patients. This research used a total sample of psoriasis patients receiving NB-UVB phototherapy at the Dermatology and Venereology Outpatient and Inpatient Unit of Dr. Soetomo General Academic Hospital Surabaya in March 2019-November 2020, whose medical records contain all the needed variables. The variables collected were the age, PASI score before NB-UVB phototherapy, psoriasis type, prior treatments, combination treatments with NB-UVB phototherapy, the first dose of NB-UVB phototherapy, latest dose of NB-UVB phototherapy, frequency of NB-UVB phototherapy, and PASI score after NB-UVB phototherapy. The obtained data were analyzed descriptively using SPSS. This research has been reviewed and approved by the Ethics Committee at Dr. Soetomo General Academic Hospital Surabaya (0193/LOE/301.4.2/XI/2020).

RESULT

Over the period of March 2019-November 2020, out of 32 psoriasis patients that underwent NB-UVB phototherapy at Dr. Soetomo General Academic Hospital Surabaya, 28 patients were qualified for the inclusion criteria.

Table 1. The profile of psoriasis patients receiving NB-UVB phototherapy

Variable	Result	
Age (mean ± SD)	43.68 ± 13.562	
Psoriasis type, *N* (%)*		
Plaque psoriasis/psoriasis vulgaris		26 (92.9%)
Psoriatic arthritis		5 (17.9%)
Guttate psoriasis		4 (14.3%)
Erythrodermic psoriasis		3 (10.7%)
Pustular psoriasis		2 (7.1%)
Inverse psoriasis		0 (0%)
Nail psoriasis		0 (0%)
PASI score before NB-UVB phototherapy (mean ± SD), *N* (%)		
<5 (mild)	4 ± 0	1 (3.6%)
5-10 (moderate)	8.5 ± 1.7321	4 (14.3%)
>10 (severe)	17.565 ± 6.5259	23 (82.1%)

PASI = psoriasis area and severity index
NB-UVB = narrowband ultraviolet-B
*a patient may develop more than one type of psoriasis

Table 2. Prior treatment history of psoriasis patients receiving NB-UVB phototherapy

Treatments prior to NB-UVB phototherapy	N	% of all medications	% of patients
Corticosteroid			
Desoximetasone 0,25%	21	12.1%	75.0%
Mometasone furoate 0,1%	15	8.7%	53.6%
Desonide 0,05%	6	3.5%	21.4%
Dexamethasone	2	1.2%	7.1%
Methylprednisolone	2	1.2%	7.1%
Clobetasol propionate 0,05%	2	1.2%	7.1%
Hydrocortisone 1%	1	0.6%	3.6%
Betamethasone valerate + Neomycin sulphate	1	0.6%	3.6%
Antimetabolite			
Methotrexate	20	11.6%	71.4%
Antihistamine			
Cetirizine	18	10.4%	64.3%
Mebhydrolin napadisylate (Interhistin®)	2	1.2%	7.1%
Loratadine	2	1.2%	7.1%
Chlorpheniramine	1	0.6%	3.6%
Vitamin			
Folic acid	17	9.8%	60.7%
Vitamin B complex	5	2.9%	17.9%
Vitamin D	2	1.2%	7.1%
Vitamin C	1	0.6%	3.6%
Calcipotriol 0,005%	1	0.6%	3.6%
Moisturizer			
Urea 10%	11	6.4%	39.3%
Emollient cream	11	6.4%	39.3%
Vaseline album	9	5.2%	32.1%
Antifungal			
Ketoconazole 2%	8	4.6%	28.6%
Antibiotic			
Fusidic acid	6	3.5%	21.4%
Gentamicin 0,1%	1	0.6%	3.6%
Keratolytic agents			
Salicylic acid	2	1.2%	7.1%
Non-narcotic analgesic			
Metamizole	1	0.6%	3.6%
Paracetamol	1	0.6%	3.6%
Analgesic, herbal			
Curcuma	1	0.6%	3.6%
Nonsteroidal anti-inflammatory drug			
Natrium diclofenac	1	0.6%	3.6%
Others			
Oleum Iecoris aselli (Cod liver oil Levertran)	2	1.2%	7.1%
Total	173	100.0%	

NB-UVB = narrowband ultraviolet B

Table 3. Combination treatments with NB-UVB phototherapy of psoriasis patients

Combination treatments with NB-UVB phototherapy	N	% of all medications	% of patients
Antihistamine			
Cetirizine	27	10.1%	96.4%
Loratadine	7	2.6%	25.0%
Mebhydrolin napadisylate (Interhistin®)	3	1.1%	10.7%
Chlorpheniramine	1	0.4%	3.6%
Corticosteroid			
Desoximetasone 0,25%	26	9.7%	92.9%
Mometasone furoate 0,1%	23	8.6%	82.1%
Desonide 0,05%	6	2.2%	21.4%
Dexamethasone	4	1.5%	14.3%
Hydrocortisone 2.5%	2	0.7%	7.1%
Hydrocortisone 1%	1	0.4%	3.6%
Vitamin			
Folic acid	26	9.7%	92.9%
Vitamin B complex	7	2.6%	25.0%
Vitamin C	2	0.7%	7.1%
Vitamin D	1	0.4%	3.6%
Antifungal			
Ketoconazole 2%	24	9.0%	85.7%
Antimetabolite			
Methotrexate	24	9.0%	85.7%
Moisturizer			
Emollient cream	24	9.0%	85.7%
Urea 10%	19	7.1%	67.9%
Vaseline album	16	6.0%	57.1%
Ambiphilic Dermatological Cream (Biocream®)	3	1.1%	10.7%
Antibiotic			
Fusidic acid	6	2.2%	21.4%
Gentamicin 0.1%	1	0.4%	3.6%
Nonsteroidal anti-inflammatory drug			
Natrium diclofenac	6	2.2%	21.4%
Analgesic, herbal			
Curcuma	2	0.7%	7.1%
Non-narcotic analgesic			
Paracetamol	1	0.4%	3.6%
Others			
Oleum Iecoris aselli (Cod liver oil Levertran)	3	1.1%	10.7%
NaCl 0.9% compress	2	0.7%	7.1%
Calcium lactate	1	0.4%	3.6%
Total	268	100.0%	

NB-UVB = narrowband ultraviolet B

One patient can suffer from more than one type of psoriasis at a time. Combinations of psoriasis types found in the patients were 1 patient with psoriasis type plaque/vulgaris and erythrodermic; 2 patients with psoriasis type plaque/vulgaris and guttate; 2 patients with psoriasis type plaque/vulgaris and arthritis; 1 patient with psoriasis type erythrodermic, plaque/vulgaris, and pustular; 1 patient with psoriasis

type plaque/vulgaris, arthritis, and guttate; and 1 patient with psoriasis type erythrodermic, plaque/vulgaris, arthritis, and guttate.

Table 2 shows the administration of therapy before laser therapy. The study subjects were mostly using desoximetasone 0.25% (75% of the subjects) followed by the administration of methotrexate (71.4% of all subjects). The other medication administered based on the symptoms.

Table 3 shows the therapy the subjects received during NB-UVB phototherapy program. Most of the subjects received adjunctive oral cetirizine therapy (96.4%) followed by desoximethasone 0.25% and folic acid (92.9%). Administration of 2% ketoconazole, methotrexate, and emollient cream in 85.7% of subjects. The administration of this combination therapy was adjusted to the clinical findings of the subject.

Table 4. The distribution of NB-UVB phototherapy administration to psoriasis patients

Variable	Result
Initial dose of NB-UVB phototherapy (mJ/cm2), N (%)	
260	28 (100.0%)
Latest dose of NB-UVB phototherapy (mJ/cm2), N (%)	
120	1 (3.6%)
190	1 (3.6%)
210	1 (3.6%)
225	1 (3.6%)
260	4 (14.3%)
270	1 (3.6%)
280	1 (3.6%)
300	5 (17.9%)
310	1 (3.6%)
340	3 (10.7%)
410	1 (3.6%)
460	1 (3.6%)
500	3 (10.7%)
615	1 (3.6%)
620	1 (3.6%)
700	2 (7.1%)
Initial frequency of NB-UVB phototherapy, N (%)	
1x weekly	5 (17.9%)
2x weekly	8 (28.6%)
3x weekly	15 (53.6%)
Latest frequency of NB-UVB phototherapy, N (%)	
1x monthly	1 (3.6%)
1x biweekly	1 (3.6%)
1x weekly	21 (75.0%)
2x weekly	5 (17.9%)
Patient's compliance in following therapy sessions, N (%)	
Never missed any therapy session	8 (28.6%)
Have missed at least one therapy session	
NB-UVB dose decreased	16 (57.1%)
NB-UVB dose didn't decrease	4 (14.3%)
Number of NB-UVB phototherapy sessions (mean ± SD)	31.54 ± 20.549
Total, N (%)	28 (100.0%)

NB-UVB = narrowband ultraviolet B

Table 4 shows that all subjects received the same initial dose of 260 mJ/cm^2 with the highest frequency three times a week (53.6%). In the process, 71.4% had missed a therapy session and adjusted the dose of NB-UVB. At the end of the session, 17.9% received a dose of 300 mJ/cm^2 followed by a dose of 260 mJ/cm^2 by 14.3%. The final dose at the session varies depending on the clinical findings in the subject

Table 5. PASI score responses towards NB-UVB phototherapy

	No improvements on PASI score	PASI improvements		Total
		PASI-75 not achieved	PASI-75 achieved	
Number of NB-UVB phototherapy sessions				
<20	5 (17.9%)	4 (14.3%)	1 (3.6%)	10 (35.7%)
20-39	1 (3.6%)	6 (21.4%)	1 (3.6%)	8 (28.6%)
40-60	0%	5 (17.9%)	3 (10.7%)	8 (28.6%)
>60	0%	2 (7.1%)	0%	2 (7.1%)
Psoriasis type*				
Plaque/vulgaris	6 (21.4%)	15 (53.6%)	5 (17.9%)	26 (92.9%)
Guttate	1 (3.6%)	3 (10.7%)	0 (0%)	4 (14.3%)
Pustular	0 (0%)	2 (7.1%)	0 (0%)	2 (7.1%)
Erythrodermic	0 (0%)	2 (7.1%)	1 (3.6%)	3 (10.7%)
Arthritis	2 (7.1%)	3 (10.7%)	0 (0%)	5 (17.9%)
Total	6 (21.4%)	17 (60.7%)	5 (17.9%)	
PASI score changes (mean ± SD)	+2.167 ± 1.7512	-8.259 ± 4.821		

PASI = psoriasis area and severity index
NB-UVB = narrowband ultraviolet B
*a patient may develop more than one type of psoriasis

Table 5 shows that most of the subjects experienced an improvement, 78.6% of the subjects. However, only 17.9% of subjects achieved PASI-75. In the group that did not experienced improvement in PASI score, none reached 40-60 sessions, and most were only <20 sessions. The most common type of psoriasis was plaque/vulgaris by 92.9% of all subjects.

DISCUSSION

NB-UVB phototherapy is a new therapy that was first implemented in 2019 at Dr. Soetomo General Academic Hospital Surabaya. The mean age of psoriasis patients undergoing NB-UVB phototherapy at Dr. Soetomo is 43.68 ± 13.562. The distribution of age in the patients is in accordance with research by James et al. which states that the age distribution of psoriasis patients is very wide, ranging from neonates to the elderly aged 70 years.[8]

The patients that started the NB-UVB phototherapy mostly had PASI score >10 (severe). This finding is in accordance with the guidelines of phototherapy/photochemotherapy in that stated the therapy options are more desirable in psoriasis that does not work with topical treatment and in moderate-to-severe psoriasis.[6]

From the results of the study, it was found that the majority of patients experienced a decrease in PASI score, but didn't manage to achieve PASI-75 (60.7%). Only a small portion of patients managed to achieve PASI-75 (17.9%) and 21.4% of the patients didn't experience improvements on the PASI score. The patients who experienced an increase in the PASI score were due to skipping the phototherapy session and were still at the beginning of the therapy stage so that the patients only underwent 4 phototherapy sessions. Psoriasis patients on this study has undergone NB-UVB phototherapy with a mean number of sessions of 31.54 ± 20.549. According to Indonesian Society of Dermatology and Venereology, psoriasis patients can achieve clean skin after 15-20 sessions of NB-UVB phototherapy.[6] The statement did not match the finding in this study because the majority of patients who had

undergone at least 20 sessions of NB-UVB phototherapy in this study had not achieved PASI-75. This difference can be caused by other factors that affect the therapy response in each patient, besides the number of phototherapy sessions.

The majority of psoriasis patients who managed to achieve PASI-75 were found to have undergone NB-UVB phototherapy in the range of 40-60 therapy sessions (10.7%). PASI-75 were also found in patients who went through <20 (3.6%) and 20-40 (3.6%) NB-UVB phototherapy sessions. This study found that the more sessions of NB-UVB phototherapy did not determine the achievement of PASI-75 because there were patients who had undergone >60 sessions of NB-UVB phototherapy but had not achieved PASI-75. Patients with poor response to therapy (score PASI >10, body surface area 10%) to at least 2 standard systemic therapies such as cyclosporine A, etretinate/acitretin, methotrexate, and phototherapy (PUVA, UVB) are indications for biologic agent therapy.[6] Biologic agents that are currently approved for treating moderate to severe plaque psoriasis are namely inhibitor TNF-α (adalimumab, etanercept, infliximab), inhibitor IL-17 (ixekizumab, brodalumab, secukinumab), inhibitor IL-12/IL-23 (ustekinumab), and inhibitor IL-23 (guselkumab, tildrakizumab), each with its unique effectiveness and safety profile.[9]

Patients who managed to achieve PASI-75 (17.9%) were all patients with plaque/vulgaris type psoriasis and one of the patients is a combination of plaque/vulgaris and erythrodermic type psoriasis. These results support the finding of effectiveness NB-UVB phototherapy from a study by Polańska that found 70% of plaque psoriasis patients who received NB-UVB monotherapy achieved PASI-75 and 17.8% achieved PASI-90.[10]

The most common type of psoriasis found in psoriasis patients undergoing NB-UVB phototherapy at Dr. Soetomo General Academic Hospital Surabaya is psoriasis type plaque/vulgaris. This finding is supported by a study by Badri, Kumar, and Oakley which stated that the most frequent type of psoriasis encountered clinically is psoriasis vulgaris.[11]

This study also found that the distribution of therapy for psoriasis patients undergoing NB-UVB phototherapy at Dr. Soetomo General Academic Hospital Surabaya, both given prior to and combined with NB-UVB phototherapy, varies widely. Prior to the NB-UVB phototherapy, most patients were administered Desoximetasone 0.25% (75.0%) and Methotrexate (71.4%). Desoximethasone is a potent corticosteroid with anti-inflammatory and antiproliferative effects. Desoximetasone can be administered topically for psoriasis therapy with different vehicles to choose, like ointments, creams, lotions and newer formulations, like foams and sprays.[12] Methotrexate is an antimetabolite analogue of folic acid which has anti-inflammatory, anti-proliferative, and immunosuppressive. Methotrexate is indicated as systemic therapy in various types of psoriasis including moderate-to-severe psoriasis type plaque/vulgaris, psoriasis type erythrodermic, psoriasis type pustular, nail psoriasis, and psoriasis type arthritis.[13]

Administration combination therapy with NB-UVB phototherapy in patients supports healing of psoriasis patients through various mechanisms of action. The most commonly used combination therapy for psoriasis patients undergoing NB-UVB phototherapy at Dr. Soetomo General Academic Hospital Surabaya are Cetirizine (96.4%), Desoximetasone 0.25% (92.9%), Folic acid (92.9%), Moisturizing cream (85.7%), Ketoconazole 2% (85.7%), and Methotrexate (85.7%). Sasmito et al. supported this finding by stating that there was a statistically significant difference in the reduction in PASI scores after receiving a combination of methotrexate with NB-UVB phototherapy.[14] Cetirizine is an antihistamine with selective inhibitory effects to peripheral H1 receptors.[15] Research by Domagala, Szepietowski,and Reich showed that the use of antihistamines can reduce the intensity of itching in psoriasis significantly.[16] Folic acid in psoriasis therapy works by lowering serum homocysteine that is usually high in psoriasis patients. This state of hyperhomocysteinemia is a risk major cause of cardiovascular diseases comorbidity in psoriasis patients. Folic acid and vitamin B12 deficiency can cause hyperhomocysteinemia in psoriasis patients. Folic acid derivate, systemic calcium folinate and vitamin Topical B12 was found to be effective in psoriasis therapy.[17] Folic acid supplementation was also given along with Methotrexate usage because Methotrexate can inhibit metabolic processes that use folic acid.[13] Ketoconazole is an imidazole antifungal with a mechanism of action of ergosterol synthesis blocking. Ketoconazole 2% cream used with topical corticosteroids and antibacterial agents can give good results in the treatment of skin diseases caused by fungal or bacterial superinfection.[18] The healing effect obtained from the combination therapy of NB-UVB phototherapy is part of the variables that support the achievement of PASI-75.

The initial dose of NB-UVB phototherapy was the same for all psoriasis patients undergoing NB-UVB phototherapy at Dr. Soetomo General Academic Hospital Surabaya, 260 mJ/cm2 (100%). The initial

dose given to the patient is appropriate with the recommended dose range of NB-UVB phototherapy in Indonesia, which is initial 130-400 mJ/cm^2.[6] UVB phototherapy initial dose can be given based on Fitzpatrick skin phototype or minimal erythema dose (MED).[19] The initial dose of NB-UVB in the hospital was determined based on the patient's Fitzpatrick skin type. The most common Fitzpatrick skin type found in Indonesians are types IV and V.[20] The initial dose of 260 mJ/cm^2 is the dose given to patients with Fitzpatrick skin type III, while for Fitzpatrick IV skin type requires an initial dose of 330 mJ/cm^2 and for type V requires an initial dose of 350 mJ/cm^2. Risk prevention of side effects can be the cause of administering the dosage lower than the patient's skin type, since the side effects of NB-UVB phototherapy is dose-dependent.[21] However, administration of a lower initial dose than what is needed for the patient's skin type is a variable that can affect the outcome of NB-UVB phototherapy. When compared with low-dose UVB, UVB therapy at higher doses prolong remission with fewer sessions of treatment and less expensive for patients and hospitals.[22]

Dosage of NB-UVB phototherapy in psoriasis patients at Dr. Soetomo General Academic Hospital Surabaya changed as therapy progressed, depending on the therapeutic needs of each patient. Therefore, the final dose distribution was highly variable. The most frequent latest dose during the data collection period was 300 mJ/cm^2 (17.9%). The patient had an increase in the dose at each therapy cycle. The recommended dose increase for NB-UVB phototherapy is 15-65 mJ/cm^2.[6] In patients with skin type III and IV, the maximum dose is acceptable is 3000 mJ/cm^2.[19] Reduction of dosages were found in the final dose in 6 patients (21.4%) due to a reduction in the score PASI to PASI score 1. In addition, 10 patients (35.7%) also experienced a decrease in dose due to missing phototherapy sessions until the therapeutic dose needs to be reduced. Among these, 5 patients (17.8%) repeated the initial therapeutic dose. Patients that missed their therapy schedule for 1-2 weeks, 2-3 weeks, and 3-4 weeks needs to reduce the dose by consecutively 25%, 50% or repeat the initial dose, and repeat the initial dose.[19]

Although dose changes have been adjusted according to phototherapy guidelines, patient nonadherence in undergoing phototherapy sessions is one of the leading causes of treatment failure and can lead to increased health care utilization and costs of the medication.[23] The study found that the majority of patients had missed NB-UVB phototherapy sessions and the phototherapy dose needed to be reduced (57.1%) and only 28.6% of patients had never missed a session of NB-UVB phototherapy during the data collection period. Therapy compliance in developing countries such as Indonesia is lower than developed countries, which also becomes a public health problem because inadequate therapy compliance leads to poor treatment outcomes, increased risk of developing comorbidities, inefficient use of healthcare resources, and increased treatment costs.[24] Factors that can worsen patient's noncompliance to psoriasis therapy can be divided into: patient-related factors, namely demographic, socioeconomic, psychological nature, and treatment understanding and expectations; treatment-related factors, namely the administration route, treatment duration, dosing frequency, regime complexity, side effects, and financial impact; disease-related factors, namely the chronicity and visibility of lesions; . It is very important to know the cause of each patient's noncompliance to determine actions that can improve the level of patient compliance in order to increase the effectiveness of therapy.[25]

The majority of patients received the initial frequency of phototherapy 3 times per week (53.6%). With a minimum of 1 time a week (17.9%) and a maximum of 3 times a week. These results are inconsistent with the guideline by PERDOSKI which mentioned the frequency of NB-UVB phototherapy should be 3-5 times per week.[6] However, dosing frequency also has an impact on patient adherence.[25] The administration of NB-UVB phototherapy with a frequency of less than minimal recommended frequency (3 times per week) can be a variable that affect the outcome of therapy since it may take longer for the phototherapy to achieve clearance.[19]

During the data collection period, the majority of patients received the latest phototherapy frequency of once per week (75%). With a minimum of once per month (3.6%) and a maximum twice a week (17.9%). Patients receiving a final frequency of less than once per week (7.1%) has achieved a PASI score of 1. Once the patient's psoriasis has cleared, the patient may choose to continue maintenance therapy as a taper or indefinitely. The maintenance therapy taper protocol is treatment twice a week for 4 weeks and then once a week for 4 weeks, with constant dose. For prolonged maintenance therapy, the patient should receive a treatment every 1-2 weeks, with the final dose should be decreased by 25% and held constant for all maintenance treatments.[19]

This research found several variables that can affect the outcome of psoriasis therapy in psoriasis patients. The variables are divided into therapeutic factors, namely the total number of NB-UVB phototherapy sessions, combination therapy, initial

dose of NB-UVB phototherapy, and frequency of NB-UVB phototherapy, as well as patient factors, namely patient noncompliance that may also cause changes in the therapeutic dose.

The limitation of this retrospective study is that some data are not listed in the patient's medical record which complicates the process of collecting data and the available data in the patient's medical record is also very limited. Availability of other data in medical records that can be a potential variable to be studied in this study is also very limited, for example side effects and level of patient satisfaction with therapy. Therefore, further research can be done prospectively by taking into account other variables that can be recorded other than the variable already listed in the medical record.

This research concluded that 1) The achievement of PASI-75 in psoriasis patients undergoing NB-UVB phototherapy in Dr. Soetomo General Academic Hospital Surabaya was found to be low, influenced by multiple factors such as the total number of NB-UVB phototherapy sessions, combination therapy, initial dose of NB-UVB phototherapy, and frequency of NB-UVB phototherapy, as well as the level of patient compliance to therapy. 2) The majority of psoriasis patients who have undergone at least 20 sessions of NB-UVB phototherapy at Dr. Soetomo General Academic Hospital Surabaya has not yet reached PASI-75. 3) The level of compliance of psoriasis patients in undergoing NB-UVB phototherapy sessions according to schedule in Dr. Soetomo General Academic Hospital Surabaya and is low and it may cause changes in the therapeutic dose. 4) NB-UVB phototherapy is administered at an initial frequency lower than the therapy guidelines in some psoriasis patients in Dr. Soetomo General Academic Hospital Surabaya. 5) In Dr. Soetomo General Academic Hospital Surabaya, NB-UVB phototherapy is given at a lower initial dose than the minimum dosage requirements according to the guidelines for Fitzpatrick skin types IV and V.

Therefore, it is necessary to explore the causes of therapy noncompliance in psoriasis patients undergoing NB-UVB phototherapy at Dr. Soetomo General Academic Hospital Surabaya to be able to implement effective measures to increase the level of patient's therapy compliance in order to increase the effectiveness of therapy. The medical record should also record the side effects of using NB-UVB phototherapy and the level of satisfaction with psoriasis patients at Dr. Soetomo General Academic Hospital Surabaya. Patients with poor response to therapy should consider treatment options with biologic agents according to PERDOSKI guidelines, especially because biologic agent therapy options are also available at Dr. Soetomo General Academic Hospital Surabaya. It is also necessary to record PASI scores of psoriasis patients who undergo NB-UVB phototherapy consistently at each therapy session to evaluate the success of patient therapy and the complete PASI score results should be written into the electronic medical record system at Dr. Soetomo General Academic Hospital Surabaya. The initial frequency of NB-UVB phototherapy should be no less than the existing guidelines (at least 3 times a week). The initial dose of NB-UVB phototherapy should be given according to the needs of each patient's Fitzpatrick skin type.

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