



Sociodemographic and Clinical Characteristics of Geriatric Patients with Psoriasis Receiving Narrowband Ultraviolet B Phototherapy

Lili Legiawati, Rinadewi Astriningrum, Shannaz Nadia Yusharyahya, Vivianne Chandrakesuma

Department of Dermatovenereology, Dr. Cipto Mangunkusumo Hospital, Faculty of Medicine University of Indonesia, Central Jakarta, Indonesia

Corresponding Author:

Lili Legiawati, MD, PhD

Department of Dermatovenereology,

Dr. Cipto Mangunkusumo Hospital,

Faculty of Medicine University of

Indonesia, Jl Salemba Raya No. 6,

Central Jakarta 10430, Indonesia

E-mail: lililegiawati@yahoo.com

ORCID:

<https://orcid.org/0000-0002-5793-2525>

Received: July 15, 2020

Revised: November 22, 2020

Accepted: November 25, 2020

Background: Although the demographic and clinical characteristics of patients with psoriasis have been evaluated in many countries, studies specifically on geriatric patients remain scarce and none have focused on those receiving phototherapy. This study describes the sociodemographic and clinical characteristics of geriatric patients with psoriasis in Indonesia, specifically those who received narrowband ultraviolet B (NB-UVB) phototherapy. **Methods:** This retrospective study using data obtained from phototherapy and medical records of psoriasis patients who received phototherapy in 2014–2019 was conducted at the Dermatovenereology Clinic of Dr. Cipto Mangunkusumo National General Hospital. **Results:** Among 24 geriatric patients with psoriasis who received NB-UVB phototherapy, the median age of onset was 61 years (range, 36–74 years). Regarding comorbidities, 15 patients (62.5%) had dyslipidemia, 15 patients (62.5%) had hypertension, 11 patients (45.8%) had obesity, 9 patients (37.5%) had periodontitis/gingivitis, 9 patients (37.5%) had type 2 diabetes mellitus, and 6 patients (25.0%) had hyperuricemia. **Conclusion:** Some comorbidities have been associated with psoriasis, including metabolic syndrome and periodontitis. The data from this study could help physicians in evaluating and making appropriate clinical decisions when managing psoriasis patients in the geriatric population.

Key Words: Geriatrics, Phototherapy, Psoriasis

INTRODUCTION

Psoriasis is a chronic inflammatory skin disease and presents as erythematous plaques with silvery scales. It also commonly affects the joints and nails and exhibits systemic manifestations.¹⁾ Some comorbidities have been associated with psoriasis, including metabolic syndrome and depression, and the condition significantly affects patient quality of life.²⁾

Psoriasis affects approximately 2%–4% of the population in Europe and the United States, whereas the prevalence in Asian countries is lower.³⁾ The prevalence ranges from 0.29% to 1.18% in Japan and 0.2% to 1.5% in China. In Korea, the prevalence is 453 per 100,000 population.⁴⁾ The age of onset of psoriasis shows a bimodal distribution, with the first peak occurring at 15–25 or 30–39 years and the second at 50–70 years.^{3,5)} A population-based study

in the United States observed the highest rate of psoriasis incidence among patients aged 60–69 years.¹⁾ With ongoing increases in aging populations, psoriasis in older patients is also expected to increase. Aside from the comorbidities, this population is also more vulnerable to the psychological distress and impaired quality of life that are associated with psoriasis.⁶⁾ Most skin diseases in older patients are treatable if detected early; thus, physicians must be attentive when presented with patients from this specific population,⁷⁾ as early and late-onset psoriasis have clinical differences and distinct characteristics in geriatric patients.^{5,6,8,9)}

Although the demographic and clinical characteristics of patients with psoriasis have been evaluated in many countries, studies specifically on geriatric patients remain scarce and none have focused on patients receiving phototherapy, who generally have moderate-to-severe psoriasis.^{4,5,9-15)} Obtaining this information

may provide a better understanding of the psoriasis characteristics in this population and help clinicians make appropriate decisions. Phototherapy is a good alternative to systemic therapy, especially for older patients with polypharmacy, and has long been utilized with great efficacy and safety for many dermatoses. Therefore, this study aimed to describe the sociodemographic and clinical characteristics of geriatric patients with psoriasis in Indonesia, specifically those who received narrowband ultraviolet B (NB-UVB) phototherapy.

MATERIALS AND METHODS

This study was conducted at the Dermatovenereology Clinic of Dr. Cipto Mangunkusumo National General Hospital. Data were obtained from the phototherapy and medical records of geriatric patients with psoriasis who received phototherapy between 2014 and 2019. The inclusion criterion was all psoriasis patients aged ≥ 60 years who received NB-UVB phototherapy between January 2014 and August 2019. Patients were excluded if they had undergone fewer than eight phototherapy sessions or if the information in the medical records was incomplete. The study has been approved by the Health Research Ethics Committee (No. 0981/UN2.F1/ETIK/2018), Faculty of Medicine, Universitas Indonesia, and Dr. Cipto Mangunkusumo National General Hospital. Informed consent for phototherapy was obtained before treatment.

Phototherapy Protocol

We conducted the NB-UVB phototherapy with an initial dose of 75% of the minimal erythema dose. In the following session, the dosage was increased by 20% each session if no erythema was observed. In the case of minimal erythema that diminished within 24 hours, we increased the dose by 10%. NB-UVB was administered starting from two to three sessions per week.

Treatment Response Evaluation

A good response in psoriasis vulgaris was defined as the achievement of a Psoriasis Area Severity Index score of 75% (PASI 75) or over.

Analysis

The data were processed with Microsoft Excel 2016 and we conducted a descriptive analysis. Numerical data are presented as mean \pm standard deviation or medians (minimum–maximum). Categorical data are presented as frequencies and percentage.

RESULTS

This study included a total of 24 patients with psoriasis who received NB-UVB phototherapy. Their sociodemographic data are summarized (Table 1). All patients were diagnosed as having plaque-type psoriasis; however, 2 patients also had guttate psoriasis and 2 patients had pustular psoriasis during phototherapy.

According to the Asia-Pacific-specific classification of body mass index (BMI), the median BMI of all patients was classified as overweight (BMI 23.0–24.9 kg/m²; median, 24.7 kg/m²; range, 18.8–37.0 kg/m²), whereas 11 patients (45.8%) were obese. Among 15 patients with available lipid profile data, 12 had low-density lipoprotein (LDL) levels above 100 mg/dL, 4 had total cholesterol levels above 200 mg/dL, 2 male patients had high-density lipoprotein (HDL) levels below 40 mg/dL, one female patient had an HDL level below 50 mg/dL, and 3 patients had triglyceride levels above 150 mg/dL. The majority of educational level in our study was bachelor and master graduates (41.7%). The patients' baseline characteristics are summarized in Table 1.

Regarding comorbidities, dyslipidemia (n = 15; 62.5%) and hypertension (n = 15; 62.5%) were the most common in these patients (Table 2).

Medications that are reported to have photosensitizing properties were consumed by 11 patients during their phototherapy course, with 4 patients consuming multiple photosensitizing medications. The medications were statins (n = 7; 29.2%); methotrexate (n = 2; 8.3%); non-steroidal anti-inflammatory drugs (NSAIDs; n = 3; 12.5%); and nifedipine, captopril, furosemide, hydrochlorothiazide (n = 1 in each; 4.2%). Two patients experienced one episode of side effects while consuming photosensitizing medications. However, no changes were made to their medications, only adjustment of phototherapy doses (Table 3).

We only included patients who received phototherapy, the treatment of choice for moderate-to-severe psoriasis. The present study did not include patients with mild disease severity. Thirteen patients achieved a PASI 75 response after a median of 19 sessions (range, 12–84) and a median cumulative dose of 24.8 J/cm² (range, 13.3–190.2 J/cm²). Seven patients were lost to follow-up; thus, treatment response could not be assessed. Three patients did not achieve improvement; therefore, their treatment was changed to a different modality.

DISCUSSION

This study was conducted to identify the demographic and clinical characteristics of geriatric patients with psoriasis treated with NB-UVB phototherapy. Our results showed a male predominance

Table 1. Sociodemographic data and baseline characteristics

Characteristic	Value
Age (y)	66.4 ± 5.6
Median (range)	65 (60–79)
Sex, male	16 (66.7)
Duration of psoriasis (y)	7.5 ± 9.4
Median (range)	3.00 (0.17–3.00)
Age at onset (y)	59.8 ± 10.1
Median (range)	61 (36–74)
Baseline PASI	8.2 ± 3.5
Median (range)	7.50 (3.6–27.7)
Baseline BSA (%)	20.6 ± 18.5
Median (range)	13 (3.5–80.0)
Psoriasis severity based on BSA (%)	
< 10	9 (37.5)
10–30	10 (41.7)
> 30	5 (20.8)
Severity of psoriasis based on PASI	
< 8	12 (50.0)
8–12	7 (29.2)
> 12	5 (20.8)
Types of psoriasis ^{a)}	
Plaque-type psoriasis	23 (95.8)
Guttate psoriasis	2 (8.3)
Pustular psoriasis	2 (8.3)
Psoriasis arthritis	3 (12.5)
BMI (kg/m ²)	25.2 ± 4.8
Median (range)	24.7 (18.8 ± 37.0)
BMI classification	
Obese I (BMI ≥ 25.0–29.9)	8 (33.3)
Obese II (BMI ≥ 30.0)	3 (12.5)
Blood pressure	
Normal	4 (16.7)
Pre-hypertension	8 (33.3)
Stage 1	11 (45.8)
Stage 2	1 (4.2)
Abnormal blood glucose level	2 (14.3) of 14 with available data
Abnormal lipid profile	14 (93.3) of 15 with available data
Abnormal uric acid level	3 (37.5) of 8 with available data
Previous treatment ^{a)}	
Phototherapy	5 (20.8)
Immunosuppressive agent	4 (16.7)
Topical only	13 (54.2)
None	4 (16.7)
Occupation	
Retiree	15 (62.5)
Entrepreneur	3 (12.5)
Private employee	3 (12.5)
Housewives	3 (12.5)
Educational level	
Elementary–Middle school	5 (20.8)
High school	9 (37.5)
Bachelor–Master	10 (41.7)

Values are presented as mean ± standard deviation or number (%).

BMI, body mass index; BSA, body surface area; PASI, Psoriasis Area and Severity Index.

^{a)}Include more than one type of psoriasis could occur in one patient, and one patient could undergo different types of treatment previously.

Table 2. Frequencies of comorbidities

Comorbidities	Frequency
Dyslipidemia	15 (62.5)
Hypertension	15 (62.5)
Obesity	11 (45.8)
Periodontitis/gingivitis	9 (37.5)
Diabetes	9 (37.5)
Hyperuricemia	6 (25.0)
Chronic kidney disease	4 (16.7)
Osteoarthritis	4 (16.7)
Chronic heart failure	4 (16.7)
Coronary artery disease	3 (12.5)
Fatty liver	2 (8.3)
Stroke	2 (8.3)
Vitiligo	1 (4.2)
Gout arthritis	1 (4.2)
Cholelithiasis	1 (4.2)

Values are presented as number (%).

Table 3. Systemic medications taken by the patients during phototherapy treatment

Medications	Value
Antihistamines (cetirizine, loratadine, fexofenadine, cinnarizine)	13 (54.2)
CCB (amlodipine, nifedipine ^{a)} , cinnarizine)	9 (37.5)
ARB (valsartan, telmisartan, candesartan)	7 (29.2)
Statins ^{a)} (simvastatin, atorvastatin)	7 (29.2)
Oral hypoglycemic agents (metformin, glimepiride, gliclazide, gliquidone)	5 (20.8)
Allopurinol	4 (16.7)
Beta-blocker (bisoprolol)	3 (12.5)
Antiplatelets (aspirin)	3 (12.5)
NSAIDs ^{a)} (natrium diclofenac, ibuprofen, celecoxib)	3 (12.5)
Proton-pump inhibitor (lansoprazole)	3 (12.5)
Methotrexate ^{a)}	2 (8.3)
Insulin	2 (8.3)
Oral corticosteroids (dexamethasone, methylprednisolone)	2 (8.3)
Nitrates (nitroglycerine, ISDN)	2 (8.3)
ACE-inhibitor (captopril ^{a)} , ramipril)	2 (8.3)
Fluoroquinolone (levofloxacin)	1 (4.2)
Macrolide (azithromycin)	1 (4.2)
Furosemide ^{a)}	1 (4.2)
Hydrochlorothiazide ^{a)}	1 (4.2)

Values are presented as number (%).

CCB, calcium channel blocker; ARB, angiotensin II receptor blocker; NSAID, non-steroidal anti-inflammatory drugs; ISDN, isosorbide dinitrate; ACE, angiotensin-converting enzyme.

^{a)}Drugs with photosensitizing properties.

among the 24 included patients, with a male-to-female ratio of 2:1. Most studies reported no significant difference in prevalence across sex. However, other studies, particularly those conducted in Asian populations, reported a slightly higher prevalence in males, although the ratio was not as high as in our study.^{2,4,10,12,15} Furthermore, a study in Taiwan reported an increasing prevalence of psoriasis in men by the age of 30 years.¹⁵

The most common educational level in our study was bachelor/master graduates, in contrast to another epidemiological study conducted in our hospital for vitiligo patients, in which most of the patients were elementary/middle/high school graduates.¹⁶ Epidemiological studies conducted in the United States also revealed that only 38% of the patients were college graduates,¹⁴ whereas those conducted in Africa reported that 72.3% of the cases had primary and secondary education.¹¹ The higher educational level observed in our patients might be of advantage when providing information to patients regarding their treatments, complications, and disease course.

Concerning the age of onset, the median was 61 years (range, 36–74 years). This is consistent with the reported bimodal distribution of the age of onset for psoriasis, in which the second peak occurs around 50–70 years of age.³ A study comparing the clinical characteristics of psoriasis patients aged under and over 70 years also reported that patients aged ≥ 70 years had late-onset disease, occurring at 55.7 ± 20.8 years, compared with patients aged under 70 years, in whom disease onset occurred at 28.6 ± 15.0 years.⁵ This finding is similar to ours, in which the mean age at onset was 59.77 ± 10.06 years. As our study only included geriatric patients, most were categorized as having late-onset psoriasis (> 40 years of age).

All of our patients were diagnosed as having plaque-type psoriasis, consistent with previous studies reporting the plaque-type to be the most common type of psoriasis.^{4,5,9-15} The number of patients with other psoriasis types was too small for us to draw any conclusion. Nonetheless, a study in France observed a higher frequency of guttate and inverse psoriasis among patients aged > 70 years,⁵ whereas a study in Côte d'Ivoire demonstrated an increasing tendency for pustular and inverse psoriasis among patients with elderly-onset psoriasis.¹¹

Compared with early onset psoriasis, late-onset psoriasis generally has a milder disease severity.^{5,9} However, as we only included patients who received phototherapy, which is the treatment of choice for moderate-to-severe psoriasis, none of our patients had mild disease severity at baseline. Moreover, 83.3% of our patients had previously received treatment for psoriasis, including topical agents, immunosuppressive agents, or phototherapy. Most of those patients were treated in other hospitals and then referred to Dr.

Cipto Mangunkusumo National General Hospital because of unsatisfactory improvement or even worsening course of the disease. This finding was consistent with moderate-to-severe disease severity and a long duration of psoriasis at baseline, with a median of 3 years (range from 2 months to 31 years).

In our study, 54.2% of patients achieved a PASI 75 response. The patients underwent a median of 19 sessions, with a median cumulative dose of 24.8 J/cm^2 . Yones et al.¹⁷ reported that 65% of psoriasis patients achieved PASI 75 over a median of 28.5 sessions, whereas Markham et al.¹⁸ showed a clear response in psoriasis after 25.5 sessions. The treatment response of our study might be lower because of the lower median number of sessions.

In this study, almost half of the patients were obese (45.8%), and the median BMI was classified as overweight. More than half of the patients were hypertensive and had dyslipidemia. Furthermore, 37.5% of patients were on treatment for diabetes and 25% had been diagnosed with hyperuricemia. Previous studies have demonstrated a significantly increased risk of metabolic syndrome—which includes obesity, diabetes mellitus, hypertension, dyslipidemia, and cardiovascular disorder—in psoriasis patients.^{2,4,10,12,19,20} This increased occurrence of metabolic syndrome remained significant after adjusting for age, sex, race/ethnicity, smoking, and C-reactive protein levels and was also correlated positively with the psoriasis severity.¹⁷ Several studies have also reported an increased prevalence of nonalcoholic steatohepatitis among psoriasis patients, which we observed in 2 patients in the present study.^{2,8} Mallbris et al.²¹ reported a significant increase in LDL and apolipoprotein A-1 levels and a change in the cholesterol/triglyceride ratio in patients with psoriasis for less than 1 year compared to those in healthy controls. Psoriasis is a chronic inflammatory systemic disease mediated by various inflammatory cytokines, including tumor necrosis factor-alpha (TNF- α), adiponectin, leptin, and plasminogen activator inhibitor-1 (PAI-1), which play important roles in both psoriasis and metabolic syndrome.¹⁹ A review by Takahashi and Iizuka¹⁹ described the role of adiponectin, which is an adipocyte-specific secretory protein. Levels of adiponectin are decreased in obesity, insulin resistance, type 2 diabetes mellitus, and coronary artery disease. Moreover, low adiponectin levels showed increased risk towards the development of diabetes, hypertension, and dyslipidemia. Moreover, psoriasis patients with normal weight show decreased levels of adiponectin compared to healthy controls with normal weight. A study in Japanese reported low adiponectin levels in psoriasis patients, which was negatively correlated with psoriasis severity, blood TNF- α , and interleukin (IL)-6 levels. Angiotensin-converting enzyme (ACE) and renin activity are also reportedly increased in psoriasis patients,¹⁹ which explains the significantly higher prevalence of hy-

hypertension among psoriasis patients compared to that in patients with other dermatological diseases. Given the serious consequences for the coexistence of both psoriasis and metabolic syndrome, all patients diagnosed with psoriasis should be screened for metabolic syndrome. Additionally, Takeshita et al.²⁾ found that hypertension tended to be more severe and poorly controlled in psoriasis patients compared with patients without psoriasis. A meta-analysis also found a significantly greater reduction in PASI score among patients undergoing weight loss intervention than among those who did not.²⁾ Given that risk of comorbidities correlates positively with disease severity, the importance of compliance to both psoriasis and metabolic syndrome therapy needs to be emphasized to patients.

Besides metabolic syndrome, gingivitis/periodontitis was another prevalent comorbidity in our study. Previous studies have demonstrated an increased risk and incidence of periodontitis and gingivitis among psoriasis patients.^{22,23)} Another study also reported a higher incidence of psoriasis among patients with periodontitis.²⁴⁾ Furthermore, the number of comorbidities was higher in psoriasis or psoriatic arthritis patients who also had periodontitis.²³⁾ Further, patients with psoriatic arthritis or more severe psoriasis severity had more severe periodontitis.²²⁾ Although smoking is believed to be an important confounding factor for periodontitis, Egeberg et al.²³⁾ found that the risk of periodontitis persisted after adjusting for smoking. Unfortunately, we did not have data on the smoking behavior of our patients. The association between psoriasis and periodontitis was linked by the similarities in their underlying inflammatory and immunological processes. IL-17A is a crucial player in the pathogenesis of both diseases.^{22,23)} The bacterial microenvironment in periodontitis, which is dominated by *Porphyromonas gingivalis*, is believed to induce the production of IL-17A, a pro-inflammatory cytokine involved in tissue destruction and osteoclastogenesis.^{23,25)} *P. gingivalis* drives chronic inflammatory and tissue destruction processes and enters systemic circulation, on the basis of its detection at distant sites. Its antibodies were also present in the synovial fluid of patients with rheumatic arthritis and atheromas.²⁵⁾ Additionally, psoriasis patients had lower concentration and secretion rates of salivary immunoglobulin A (IgA) and lysozyme, which are important parts of the oral mucosal defense system, leading to an increased risk of oral infections.²⁶⁾ These findings emphasize the need for all psoriasis patients to undergo regular dental evaluations and receive education on how to maintain their oral health.

Consistent with the patients' comorbidities, besides antihistamines, the most common systemic medications consumed by the patients were antihypertensive drugs and statins. Some of our patients consumed photosensitizing medications, including statins,

methotrexate, NSAIDs, nifedipine, captopril, furosemide, and hydrochlorothiazide. Polypharmacy in geriatric patients might result in major problems because of degenerative changes that can affect drug pharmacokinetics and pharmacodynamics. Both adverse drug reactions and the risk of drug-drug interactions can be magnified.²⁷⁾ Thus, clinicians need to obtain detailed drug history and patients need to report any medication changes during their therapy. Furthermore, patients who take medications with photosensitizing properties need to be informed about the increased risk of side effects from phototherapy.

Another factor that should be considered is the exposure to certain medications that could elicit the induction of psoriasis. Beta-blockers, one of the antihypertensive drugs consumed by the patients in our study, are strongly associated with psoriasis. A prospective cohort study by Wu et al.²⁸⁾ found that beta-blockers were associated with an increased risk of psoriasis after regular use for 6 years or more. The pathogenesis by which beta-blockers provoke psoriasis is associated with the blockade of beta-adrenergic receptors.²⁹⁾ Moreover, the association between hypertension and psoriasis is likely induced by beta-blockers.²⁸⁾ In addition to beta-blockers, Cohen et al.³⁰⁾ found that calcium channel blocker (CCB) was associated with the precipitation of new-onset psoriasis. Furthermore, CCB was also associated with the exacerbation of psoriasis.³⁰⁾ However, the patients in the previous studies did not receive NB-UVB phototherapy for their psoriasis. In the current study, about 50% of our patients took beta-blockers and CCB. Unfortunately, their medical record did not document whether psoriasis had occurred after consuming beta-blockers or data on CCB.

The limitation of this study is its retrospective study design because of which some data are incomplete. In addition, the sample size was very small, which may not be representative of the general population and not comparable to the outcomes of other studies. We had tried to increase the number of patients in our study. However, we had difficulties to access the data as it becomes limited and restricted. Hence, we were unable to review the distribution of comorbidities in older patients with diseases other than psoriasis. In addition, we did not assess the characteristics of patients with milder disease severity for comparison, and we lacked data on patient quality of life, which is commonly implicated in geriatric patients. The advantages of this study are that few other studies have evaluated the sociodemographic and clinical characteristics of geriatric patients with skin diseases and this is the first study conducted specifically on patients receiving NB-UVB phototherapy, which is commonly administered to patients with higher severe disease severity.

In conclusion, this study evaluated the sociodemographic and clinical characteristics of geriatric patients with psoriasis treated

with NB-UVB phototherapy. Psoriasis is associated with comorbidities including metabolic syndrome and periodontitis, which warrant increased clinician vigilance in the screening and evaluation of these diseases. The data from this study could help physicians to evaluate and make appropriate clinical decisions when managing psoriasis patients in this age group.

ACKNOWLEDGMENTS

CONFLICT OF INTEREST

The researchers claim no conflicts of interest.

AUTHOR CONTRIBUTIONS

Conceptualization, LL, RA, SNY, VC; Data curation, LL, RA, SNY, VC; Formal analysis, VC; Investigation, LL, RA, SNY, VC; Methodology, LL, RA, SNY; Project administration, LL; Resources, LL, VC; Supervision, LL; Writing-original draft, LL, VC; Writing-review & editing, LL, RA, SNY.

REFERENCES

1. Yosipovitch G, Tang MB. Practical management of psoriasis in the elderly: epidemiology, clinical aspects, quality of life, patient education and treatment options. *Drugs Aging* 2002;19:847-63.
2. Takeshita J, Grewal S, Langan SM, Mehta NN, Ogdie A, Van Voorhees AS, et al. Psoriasis and comorbid diseases: implications for management. *J Am Acad Dermatol* 2017;76:393-403.
3. Parisi R, Symmons DP, Griffiths CE; Ashcroft DM; Identification and Management of Psoriasis and Associated Comorbidity (IMPACT) project team. Global epidemiology of psoriasis: a systematic review of incidence and prevalence. *J Invest Dermatol* 2013;133:377-85.
4. Lee JY, Kang S, Park JS, Jo SJ. Prevalence of psoriasis in Korea: a population-based epidemiological study using the Korean National Health Insurance database. *Ann Dermatol* 2017;29:761-7.
5. Phan C, Sigal ML, Esteve E, Reguiai Z, Barthelemy H, Beneton N, et al. Psoriasis in the elderly: epidemiological and clinical aspects, and evaluation of patients with very late onset psoriasis. *J Eur Acad Dermatol Venereol* 2016;30:78-82.
6. Potts GA, Hurley MY. Psoriasis in the geriatric population. *Clin Geriatr Med* 2013;29:373-95.
7. Kim JK, Bae IH, Kim MS, Choi H, Na CH, Shin BS. A study of skin disease of the external ear in older adults according to anatomical location. *Ann Geriatr Med Res* 2018;22:88-93.
8. Yamauchi PS. Psoriasis and aging. In: Farage MA, Miller KW, Maibach HI, editors. *Textbook of aging skin*. Heidelberg, Germany: Springer; 2017.
9. Kwon HH, Kwon IH, Youn JI. Clinical study of psoriasis occurring over the age of 60 years: is elderly-onset psoriasis a distinct subtype? *Int J Dermatol* 2012;51:53-8.
10. Mohd Affandi A, Khan I, Ngah Saaya N. Epidemiology and clinical features of adult patients with psoriasis in Malaysia: 10-year review from the Malaysian Psoriasis Registry (2007-2016). *Dermatol Res Pract* 2018;2018:4371471.
11. Kassi K, Djeha D, Gbery IP, Kouame K, Sangare A. Psoriasis in elderly patients in the Côte d'Ivoire: socio-demographic, clinical, and therapeutic aspects, and follow-up. *Int J Dermatol* 2016;55:e83-6.
12. Tsai TF, Wang TS, Hung ST, Tsai PI, Schenkel B, Zhang M, et al. Epidemiology and comorbidities of psoriasis patients in a national database in Taiwan. *J Dermatol Sci* 2011;63:40-6.
13. Chen K, Wang G, Jin H, Xu J, Zhu X, Zheng M, et al. Clinic characteristics of psoriasis in China: a nationwide survey in over 12000 patients. *Oncotarget* 2017;8:46381-9.
14. Strober B, Karki C, Mason M, Guo N, Holmgren SH, Greenberg JD, et al. Characterization of disease burden, comorbidities, and treatment use in a large, US-based cohort: results from the Corona Psoriasis Registry. *J Am Acad Dermatol* 2018;78:323-32.
15. Chang YT, Chen TJ, Liu PC, Chen YC, Chen YJ, Huang YL, et al. Epidemiological study of psoriasis in the national health insurance database in Taiwan. *Acta Derm Venereol* 2009;89:262-6.
16. Suseno LS, Sukma PM, Rihatmadja R, Agustin T, Rahmayunita G, Novianto E. Profile of vitiligo patients and distribution of narrowband-UVB therapy at dr. Cipto Mangunkusumo General Hospital. *J Gen Proced Dermatol Venereol Indones* 2018;3:29-33.
17. Yones SS, Palmer RA, Garibaldinos TT, Hawk JL. Randomized double-blind trial of the treatment of chronic plaque psoriasis: efficacy of psoralen-UV-A therapy vs narrowband UV-B therapy. *Arch Dermatol* 2006;142:836-42.
18. Markham T, Rogers S, Collins P. Narrowband UV-B (TL-01) phototherapy vs oral 8-methoxypsoralen psoralen-UV-A for the treatment of chronic plaque psoriasis. *Arch Dermatol* 2003;139:325-8.
19. Takahashi H, Iizuka H. Psoriasis and metabolic syndrome. *J Dermatol* 2012;39:212-8.
20. Shah K, Mellars L, Changolkar A, Feldman SR. Real-world burden of comorbidities in US patients with psoriasis. *J Am Acad Dermatol* 2017;77:287-292. e4.
21. Mallbris L, Granath F, Hamsten A, Stahle M. Psoriasis is associated with lipid abnormalities at the onset of skin disease. *J Am Acad Dermatol* 2006;54:614-21.
22. Su NY, Huang JY, Hu CJ, Yu HC, Chang YC. Increased risk of periodontitis in patients with psoriatic disease: a nationwide

- population-based retrospective cohort study. *PeerJ* 2017;5:e4064.
23. Egeberg A, Mallbris L, Gislason G, Hansen PR, Mrowietz U. Risk of periodontitis in patients with psoriasis and psoriatic arthritis. *J Eur Acad Dermatol Venereol* 2017;31:288-93.
 24. Keller JJ, Lin HC. The effects of chronic periodontitis and its treatment on the subsequent risk of psoriasis. *Br J Dermatol* 2012;167:1338-44.
 25. Moutsopoulos NM, Kling HM, Angelov N, Jin W, Palmer RJ, Nares S, et al. *Porphyromonas gingivalis* promotes Th17 inducing pathways in chronic periodontitis. *J Autoimmun* 2012;39:294-303.
 26. Ganzetti G, Campanati A, Santarelli A, Pozzi V, Molinelli E, Minnetti I, et al. Periodontal disease: an oral manifestation of psoriasis or an occasional finding? *Drug Dev Res* 2014;75 Suppl 1:S46-9.
 27. Kostovic K, Zuzul K, Ceovic R, Bukvic Mokos Z. Psoriasis in the mature patient: therapeutic approach in the era of biologics. *Clin Dermatol* 2018;36:222-30.
 28. Wu S, Han J, Li WQ, Qureshi AA. Hypertension, antihypertensive medication use, and risk of psoriasis. *JAMA Dermatol* 2014;150:957-63.
 29. Fry L, Baker BS. Triggering psoriasis: the role of infections and medications. *Clin Dermatol* 2007;25:606-15.
 30. Cohen AD, Kagen M, Friger M, Halevy S. Calcium channel blockers intake and psoriasis: a case-control study. *Acta Derm Venereol* 2001;81:347-9.