Cross-sectional Study

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# Prevalence and clinical characteristics of pruritus, and the factors significantly associated with high pruritic intensity in patients with psoriasis: a cross-sectional study

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**Background:** Despite the significant prevalence of pruritus in psoriasis, its pathogenesis remains unknown, and research on pruritus in Thai psoriasis patients is limited.

**Objectives:** The objective was to investigate the prevalence and clinical characteristics of pruritus, and the factors significantly associated with high pruritic intensity in Thai psoriasis patients.

**Material and methods:** In a cross-sectional study design, pruritus data were collected from the medical records of patients who attended an outpatient psoriasis clinic in Thailand between 2020 and 2021.

**Results:** The overall prevalence of pruritus was 81.2% among 314 psoriasis patients. Psoriasis patients with pruritus had higher Psoriasis Area Severity Index and Dermatology Life Quality Index scores than those without pruritus. The legs, back, arms, and scalp were the most common areas for pruritus. Pruritus was relieved with topical emollients, topical corticosteroids, and oral antihistamines in 66.3, 63.1, and 52.9% of patients, respectively. Female sex, psoriasis body surface area greater than or equal to 10%, and genital psoriasis were factors that independently predicted high pruritus intensity.

**Conclusion:** Psoriasis patients should be screened and treated for pruritus to improve both psoriasis treatment outcomes and patient quality of life. Further studies are needed to clarify the most effective medications for pruritus in patients with severe psoriasis.

**Keywords:** clinical characteristics, prevalence, pruritic intensity, pruritus, psoriasis

## Introduction

Psoriasis is a common chronic immune-mediated inflammatory disease[1]. The prevalence of psoriasis in adults was reported to vary from 0.91–8.5%[2]. Pruritus is a clinically important symptom of psoriasis, and it presents in 64–98% of psoriasis patients[3–5]. Psoriasis has been linked to several comorbidities, and these comorbidities may also contribute to triggering, maintaining, or even worsening psoriasis-related pruritus. Controlling pruritus in psoriasis helps to prevent the Köebner phenomenon and a worsening of psoriatic lesions. Despite our improved understanding of the pathogenesis of psoriasis, the mechanism of psoriasis-related pruritus remains unclear. The molecular mechanism of psoriatic pruritus was reported to be the result of a complex interaction among the neuroendocrine, immune, and vascular systems that results in neurogenic inflammation[6,7]. Various molecular factors have been associated with pruritus in psoriasis, such as nerve growth factor, substance *P*, and calcitonin gene-related peptide. Moreover, vascular endothelial growth factor[8] and overexpression of the transient receptor potential cation channel subfamily V member 1 gene were reported to be correlated with high pruritus intensity in psoriasis[9].

In patients with mild or severe psoriasis, pruritus is a significant psoriasis symptom that affects quality of life[10]. However, no single antipruritic therapy has yet been identified or developed that effectively treats psoriasis-related pruritus[6]. Since psoriasis remission is typically accompanied with relief

### HIGHLIGHTS

- Pruritus is a significant psoriasis symptom that has a negative impact on a patient's quality of life.
- The overall prevalence of pruritus was 81.2%. Psoriasis patients with pruritus had higher Psoriasis Area Severity Index and Dermatology Life Quality Index scores than those without pruritus.
- Female sex, psoriasis body surface area greater than or equal to 10%, and genital psoriasis were factors that independently predicted high pruritus intensity.

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from pruritus, the goal of treatment for psoriasis-related pruritus should be the clearance of skin lesions. Previous studies reported anti-interleukin (IL)-17, IL-12/23, IL-23, adalimumab, apremilast, and ultraviolet B phototherapy to be effective for reducing pruritus in psoriasis[11–13].

In the past, pruritus was considered to be less significant than other psoriasis symptoms including rash and scaling. To improve our understanding of the scope and importance of pruritus in psoriasis, we set forth to investigate the prevalence and clinical characteristics of pruritus, and the factors significantly associated with high pruritic intensity in Thai psoriasis patients.

## Materials and methods

This study has been reported in line with the strengthening the reporting of cohort, cross-sectional and case-control studies in surgery (STROCSS) criteria[14]. This is a cross-sectional study conducted at the department of Dermatology, Faculty of Medicine Siriraj Hospital, Bangkok, Thailand. Enrollment was limited to any adult patients (18 years or older) who were diagnosed as psoriasis at our center's outpatient psoriasis clinic between April 2020 and October 2021. Patient data were collected from our clinic's electronic medical record system. Patients having renal, hepatic, or other dermatological illnesses that cause pruritus were excluded. All collected patient data were anonymized to protect patient confidentiality. The protocol for this study was approved by the Ethics Committee of Siriraj Institutional Review Board, Faculty of Medicine Siriraj Hospital (COA no. 775/2020) that was compatible with the Declaration of Helsinki. Informed verbal consent was obtained from all participants. All methods were performed in accordance with the relevant guidelines and regulations. (UIN no. researchregistry 8720)

For multivariable binary logistic regression, we used the 'rule of thumb' method, which requires at least 10 events per variable. Sex, body mass index, smoking, Psoriasis Area and Severity Index (PASI) score, time before rash, and history of psoriatic arthritis are the six characteristics (six variables) that influence pruritus in psoriasis patients, according to prior research[15,16]. The sample size for no-pruritus should be 60 patients. A pilot investigation at our institution discovered that around 30% of psoriasis patients did not have pruritus. A 10% reserve was set aside to accommodate for possible incomplete data, resulting in a total sample size of at least 223 patients[17]. The patient recruitment procedure will be carried out until the target sample size is achieved. A total of 314 people were recruited for the study, and they were separated into two groups: those with pruritus (255 patients) and those without pruritus (59 patients).

Collected data included demographics (age at entry, sex, marital status); lifestyle habits (smoking, alcohol consumption); body mass index; history of comorbidities, including psoriatic arthritis; severity of psoriasis, including PASI and body surface area (BSA); previous and current oral systemic treatments (methotrexate, acitretin, and cyclosporine), phototherapy, and biologics (etanercept, infliximab, ustekinumab, secukinumab, ixekizumab, brodalumab, and guselkumab). Previous treatment was defined as 'Yes' if patients had previously used systemic treatment at any time point or were currently using it. The Dermatology Life Quality Index (DLQI) was used to assess quality of life. Kulthanan et al.[18] translated and validated the DLQI questionnaire into Thai language. Additional pruritus-specific data were also collected, such as the location of the pruritus, aggravating factors, relieving factors, and the impact of the pruritus on work, sleep, and daily life. Participants verbally self-reported the severity of their pruritus the previous week using a numeric rating scale (NRS) ranging from 0 (no pruritus) to 10 (the worst imaginable pruritus). The primary objective of this study was to evaluate the prevalence and clinical characteristics of pruritus in Thai psoriasis patients, and the secondary objective was to identify factors that were significantly associated with high pruritic intensity.

### *Statistical analysis*

Patient demographics and clinical characteristics were summarized using descriptive statistics. Categorical variables were compared using the $\chi^2$-test or Fisher's exact test, and the results are given as number and percentage. Continuous data were compared using Student's *t*-test and Mann–Whitney *U* test for normally distributed and non-normally distributed data, respectively. The results of those comparisons are presented as mean plus/minus SD and median and interquartile range (IQR) for normally and non-normally distributed continuous data, respectively. Mann–Whitney *U* test and Kruskal–Wallis test was used to assess differences in the distribution of pruritus intensity across dichotomous variables and categorical variables with three or more categories, respectively. All factors with a *P*-value <0.1 in univariate analysis were evaluated for inclusion in multivariate linear regression analysis. The results of multivariate analysis are shown as the coefficient plus/minus standard error. A *P*-value of <0.05 was considered statistically significant for all tests. All statistical analyses were performed using SPSS Statistics version18.0 (SPSS, Inc.; IBM Corporation).

## Results

This study included 314 patients (mean age 47.8 ± 15.0 years, female sex 51.6%). The majority of the patients had plaque psoriasis. Pruritus was present in 81.2% of patients (255), with women being more likely than males to have it. The majority of psoriasis patients with pruritus (78%) had a PASI score of less than 10. The median BSA was 5.0%. (IQR: 2–12). The median DLQI in all psoriasis patients was 6. (IQR: 2–13). The demographic and clinical parameters of all psoriatic patients with and without pruritus are compared in Table 1. There was no statistically significant difference between groups in demographics or clinical features. However, the median PASI score in the pruritus group was substantially higher than in the nonpruritus group (4.7 [IQR: 2.7–8.9 vs. 3.8 [IQR: 1.2–5.8], $P = 0.014$). Also, the pruritus group had significantly higher DLQI than the nonpruritus group (8 [IQR: 2–14 vs. 3 [IQR: 0.75–8], $P = 0.001$).

Our study comprised 51 patients who had previously or currently received biologics including etanercept, infliximab, ustekinumab, secukinumab, ixekinumab, brodalumab, and guselkumab. This group's average PASI score was 4.3. (median, IQR 1.2–9.6, range 0–23). Secukinumab was the most commonly used biologic ($n = 12$, 34%) among the 35 patients, followed by etanercept ($n = 8$, 23%), infliximab ($n = 7$, 20%), ixekinumab ($n = 4$, 11%), brodalumab ($n = 3$, 9%), and guselkumab ($n = 1$, 3%). According to univariate analysis, biologics improve the control of psoriatic

**Table 1**

**Demographics and clinical characteristics of all psoriasis patients, and compared between those with and without pruritus**

| Characteristics | Total ($n=314$) | With pruritus ($n=255$) | Without pruritus ($n=59$) | *P* |
|---|---|---|---|---|
| Age (years), mean ± SD | 47.8 ± 15.0 | 47.5 ± 15.2 | 48.9 ± 14.3 | 0.420 |
| Sex, *n* (%) | | | | |
| Male | 152 (48.4%) | 117 (45.9%) | 35 (59.3%) | 0.063 |
| Female | 162 (51.6%) | 138 (54.1%) | 24 (40.7%) | |
| Type of psoriasis, *n* (%) | | | | |
| Plaque | 280 (89.2%) | 226 (88.6%) | 54 (91.5%) | 0.519 |
| Pustular | 17 (5.4%) | 12 (4.7%) | 5 (8.5%) | 0.333 |
| Guttate | 23 (7.3%) | 19 (7.5%) | 4 (6.8%) | 1.000 |
| Erythroderma | 13 (4.1%) | 10 (3.9%) | 3 (5.1%) | 0.716 |
| PASI score, median (IQR) | 4.5 (2.5–8.1) | 4.7 (2.7–8.9) | 3.8 (1.2–5.8) | ***0.014*** |
| Body surface area (%), median (IQR) | 5 (2–10) | 5.0 (2–12) | 4.0 (1–10) | 0.087 |
| BMI (kg/m$^2$), mean ± SD | 25.2 ± 5.5 | 26.0 ± 5.6 | 25.9 ± 5.3 | 0.442 |
| Dermatology Life Quality Index, median (IQR) | 6 (2–13) | 8 (2–14) | 3 (0.75–8) | ***0.001*** |
| Psoriatic arthritis, *n* (%) | | | | |
| Yes | 82 (26.1%) | 66 (25.9%) | 16 (27.1%) | 0.850 |
| No | 232 (73.9%) | 189 (74.1%) | 43 (72.9%) | |
| Metabolic disease, *n* (%) | | | | |
| Yes | 115 (36.6%) | 88 (34.5%) | 27 (45.8%) | 0.106 |
| No | 199 (63.4%) | 167 (65.5%) | 32 (54.2%) | |
| Previous NBUVB, *n* (%) | | | | |
| Yes | 97 (30.9%) | 76 (29.8%) | 21 (35.6%) | 0.386 |
| No | 217 (69.1%) | 179 (70.2%) | 38 (64.4%) | |
| Previous PUVA, *n* (%) | | | | |
| Yes | 38 (12.1%) | 31 (12.2%) | 7 (11.9%) | 0.951 |
| No | 276 (87.9%) | 224 (71.3%) | 52 (88.1%) | |
| Previous systemic therapy, *n* (%) | | | | |
| Yes | 248 (79.0%) | 202 (79.2%) | 46 (78.0%) | 0.832 |
| No | 66 (21.0%) | 53 (20.8%) | 13 (22.0%) | |
| Previous biologics, *n* (%) | | | | |
| Yes | 51 (16.2%) | 38 (14.9%) | 13 (22.0%) | 0.181 |
| No | 263 (83.8%) | 217 (85.1%) | 46 (78.0%) | |

A, *P*-value ≤ 0.05 indicates statistical significance.

All bold values have statistical significance.

B, PUVA, psoralen plus ultraviolet A; IQR, interquartile range; NBUVB, narrowband ultraviolet; PASI score, Psoriasis Area and Severity Index score.

**Table 2**

**Clinical characteristics of pruritus in psoriasis patients with pruritus**

| Characteristics of pruritus | ($n=255$) |
|---|---|
| Type of pruritus (lesional/nonlesional), *n* (%) | |
| Lesional | 213 (83.5%) |
| Nonlesional | 7 (2.7%) |
| Lesional and nonlesional | 35 (13.7%) |
| Pruritus score (numeric rating scale 0–10) | |
| Mild (1–3) | 135 (52.9%) |
| Moderate (4–6) | 76 (29.8%) |
| Severe (7–10) | 43 (16.9%) |
| Pruritus score (0–10), mean ± SD | 3.6 ± 2.9 |
| Most pruritus score (0–10), mean ± SD | 7.9 ± 2.3 |
| Duration of pruritus, *n* (%) | |
| Persistent | 18 (7.1%) |
| Intermittent | 236 (92.5%) |
| Pruritus site, *n* (%) | |
| Leg | 173 (67.8%) |
| Back | 145 (56.9%) |
| Arm | 129 (50.6%) |
| Scalp | 128 (50.2%) |
| Chest | 83 (32.5%) |
| Face | 51 (20.0%) |
| Feet | 47 (18.4%) |
| Hands | 47 (18.4%) |
| Flexural | 46 (18.0%) |
| Genitalia | 17 (6.7%) |
| Nail | 10 (3.9%) |
| Aggravating factors of pruritus, *n* (%) | |
| Skin dryness | 163 (63.9%) |
| Sweating | 119 (46.7%) |
| Stress | 113 (44.3%) |
| Hot weather | 113 (44.3%) |
| Cold weather | 92 (36.1%) |
| Sunlight | 69 (27.1%) |
| Seafood | 40 (15.7%) |
| Fermented food | 25 (9.8%) |
| Others | 28 (11.0%) |
| Relieving factors of pruritus, *n* (%) | |
| Topical emollient | 169 (66.3%) |
| Topical steroid | 161 (63.1%) |
| Oral antihistamine | 135 (52.9%) |
| Sleep | 104 (40.8%) |
| Cold shower | 60 (23.5%) |
| Cold weather | 35 (13.7%) |
| Topical vitamin D analog | 11 (4.3%) |
| Sunlight | 10 (3.9%) |
| Hot weather | 9 (3.5%) |
| Topical calcineurin inhibitors | 6 (2.4%) |
| Others | 21 (8.2%) |

skin plaques and pruritus, although the difference between the pruritus and nonpruritic groups is not statistically significant.

The clinical characteristics of pruritus in psoriasis patients with pruritus are shown in Table 2. Most patients reported pruritus on psoriasis lesions (83.5%). The mean pruritus intensity score based on a 0–10 NRS was 3.6 ± 2.9 points, and the mean highest pruritus score was 7.9 ± 2.3 points. The vast majority of patients had intermittent pruritus 236 (92.5%), and there was no specific time point of pruritus onset in 144 patients (56.5%). Almost all occurrences of pruritus (88.6%) appear after the development of the rash. The legs were the most commonly affected area (67.8%), followed by the back (56.9%), arms (50.6%), and scalp (50.2%). The four most common causes of pruritus aggravation were skin dryness (63.9%), sweating (46.7%), stress (44.3%), and hot weather (44.3%). The four most commonly reported treatments for pruritus were topical emollients (66.3%), topical corticosteroids (63.1%), oral antihistamines (52.9%), and sleep (40.8%). 45.1% of pruritus patients reported that the negative impacts of their itch were distressing, and 42.7% reported that their itch was so disturbing that it interfered with their sleep.

According to a univariate analysis, female sex, PASI score greater than or equal to 10, BSA greater than or equal to 10%, plaque type psoriasis, and psoriasis on the scalp, face, hands, or genitalia were all significantly associated with high pruritus intensity. Base on the findings of multivariate analysis, the presence of genital psoriasis, BSA greater than or equal to 10%, and female sex are all independent predictors of high pruritus intensity (Table 3).

**Table 3**

**Univariate and multivariate analysis for factors independently associated with high pruritus intensity in psoriatic patients with pruritus**

| | Univariate analysis | | Multivariate analysis | |
|---|---|---|---|---|
| **Patients ($n=255$)** | **Pruritus score median (IQR)** | ***P*** | **Coefficient ± standard error** | ***P*** |
| Age (years) | | | | |
| 18–29 | 3 (1–5) | 0.781 | N/A | N/A |
| 30–44 | 3 (1–5) | | | |
| 45–59 | 3.5 (1–6) | | | |
| ≥ 60 | 3 (0–5) | | | |
| Sex | | | | |
| Male | 3 (1–5) | ***0.010*** | 1 | ***0.012*** |
| Female | 4 (1–6) | | 0.89 ± 0.36 | |
| BMI (kg/m$^2$) | | | | |
| < 20 | 4 (2–6) | 0.233 | N/A | N/A |
| 20–24.9 | 3 (1–5) | | | |
| 25–29.9 | 4 (1–6) | | | |
| ≥ 30 | 2 (1–5) | | | |
| PASI score | | | | |
| < 10 | 3 (1–5) | ***0.003*** | 1 | |
| 10–19 | 5 (3–7) | | 0.13 ± 0.570 | 0.826 |
| ≥ 20 | 5 (3–7) | | 0.17 ± 0.91 | 0.849 |
| Body surface area (%) | | | | |
| < 10 | 3 (0–5) | < ***0.001*** | 1 | ***0.003*** |
| ≥ 10 | 5 (3–7) | | 1.38 ± 0.47 | |
| Psoriatic arthritis | | | | |
| Yes | 3 (1–5.5) | 0.795 | N/A | N/A |
| No | 3 (1–5) | | | |
| Metabolic disease | | | | |
| Yes | 3 (1–5) | 0.398 | N/A | N/A |
| No | 3 (1–5) | | | |
| Type of psoriasis | | | | |
| Plaque | | | | |
| Yes | 3 (1–5) | ***0.020*** | 1.02 ± 0.63 | 0.106 |
| No | 5 (3–7) | | | |
| Pustular | | | | |
| Yes | 3 (0–3) | 0.070 | N/A | N/A |
| No | 3 (1–5) | | | |
| Guttate | | | | |
| Yes | 3 (0–7) | 0.831 | N/A | N/A |
| No | 3 (1–5) | | | |
| Erythroderma | | | | |
| Yes | 5 (2.5–8) | 0.109 | N/A | N/A |
| No | 3 (1–5) | | | |
| Location of psoriasis | | | | |
| Scalp | | | | |
| Yes | 3 (0–5) | ***0.046*** | 0.45 ± 0.45 | 0.312 |
| No | 2.5 (1–6) | | | |
| Face | | | | |
| Yes | 5 (2–6) | < ***0.001*** | 0.57 ± 0.39 | 0.142 |
| No | 3 (0–5) | | | |
| Flexural | | | | |
| Yes | 3 (1–6) | 0.736 | N/A | N/A |
| No | 3 (1–5) | | | |
| Genitalia | | | | |
| Yes | 3 (4–8) | < ***0.001*** | 1.36 ± 0.57 | ***0.024*** |
| No | 6 (1–5) | | | |
| Hands | | | | |
| Yes | 5 (1–7) | ***0.002*** | 0.31 ± 0.40 | 0.441 |
| No | 3 (1–5) | | | |
| Nail | | | | |
| Yes | 3 (1–5) | 0.999 | N/A | N/A |
| No | 3 (1–6) | | | |
| Previous systemic therapy | | | | |
| Yes | 3 (1–5) | 0.423 | N/A | N/A |
| No | 4 (1–6) | | | |

**Table 3**

**(*Continued*)**

| | Univariate analysis | | Multivariate analysis | |
|---|---|---|---|---|
| **Patients ($n = 255$)** | **Pruritus score median (IQR)** | ***P*** | **Coefficient ± standard error** | ***P*** |
| Previous biologics | | | | |
| Yes | 4 (1–5.5) | 0.556 | N/A | N/A |
| No | 3 (1–5) | | | |

A *P*-value ≤ 0.05 indicates statistical significance.
All bold values have statistical significance.
IQR, interquartile range; N/A, not applicable; PASI score, Psoriasis Area and Severity Index score.

## Discussion

The prevalence of pruritus in Thai psoriasis patients was 81.2% in this study. The majority of the patients in our study had mild pruritus (NRS 1-3), with a mean pruritus score of 3.6 out of 10. Our high prevalence of pruritus in psoriasis is comparable to previously reported rates of 84–96%[3,4,19,20]. Our data also demonstrated that pruritus correlates with the higher score of PASI, which is in line with findings from Australia and Turkey[16,19]. Besides the fact that the majority of patients in our study had a PASI score of less than 10. However, we discovered that patients with pruritus had a significant influence on quality of life, as measured by a higher DLQI score. This is consistent with Mrowietz *et al.*[4] findings that the DLQI score was considerably higher in patients with severe pruritus. There were no statistically significant differences in the demographics and clinical parameters of psoriasis patients with and without pruritus. Bahali *et al.*[19] reported no significant associations between pruritus and age, clinical type of disease, or presence of systemic disease, which is similar to our findings.

The majority of the current study's subjects felt itching on their psoriatic lesions. Only 2.7% of patients reported pruritus on nonpsoriatic skin. This is due to the fact that normal-looking skin is actually in a state of transition between healthy and lesional skin. Pruritogenic mediators include neurogenic tissue innervation and changes to the epidermal barrier, keratinocytes, innate and adaptive immunological responses, and the microbiota, which are involved in disease progression due to an iterative itch-scratch cycle[21]. Pruritus tended to occur intermittently without a specific time of commencement, but tended to occur in the evening and nighttime, as Yosipovitch *et al.* reported[3]. Although psoriasis patients can have pruritus anywhere on their bodies, the legs, back, arms, and scalp were the four most commonly reported locations of pruritus in our study. According to Yosipovitch *et al.*, the most usually affected areas are the back (82%), legs (75%), arms (58%), buttocks (45%), and abdomen (40%). This can be explained by the fact that pruritus on the legs and/or scalp has been found to be prevalent in patients with recalcitrant psoriasis[16]. Unpredictable pruritus and pruritus in recalcitrant areas can have a significant negative impact on patient quality of life.

In this study, 35/314 patients had genital psoriasis, representing for 11.2% of the total, while 6.7% (17/255 patients) of pruritus patients had genital pruritus. Meeuwis *et al.*[22] reported a prevalence of genital psoriasis of 29–40% in psoriatic individuals in a systematic review. Also, 86% of patients identified pruritus as the most common symptom of genital/perianal psoriasis[23]. This significant finding emphasizes the need of clinicians inquiring about genital involvement because many patients may not feel comfortable willingly disclosing this sensitive information.

According to our findings, skin dryness is the most common aggravating factor of pruritus, followed by sweating, stress, and hot weather. Pruritus in dry skin is caused by changes in the structure of the stratum corneum as well as anomalies in proliferation, keratinization, surface lipid, water metabolism, pH, and cytokine levels. Another known mechanism of pruritus is the stimulation of nerve fiber development in dry skin[24]. Takamori, *et al.*[25] reported that dry skin has a high density of intraepidermal fibers. These reported findings correlate with the relieving factors of emollient, sleep, and a cold shower. Interestingly, both hot and cold weather can aggravate pruritus. Yosipovitch, *et al.*[3] reported the important daily factors that exacerbate pruritus to be ambient heat, skin dryness, sweating, and stress, while the important factors that were found to relieve itch were sleep and a cold shower.

Female sex, PASI score ≥ 10, BSA ≥ 10%, plaque type psoriasis, and psoriasis on the scalp, face, hands, or genitalia were found to be variables substantially associated with high pruritus intensity in our univariate analysis. Following multivariate analysis, female sex, BSA ≥ 10%, and genital psoriasis were found to be independently associated with high pruritus intensity. Similarly, Bahali *et al.* and Murer *et al.* found that pruritus was more prevalent in female psoriasis patients than in male psoriasis patients[19,26]. Amatya *et al.*[27] and Sampogna *et al.*[28] have shown an increased incidence of intensity, heat, pain, stinging, tickling, and crawling sensations in female. A recent study on the neurophysiological findings of pruritus transmission found that women have a higher incidence of neuropathic pruritus, we can speculate that the increased pruritus observed in female patients reflects a higher involvement of C-mechanosensitive or A-delta fibers[29]. Our research found an association between BSA greater than 10% and high pruritus intensity. Several earlier investigations have demonstrated that neurogenic inflammation and increased nerve density in psoriatic skin are associated to itch intensity[30–32]. However, based on multivariate analysis, our study identified no significant association between PASI score and high pruritus intensity, which is consistent with one earlier study[33]. This finding could be explained by the fact that the majority of patients in our study had a PASI score less than 10.

The genitalia were found to be significantly associated with high pruritus intensity. Variation in the density of nerve innervation and the distribution of various pruritic mediators of the skin in different parts of the body could have affected the different perception of pruritus, including the distribution of various pruritic mediators[34]. A recent study shown that pruritus is a complex nociceptive response that is present at all mucosal sites

regions such as genitalia where the mucosal surfaces meet the external epithelium. These serve an evolutionary benefit to having highly developed sensory mechanisms in these areas, with an increased capacity for inflammation and pruritus[35].

The pathogenesis of psoriasis and pruritus is not yet fully understood and is thought to be influenced by several cytokines, such as nerve growth factor, substance *P*, calcitonin gene-related peptide, and vascular endothelial growth factor, as well as overexpression of the transient receptor potential cation channel subfamily V member 1 gene. Further research is needed to better understand the mechanisms underlying these conditions. The overarching goal of antipruritic therapy should be the resolution of skin lesions[6]. In this study, no single psoriasis treatment was found to significantly improve psoriasis when compared between the pruritus and nonpruritus groups. The treatments that showed the most benefit for treating psoriasis were emollients, topical corticosteroids, and antihistamines. In previous studies, phototherapy promoted pruritus relief in 25–50% of patients[3,27,36]. Domagala, *et al.*[37] reported antihistamines to be effective for reducing pruritus in patients with psoriasis. A study from Italy reported that various emollients, topical corticosteroids, and calcipotriol cream could relive pruritus[38]. Treatment with apremilast or biologics, like etanercept, secukinumab, adalimumab, ixekizumab, and brodalumab, was reported to be beneficial for reducing itch intensity[5,39].

### *Limitations*

This study has some mentionable limitations. First, our study has a cross-sectional design, which has the inherent weaknesses of missing or incomplete data and a vulnerability to certain biases. Second, the sample size was relatively small and most patients had a PASI score less than 10. These factors may have limited the statistical power of our study to identify all statistically significant differences and associations. Third, the patients enrolled in this study were recruited from a single center, which also happens to be a national tertiary referral center. As such, the findings of our study may not be immediately generalizable to other care settings. Fourth and last, our study included patients that were being treated for psoriasis and related symptoms. These treatments would be expected to decrease psoriasis severity and itch as well as other psoriasis-related symptoms, and this may have adversely influenced our results.

## Conclusion

The prevalence of pruritus in psoriasis was 81.2%, and female sex, psoriasis BSA greater than 10%, and genital psoriasis were the variables that independently predicted high pruritus intensity. Further studies are needed to clarify the most effective medications for pruritus in patients with severe psoriasis. To enhance the effectiveness of psoriasis treatment and patient quality of life, pruritus should be assessed in psoriasis patients and treated appropriately.

## Ethical approval

This study was reviewed and approved by the Ethics Committee of Siriraj Institutional Review Board (SIRB), Faculty of Medicine, Siriraj Hospital (COA no. 775/2020).

## Consent

NA.


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This was an unfunded study.


## Author contribution

All authors made substantial contribution to this work.

## Conflicts of interest disclosures

All authors declare no personal or professional conflicts of interest relating to any aspect of this study.

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