ORIGINAL ARTICLE

Keratosis Pilaris: Clinical Features, Clinical Course, and Treatment Satisfaction in Thai Patients

Yodmanee Chiawsirikajorn, MD[1], Atchara Aswapat, MD[1], Nicha Jenmanachaiyakun, MD[1]

[1] Skin Clinic, Faculty of Medicine, Pranangklao Hospital, Bang Krasaw, Nonthaburi, Thailand

Background: Keratosis pilaris (KP) is a chronic, occasionally relapsing skin disease that has long-term physical and mental health impacts in Thai patients.

Objective: To study skin rash characters, clinical course, treatment satisfaction, and quality of life in Thai patients with KP.

Materials and Methods: Patients were recruited at the skin clinic of a 700-bed regional hospital between July 2020 and December 2021. Clinical presentation and course were recorded at enrollment. Dermatologist thoroughly examined the cutaneous lesions. Patients answered the Thai version of the Dermatology Life Quality Index (DLQI) questionnaire at enrollment and then, recorded treatment satisfaction and response to the same DLQI questionnaire at one and three months after receiving the standard treatment. The present study was approved by the IRB, Pranangklao Hospital (code ID 6206).

Results: One hundred sixty-four KP patients with 69.5% female, completed the present study. Patients visited skin clinic due to rash of KP at enrollment in 47 female (41.2%) and 23 male (46%). Severity of KP was perceived as stable or worsen in 46 female (40.4%) and 22 male (44%). Age onset of KP was most common in the second decade for 43.9%. The lesions appeared most frequently on calves for 64%. Patients with high, normal, and low BMI had skin rash presented in 19%, 17%, and 15% of their body surface area, and the numbers of papule on average was 5, 5, and 3.5 per square centimeter, respectively. Forty-eight cases (29.3%) suffered poor quality of life, which was improved after receiving standard treatment.

Conclusion: Clinical features and course of KP in most Thai patients were similar to international studies. However, rash appeared more commonly in the calves of Thai patients. Standard treatment improved patients' satisfactions and quality of life at 1- and 3-month follow-up.

Keywords: Keratosis pilaris; Clinical features; Treatment satisfaction; Dermatologic Life Quality Index; Quality of life

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Keratosis pilaris (KP) is a common, autosomal-dominant genetic condition of keratinization of hair follicles of the skin. It is found in about 40% of the population[1], both in children and adolescents who may be asymptomatic and have seen a dermatologist for other conditions. The age onset of Thai patients is between one and 67 years old, as reported in a Thai journal[2]. The onset of KP is 26% and 42% of the patients in their first decade and second decade of life, respectively[2]. The disease tends to improve with age and affects female more than male. Family history of KP was from 21% to 67%[2-4]. The abnormalities of keratin formation at the follicular orifice of hair follicles result in follicular plugging that prevents hairs from growing through the stratum corneum. This condition causes follicular keratotic papules on the skin in which rough texture is felt and resemble gooseflesh. The lesions appear on the arms, thighs, buttocks, or cheeks[2-5]. Normally, there is no itch or pain, but sometimes it causes inflammation that results in erythema around hair follicles and an itch. KP is often found in association with other dry skin conditions such as ichthyosis vulgaris and atopic dermatitis in 74.3% and 42.6%, respectively[1]. Obesity and xerosis are also frequently associated with KP[6]. The disease can worsen during pregnancy or after childbirth[7]. Seasonal variation is sometimes described, with symptoms improvement in summer and worsening in winter[4,6].

KP is usually a clinical diagnosis based on history and physical exam findings. However,

Correspondence to:

Chiawsirikajorn Y.

Skin Clinic, Faculty of Medicine, Pranangklao Hospital, Bang Krasaw, Nonthaburi 11000, Thailand

Phone: +66-81-2700404, **Fax**: +66-2-5265629

Email: yc.pakpao@gmail.com

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evaluation of the skin lesions with a dermoscope can aid in the diagnosis or decision to perform skin biopsy when doubtful lesion is found[2,5,8,9]. Other laboratory investigation is not needed. KP is also frequently asymptomatic and improves over time[4]. Hence, the treatment may be unnecessary. However, for patients interested in treatment, topical medications such as moisturizing cream, weak acidic cream, and corticosteroid cream can be used[3,10]. There were reports that described the use of laser treatment, which was expensive and required repeated treatments[10-13]. Both creams and laser treatments are effective in improving the skin texture, but the lesions tend to recur when the treatments are discontinued. Though KP is not harmful, its appearance of keratotic papules, often described as chicken bumps or chicken skin can lead to anxiety and depression.

Since KP is an underreported chronic, intermittent condition and there is no well-established study related to its clinical characteristics and quality of life among Thai patients, the authors undertook the present study to add more data on clinical features, the number and distribution of rashes of KP, and the quality of life, before and after treatment using the Dermatology Life Quality Index (DLQI) with permission (supplementary data), which is a simple, self-administered, and user-friendly validated questionnaire in the Thai patients[14,15].

Materials and Methods

The present study was a prospective observational study conducted between July 2020 and December 2021 at a regional 700-bed public hospital of Nonthaburi Province. The present study was approved by the Institutional Review Board of Pranangklao Hospital (code ID 6206), and informed consents were obtained from all patients. Patients with suspected KP or complaints of other skin diseases, were recruited from the outpatient clinic. Patients were eligible if the skin lesion was diagnosed as KP by a dermatologist. When the patients agreed and consented to participate in the project, each individual completed a personal and family history questionnaire and DLQI form. The DLQI scoring system is a suitable measurement of quality of life in patients with skin disease. A dermatologist confirmed the relevant information from questionnaire and performed complete physical examination for skin lesion such as site of lesion, density, induration, erythema, dryness, and pruritus, and evaluated the risk factors in those who had history of disease relapse. Density of the rash was calculated by dividing the number of the papules in 4 square centimeters (sq.cm) at each site by four to yield the number of papules per 1 sq.cm as showed in Figure 1. Then the participants received a DLQI form to self-evaluate the quality of life and were treated according to standard guidelines[10], which consist of 10% urea cream, 3% salicylic acid, and 0.1% triamcinolone cream, applied twice a day for each patient. The researchers explained the meaning of each questionnaire in the DLQI form to the patients to ensure their clear understandings in order to answer the questionnaire consistently using the same criteria.

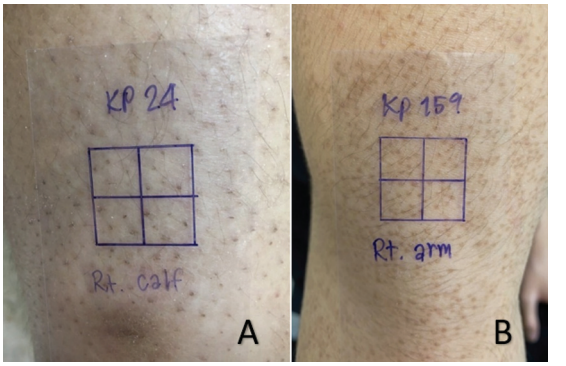

Figure 1. (A) KP at the right calf with 4 areas of 1 square centimeter. The number of papules located inside each square was counted and totally equal to 20 papules, then divided by four to obtain the average number which was 5 papules per sq.cm. (B) KP at the right arm with 4 areas of 1 square centimeter. The number of papules located inside each square was counted and totally equal to 48 papules, then divided by four to obtain the average number which was 12 papules per sq.cm.

After the first visit, two appointments were scheduled to follow the result of the treatment, to perform physical examination of skin lesions, to ask the patients to answer the same DLQI form, and to assess the satisfaction of treatment at one and three months after the treatment. The DLQI score was interpreted as 0 to 1 for no effect at all, 2 to 5 for small effect on patient's life, 6 to 10 for moderate effect on patient's life, 11 to 20 for very large effect on patient's life, and 21 to 30 for extremely large effect on patient's life. The examples of clinical improvement or worsening are showed in Figure 2 (A-F).

Sample size calculation

According to the objective of the study to find a correlation of treatment satisfaction and density of KP, the null hypothesis stated that there was no correlation and hence $r_0=0$. In case the correlation between the above variables was poor to fair, r_1 was assigned to 0.25 (poor to fair correlation) (Cohen 1988), the two-tailed alpha for type one

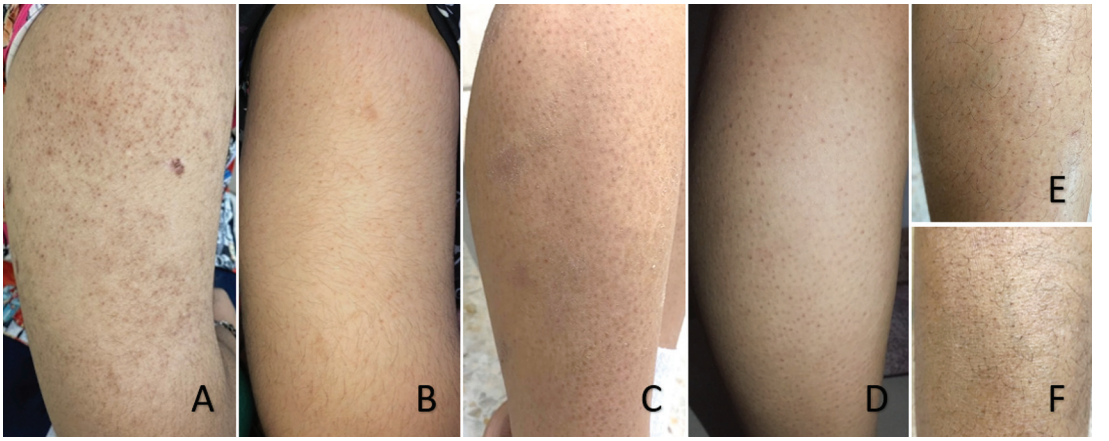

Figure 2. (A, B) KP on right arm in the same patient, A=KP at enrollment, B=KP after 3-month follow-up with clinical improvement. (C, D) KP on right calf in the same patient, C=KP at enrollment, D=KP after 3-month follow-up with clinical improvement. (E, F) KP on right calf in the same patient, E=KP at enrollment, F=KP after 3-month follow-up with clinical worsening.

error=0.05 (α), the power was set at 90% (β=0.10), then the values for Z_α and Z_β were 1.96 and 1.28, respectively. The formula for sample size calculation on correlation test according to nQuery Advisor was $N = [(Z_\alpha+Z_\beta) / (Z_{(r_0)}-Z_{(r_1)})]^2 + 3$, and the total number from the calculation was 165 cases. Loss to follow-up was estimated to be 10%. Hence, the total number of cases needed for the present study was 182 cases[16,17].

Statistical analysis

Statistical analyses were conducted using PASW Statistics for Windows, version 18.0 (SPSS Inc., Chicago, IL, USA). Continuous data are presented as the mean ± standard deviation (SD) and median (interquartile range), whereas categorical data are presented as frequencies and percentages. As appropriate, group comparisons were made using Friedman test, Kruskal-Wallis test, chi-square test, and Bonferroni multiple comparison test. A p-value less than 0.05 is typically considered to be statistically significant.

Results

One hundred ninety-two patients agreed to participate the present study. However, 164 patients or 85.4% returned to complete the follow-up schedules, hence were used for the final analyses. The mean age and range were 30.4 and 4 to 70 years old, respectively. One hundred fourteen patients (69.5%) were female and 50 patients (30.5%) were male (Table 1). The age of disease onset was between 1 and 70 years, mostly frequent in the second decade at 43.9%. The detail of onset age of all patients is shown in Table 2. KP was first diagnosed at enrollment in 131 patients (79.9%) and had been diagnosed by other doctors before the study enrollment in 22 patients, by their relatives or friends in seven patients, and from criteria found on the internet in four patients. Twenty patients (12.2%) never recognized the existence of KP before. In the 144 patients that had known of the disease before enrollment, the clinical course of skin lesions or rash were felt as stable in 113 patients (68.9%), progressive with more rash in 25 patients (15.2%) and subsided in six patients (3.7%), as shown in Table 2.

Among the female patients who had ever been pregnant, the lesions worsen during pregnancy in 10 (41.7%) over 24 pregnancy times. Seasonal variation was described in 71 (43.3%) patients with rash worsening during summer, winter, and rainy season in 46 (28%), 24 (14.6%), and one case, respectively.

In Table 3, the body mass index (BMI) was classified into three groups, low BMI (less than 18.5), normal BMI (18.5 to 22.9), and high BMI (23 or more). The authors found that 51.2% of the patients fell into high BMI group, 39.6% in normal BMI group, and 9.1% in low BMI group. Body surface area (BSA) with presence of skin lesions from KP was found to be 19% in high BMI group, 17% in normal BMI group, and 15% in low BMI group. Density of lesions or number of tiny papules per 1 sq.cm, was found to be an average of 5 papules per sq.cm in high and normal BMI groups, but lower significantly at 3.5 papules per sq.cm in low BMI group. The scores of quality-of-life in each group at the enrollment were not statistically different.

Family history of KP was found among the first-

Table 1. Relationship among complaint for 1st hospital visit, disease progression of KP before enrollment and age group by sex of 164 patients

	Female		Male		Total	
Complaint for 1st hospital visit (due to KP rash or non-KP)[1]	KP rash	Non-KP	KP rash	Non-KP	KP rash	Non-KP
Total number of patients; n (%)	47 (41.2)	67 (58.8)	23 (46.0)	27 (54.0)	70 (42.7)	94 (57.3)
Disease progression before enrollment[2]						
• Improve	1 (2.1)	3 (4.5)	1 (4.3)	1 (3.7)	2 (2.9)	4 (4.2)
• Stable	32 (68.1)	46 (68.6)	17 (73.9)	18 (66.7)	49 (70)	64 (68.1)
• Worse	14 (29.8)	3 (4.5)	5 (21.7)	3 (11.1)	19 (27.1)	6 (6.4)
• Unknown	0 (0.0)	15 (22.4)	0 (0.0)	5 (18.5)	0 (0.0)	20 (21.3)
p-value	<0.001		0.444		<0.001	
Age (years); mean±SD	29.9±9.2	33±13.5	28.7±12.3	26.1±13.5	29.5±10.2	31±13.8
Age group at 1st hospital visit; n (%)						
1st decade	0 (0.0)		3 (6.0)		3 (1.8)	
2nd decade	13 (11.4)		13 (26.0)		26 (15.9)	
3rd decade	47 (41.2)		20 (40.0)		67 (40.9)	
4th decade	29 (25.4)		5 (10.0)		34 (20.7)	
5th decade	15 (13.2)		6 (12.0)		21 (12.8)	
6th decade	8 (7.0)		2 (4.0)		10 (6.1)	
7th decade	2 (1.8)		1 (2.0)		3 (1.8)	
All age group	114 (69.5)		50 (30.5)		164 (100)	

[1] KP: patients visited skin clinic with keratosis pilaris (KP) rash, Non-KP: dermatologist detected KP rash when patients visited skin clinic with other skin disorders; [2] Patients' feeling towards the overall clinical course of KP before enrollment

Table 2. Comparison of onset age by history, clinical course before enrollment and associated factors or diseases of KP with previous reports[2-4]

	Number of patients; n (%)			
	The present study (n=164)	Poskitt, et al.[4] (n=49)	Sallakachart, et al.[2] (n=19)	Kootiratrakarn, et al.[3]
Onset age				-
1st decade	29 (17.7)	25 (51)	5 (26.3)	
2nd decade	72 (43.9)	17 (35)	8 (42.1)	-
3rd decade	32 (19.5)	6 (12)	4 (21)	-
4th decade	15 (9.1)	1 (2)	1 (5.3)	-
5th decade	7 (4.3)	-	-	-
6th decade	5 (3.1)	-	-	-
7th decade	3 (1.8)	-	1 (5.3)	-
8th decade	1 (0.6)	-	-	-
Clinical course				
Improved	6 (3.7)	17 (34.7)	-	-
Stable	113 (68.9)	21 (42.9)	-	-
Worsen	25 (15.2)	11 (22.4)	-	-
Unknown	20 (12.2)	-	-	-
History				
Family history of KP	54 (32.9)	19 (39)	4 (21.0)	67.0%
Personal history of atopy	70 (42.7)	18 (37)	-	42.0%
Dry skin	100 (61)	-	15 (78.9)	50.0%

KP=keratosis pilaris

degree relatives in 54 patients (32.9%). History of atopy was identified in 70 patients (42.7%). History of atopic dermatitis was obtained from 15 patients and the disease was still active in 13 cases. History

Table 3. Relationship of the BMI with percentage of BSA with KP, density of lesions and DLQI score at enrollment

BMI	Number of patients n (%)	Percentage of BSA with KP median (P_{25}, P_{75})	Number of papules median (P_{25}, P_{75})	DLQI score median (P_{25}, P_{75})
Low: <18.5	15 (9.1)	15.0 (6.0, 32.0)	3.5 (3, 4.5)	7.0 (4.0, 11.0)
Normal: 18.5 to 22.9	65 (39.6)	17.0 (13.0, 31.5)	5 (3.25, 7)	6.0 (2.0, 12.5)
High: ≥23	84 (51.2)	19.0 (10.3, 36.5)	5 (3.5, 8)	6.0 (2.0, 11.0)
p-value		0.301	0.041	0.708

BMI=body mass index; BSA=body surface area; KP=keratosis pilaris; DLQI=Dermatology Life Quality Index

Table 4. Association of KP with atopic dermatitis, asthma, allergic rhinitis and allergic conjunctivitis and disease activity at enrollment

Type of atopic disorders	Number of patients; n (%)	Active disease*; n (%)	Inactive stage**; n (%)
Atopic dermatitis	15 (9.1)	13 (86.7)	2 (13.3)
Asthma	7 (4.3)	1 (14.3)	6 (85.7)
Allergic rhinitis	61 (37.2)	14 (23)	47 (77)
Allergic conjunctivitis	11 (6.7)	1 (9.1)	10 (90.9)

* Patients were receiving treatment for each atopic disorder at enrollment

** Patients were symptom-free at enrollment

Table 5. Body site of KP and density of lesions compared with other studies[2,4]

Body site of KP	The present study (164 cases)		Poskitt, et al.[4] (49 cases)	Sallakachart, et al.[2] (19 cases)
	Number of patients; n (%)	Number of papules per sq.cm	Number of patients; n (%)	Number of patients; n (%)
Calves*	105 (64.0)	4.1	-	6 (31.6)
Arms*	101 (61.6)	4.8	45 (92)	18 (94.7)
Thighs*	86 (52.4)	3.5	29 (59) (legs)	11 (57.9)
Back	83 (50.6)	3.4	-	2 (10.5)
Buttocks	48 (29.3)	3.9	15 (30)	-
Forearms*	32 (19.5)	4.2	-	4 (21.1)
Abdomen	14 (8.5)	3.0	-	-
Chest	14 (8.5)	3.9	-	2 (10.5)
Face*	7 (4.3)	3.9	20 (41)	3 (15.8)
Eyebrows*	-	-	4 (8)	-

KP=keratosis pilaris

* Exposed body surface area

of allergic rhinitis was obtained from 61 patients with inactive disease in 47 cases. One hundred cases (61%) had dry skin (Table 2).

Table 4 describes the association of KP at enrollment with other atopic disorders and diseases' activity. Atopic dermatitis, asthma, allergic rhinitis, and allergic conjunctivitis were obtained in 15, 7, 61, and 11 cases, respectively. Atopic dermatitis was found active in 13 cases (86.7%). Other atopic disorders were mostly found in inactive stage.

At enrollment, physical examination showed the affected body sites of KP on calves (64%), arms (61.6%), thighs (52.4%), back (50.6%), buttocks (29.3%), forearms (19.5%), abdomen (8.5%), chest (8.5%), and face (4.3%). Mean density of rash was 4 papules per sq.cm. The details and comparison with other studies are shown in Table 5.

At one and three months after therapy, 146 (89%) and 150 (91.5%) patients were satisfied with the outcome of the treatment, respectively, and the main reason of satisfaction was the disappearance of the induration, increased hydrated skin, and decreased erythema or pruritus in most cases. Details of satisfaction induced by each treatment outcome are shown in Table 6.

Before treatment, quality of life in 48 patients were classified as sizably worse with a DLQI score over 10. The contributing factors with statistical significance were female, lesions on thighs and pruritus with score greater than 4. It is important

Table 6. Satisfaction level and its reason based on treatment result at 1 and 3 months of follow-up

Satisfaction level and its reason*	Number of patients; n (%)	
	One month after treatment	Three months after treatment
Satisfied due to	146 (89.0)	150 (91.5)
Decrease in induration	111 (67.7)	129 (78.7)
Increased hydrated skin	77 (47.0)	80 (48.8)
Decrease in erythema	56 (34.1)	73 (44.5)
Decrease in pruritus	54 (32.9)	76 (46.3)
Neither satisfied nor dissatisfied	13 (7.9)	11 (6.7)
Dissatisfied	5 (3.0)	3 (1.8)

* Patients' feeling towards clinical symptoms of KP at enrollment compared with one and three months after treatment

Table 7. Quality of life (DLQI score) in KP patients before and after treatment 1 and 3 months

Quality of life	Median (P_{25}, P_{75})	Number of patients with DLQI score >10*; n (%)	Number of patients with decrease of DLQI score > 4 compared with the score from previous treatment; n (%)
Before treatment	7.0 (2.0, 11.0)	48 (29.3)	-
One month after treatment	3.0 (1.0, 8.0)	28 (17.1)	54 (32.9)
Three months after treatment	2.0 (0.3, 5.0)	18 (11.0)	68 (41.5)
p-value	<0.001		

DLQI=Dermatology Life Quality Index

* Very or extremely large effect on patient's quality of life

to note that the pruritus score ranged from 0 to 10, where zero represented "no itch" and 10 represented "unbearable itch". After treatment, the quality of life improved and the number of patients with poor quality of life declined. The median score of quality of life were 7.0, 3.0, and 2.0 before treatment, at 1 month, and at 3 months after treatment, respectively, with statistically significant difference as shown in Table 7.

Discussion

Little information is available concerning the rash characters, its clinical course, and treatment satisfaction including quality of life among the Thai patients with KP. So far, the present study had the highest number of Thai cases, with 164 cases, and could add more information on KP, which is a common skin disease. The present study data revealed women were more frequently affected than men at a ratio of 2:1 and confirmed that 94 cases (57.3%) visited the hospital due to other skin diseases or were unaware of KP diagnosis. Patients may consider the lesion of KP as a variant of normal skin and hence patients who intended to visit skin clinic with the rash of KP were found in only 70 cases (42.7%). The patients who visited skin clinic with the rash of KP in all patients and female group had more active rash significantly than the patients who visited with other skin illness. It supported that KP is not harmful and often asymptomatic but can look so unattractive that female patients raise concern about it. Most cases in the present study developed KP between the ages of 11 and 20. However, it was common in children as they represented approximately 17.7% of all Thai patients with KP, while the age of KP onset was often found within the first decade of life in non-Thai studies[4]. The authors agreed that the first indication of KP usually appeared during childhood, may be symptomless, and were common in adolescents. The first recognition of KP most frequently was found in the second decade in the present study. It may be linked to the parents' concern of the disease in their children. Other factors may be due to the uneasy access to the hospital, which was the present study site. The uneasy access is because this hospital was one of the most crowded government hospitals and patients must be sick enough to seek treatment. However, KP is usually symptomless in children until they are adolescent, and the lesions become clearly visible on the exposure part of the body and can cause issues around self-esteem or cosmetic problem that can become an emotional discomfort.

The present study showed that at the time of diagnosis, 68.9% of the patients with KP felt that

the disease was stable, which confirms that KP is usually symptomless but persistent in most cases. The skin lesion in both genders was worsening in 15.2% and improving in only 3.7%. Only 20 cases (12.2%) never knew they had KP before enrollment. Forty-one percent of female patients who were ever pregnant, felt KP exacerbated during pregnancy and post-partum. The rash aggravated and appeared rough or bumpy more often in summer in 28% owing to hot weather in Thailand causing itchy lesions that led to frequent scratching. Dry skin during wintertime can also induce worsening skin lesions in 14.6% of cases and hence applying daily moisturizing lotion may temporarily relieve an itch accompanied by red, inflamed skin in winter.

Overweight and obesity were well recognized and confirmed in the present study that correlated closely with the extent of KP as reported in other studies[6]. KP affected approximately 15% of body surface area in patients with low BMI but increased to 17% and 19% in normal and high BMI groups. For the first time, the density of papules was measured at each site and found an increased number of papules with statistical significance from 3.5 per sq.cm on average in low BMI group, to 5 per sq.cm in normal and high BMI groups. Hence KP was found to be more common in patients with high BMI than normal and low BMI. The sites of skin lesions in patients with high BMI covered more body surface area than the other two groups and the density of the papules of KP was higher in the high BMI group with statistical significance.

Up to 32.9% of first-degree relatives had KP from familial history and personal history of atopy were also obtained in 42.7%, which are similarly compared to other studies[1-4]. The present study revealed the KP had closed association with allergic rhinitis at 37.2% rather than atopic dermatitis at 9.1% while in other study, it was about more closely related to atopy at 64%[18]. However, at the time of diagnosis of KP by dermatologist, the skin lesion of associated atopic dermatitis in 15 cases was active with rash in 13 cases (86.7%) while the activity of asthma, allergic rhinitis, and allergic conjunctivitis was active in only 14.3%, 23%, and 9.1%, respectively.

The present study revealed more information on the sites of predilection, which were the calves (64%), upper arms (61.6%), thighs (52.4%), back (50.6%), and buttocks (29.3%) (Table 5). The most common site from other studies was arm and forearm in 92% to 94% of cases[2,4]. The difference could be explained by the fact that the present study employed a dermatologist to examine thoroughly the whole body for detecting the lesion while other studies were retrospective or used questionnaires to obtain the site of the lesion. However, the frequency of the other lesion sites was similar. Interestingly, the density of papules was highest on the arms and forearm and equal to 4.8 and 4.2 papules per sq.cm on average, respectively. The density on the calves, buttocks, chest, and face was lower and equal to 4.1 to 3.9 papules per sq.cm. Since the density of papule was highest in arms and forearms, this information could explain why the site of lesion in other studies was found more commonly in these areas if this information was obtained by questionnaire since the lesion on arms and forearms can be more easily noticed than calves by the patients. The present study highlights the proper body site to look for KP, which must include the calves.

After treatment with topical 10% urea cream, topical steroids, weak acid cream, and oral anti-histamines, the rash and itchy sensation improved significantly within one month. The topical creams were helpful in softening and flattening the keratotic papules, reduced the associated erythema and irritated skin, and finally moisturized and softened dry skin. Treatment satisfaction was achieved within one month of treatment in 146 cases (89%) and the main reason for satisfaction was the decrease in induration followed by increased hydrated skin. Decrease in erythema and pruritus were also cited in 34.1% and 32.9% respectively. Only five patients were not satisfied with the result of treatment and 13 cases cannot judge whether they were satisfied or not. Hence, though KP was mostly symptomless, treatment may be needed to improve patients' satisfaction and maintain patient-doctor relationship.

Quality of life is not well studied in Thai patients with KP though it is a chronic intermittent disorder, with a large number of patients, and it can adversely affect their daily activities. In the present study the quality of life and contributing factors of KP based on physical appearance and symptoms before and one-month to three-month after treatment were evaluated. The DLQI is a simple, self-administered, and user-friendly validated questionnaire. It was chosen to represent a subjective appraisal of the impact of illness and reflect patients' feeling towards treatment outcomes. The DLQI consists of 10 questions concerning patients' perception of the impact of skin diseases on aspects of their health-related quality of life over the last week. Though KP is frequently

noted in otherwise asymptomatic patients visiting dermatologists for other conditions and 57.3% of the patients in the present study were not concerned about the rash of KP before enrollment, 48 patients (29.3%) of the patients were displeased with affected cutaneous lesions that looked ugly, and were annoyed, thus, yielded the DLQI score of more than 10. The score value of more than 10 can be interpreted as very or extremely large negative effect on patient's life. When standard treatment succeeded, the number of cases who achieved the score of more than 10, declined to 17.1% and 11% at one and three months, respectively. For those who felt significantly better from treatment outcome as defined by the reduction of DLQI score of at least 4 compared to baseline or before treatment, 32.9% and 41.5% achieved a better quality of life at one month and three months after treatment, respectively (Table 7). Hence standard treatment with topical cream or ointment and oral antihistamine had yield satisfactory result that had significant impact on the patients' feeling to achieve lower score of 4 or more in DLQI measurement.

The present study had limitations. The enrollment site was the OPD at a busy government hospital in one province and the patients had to seek medication for KP or other skin diseases before being enrolled to the study. Hence, the clinical data, disease severity, and DLQI scores may not be generalized to all Thai patients with KP, especially those who were still asymptomatic and lived in other community.

However, the present study report is the first study of KP that recruited the highest number of patients, assessed the magnitude of affected site on body surface area, thoroughly examined the site and appearance of skin lesion, enumerate the number of papule(s) per sq.cm, and evaluated the quality of life in Thai patients with KP. Treatment with topical cream or ointment and oral antihistamine had been found to associate with significantly improved health-related quality of life after one and three months of follow-up.

In conclusion, the present study confirmed the onset age of KP, which appeared initially during childhood or young teenagers. KP is well known for being mild or asymptomatic, not cured completely, and may improve with age. The known risk is the presence of KP among parent or sibling and personal history of atopy. A sizable portion of the patients was found to be associated with poor quality of life due to the appearance of unpleasant skin lesion on exposed area and itchy lesion. The present study illustrated that physicians should be aware of patients' perception of the impact of KP with affected cutaneous lesions that looked ugly and were annoying, on aspects of their health-related quality of life. However, the symptoms were often relieved with standard topical and oral medications, which helped improve quality of life within one to three months after the treatment.

What is already known on this topic?

KP is a chronic, occasionally relapsing skin disease with known associated factors, onset age and clinical features. KP also has long-term physical and mental health impacts since there is no cure, but the symptoms can be often relieved with medication. Quality of life by DLQI and treatment satisfaction in patients with KP are rarely studied.

What this study adds?

This study adds more information of KP in 164 Thai patients. Only 47 female cases (41.2%) and 23 male cases (46%) visited hospital due to rash of KP and its severity was perceived as stable or worsen in 46 female cases (40.4%) and in 22 male cases (44%). Age onset of KP was commonest in the second decade of life for 43.9%. Patients with high BMI had more affected body surface with KP at 19% with numbers of papule on average 5 per sq.cm. Calves was found to be common site of KP and cannot be ignored during physical examination. Treatment for KP was never prescribed in 138 cases (84.1%). Forty-eight cases (29.3%) suffered poor quality of life. After treatment, satisfaction at one and three months of follow-up was found in 146 cases (89%) and 150 cases (91.5%), respectively, with significantly more patients achieving a DLQI score of less than 10 or at least declining by 4 or more compared to baseline after one and three months of follow-up.

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Conflicts of interest

The authors declare no conflict of interest.

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