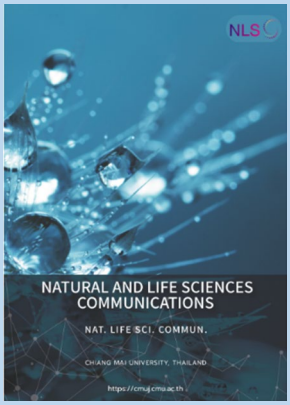
Research article



Health Utility and Its Relationship with Disease Activity and Physical Disability of Patients with Psoriatic Arthritis in Thailand

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ABSTRACT

This study aimed to estimate health utility and related factors among Thai patients with psoriatic arthritis (PsA). A cross-sectional study was performed on patients with PsA. A structured face-to-face interview was conducted including baseline characteristics, EQ-5D-5L (Thai Version) for health utility, the Thai version of the Health Assessment Questionnaire Disability Index (Thai HAQ) for physical disability and Psoriasis Area and Severity Index (PASI) for the severity of skin lesions. Patients' disease activity was measured by the clinical Disease Activity Index for Psoriatic Arthritis. A linear regression analysis was performed to relate health utility and its factors. Of 84 patients enrolled, 67 (79.8%) had remission or low disease activity. The mean ± SD overall health utility was 0.87 ± 0.15. The health utility score of patients with low disease activity was significantly greater than that of those with moderately active to active disease activity (0.89 ± 0.12 vs. 0.72 ± 0.19, $P < 0.001$). The HAQ-DI (β = -0.213, 95%CI; -0.263 to -0.164, $P < 0.001$) and PASI (β = -0.006, 95%CI; -0.049 to -0.003, $P = 0.001$) were found to be significantly related factors for health utility. In conclusion, Thai patients with PsA possessed high health utility. The HAQ-DI and PASI were strongly related to patients' health utility.

Keywords: Utility, Disability, HAQ-DI, EQ-5D-5L, Psoriatic arthritis, Health-related quality of life

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INTRODUCTION

Psoriatic arthritis (PsA) is a chronic inflammatory musculoskeletal disease associated with psoriasis, manifesting most commonly as peripheral arthritis, dactylitis, enthesitis, spondylitis and nail plate abnormalities (Singh et al. 2019). The incidence of PsA is 3.6 to 7.2 per 100,000 person-years, while the prevalence ranges from 6 to 41% among patients with psoriasis (Ogdie and Weiss 2015). PsA produces a negative impact on health-related quality of life (HRQoL) and healthcare resource use (Adams et al. 2010). Early identification and treatment are important for improving long term outcomes (Gladman 2012).

Patients with PsA could experience severe physical function impairment, occupational incapability and negative psychosocial effects. Active PsA shows a significant impact on the daily tasks of living and physical functions (Lee et al. 2010; Merola et al. 2019). It may also impact the patient's physical and mental well-being and limit treatment responses (Gottlieb et al. 2008). Many patients could hardly perform the simple tasks of daily living due to severe pain. Physical disability is substantial among these patients (Lee et al. 2010).

Treatment of PsA should aim to ameliorate the disease activity and severity of both joint and skin inflammation. Medical treatments for PsA include nonsteroidal, anti-inflammatory drugs (NSAIDs), intra-articular corticosteroids and disease-modifying antirheumatic drugs (DMARDs). DMARDs can reduce joint and/or skin symptoms and prevent disease progression. These agents may be classified as conventional synthetic DMARDs (csDMARDS) and biologic DMARDs (bDMARDs) (Roberts et al. 2017). Evidence indicates that such treatments can improve the physical signs and symptoms of PsA, as well as the patients' HRQoL (Mease and Menter 2006).

In economic evaluation, HRQoL may be measured as a utility, referring to the individual's preference for his or her health status. For PsA, estimating health utility is valued from both physical disability and the severity of skin disease. A related systematic review has shown that the Health Assessment Questionnaire Disability Index (HAQ-DI) and the Psoriasis Area and Severity Index (PASI) are important tools for estimating health utility among patients with PsA (Rodgers et al. 2011). The clinical assessment of both HAQ-DI and PASI to estimate health utility could better reflect patients' clinical status than only HAQ-DI because generally patients with PsA also have psoriasis skin lesion that might greatly affect the patient's health utility (Chiowchanwisawakit et al. 2019). However, a related study included only HAQ-DI to estimate patients' health utility not PASI. This might cause incomprehensive estimation of health utility. Thus, a comprehensive assessment of both HAQ-DI and PASI to estimate patients' health utility in Thailand is warranted. Therefore, this study aimed to estimate health utility and its related factors by incorporating both rheumatologic and dermatologic clinical factors among Thai patients with PsA.

MATERIALS AND METHODS

Study design and patient enrollment

A cross-sectional study was conducted to determine the health utility and its relationship with disease activity, HAQ-DI, and PASI scores among Thai patients with PsA. Patients meeting the following inclusion criteria were eligible. They included (1) patients receiving a diagnosis as PsA according to the classification criteria for PsA (cASPAR) criteria (Taylor et al. 2006), (2) patients visiting the outpatient regular rheumatology clinics at three university-affiliated hospitals between January and April 2020, and (3) patients able to communicate. The university hospitals were selected as study settings because they constitute tertiary hospitals serving the complicated clinical conditions of patients with PsA.

In addition, these hospitals had rheumatologists providing special care for patients with PsA reflecting the real-world clinical practice in Thailand where patients with PsA usually visit tertiary hospitals to receive clinical care. All patients gave their written informed consent before enrolling in the study. The study protocol was approved by the Central Research Ethics Committee (CREC) of Thailand in 2019 (certificate number: COA-CREC004/2020).

Sample size estimation

A related study on health utility among patients with PsA reported a mean and SD of 0.5 and 0.3, respectively (Brodszky et al. 2010). Using the above mean and SD, and the 95%CI of the true mean of 0.5 + 0.05 (error = 0.05), the sample size of this study was calculated to be 138.

Data collection

All eligible patients were invited to participate in this study. Baseline characteristics of participants were collected using a medical record review performed by a rheumatologists. Participants were face-to-face interviewed for their current clinical status including their health utility, physical disability and skin lesion activity by study nurses or rheumatologists. The interview was conducted at the three hospitals between January and April 2020. A structured data collection and interview form were developed. It consisted of four parts including 1) baseline characteristics; sex, age, health insurance, types of PsA, current disease activity (measured by the clinical Disease Activity Index for Psoriatic Arthritis (cDAPSA)) (Schoels et al. 2016), clinical deformity, co-morbidity and PsA treatment, 2) the Thai version of the EQ-5D-5L for patients' health utility, 3) the Thai version of HAQ-DI (Thai HAQ-DI) for physical disability and 4) PASI for the severity of psoriatic skin lesion. The interview form was clinically validated by rheumatologists. The study nurses and rheumatologists collecting the data were trained by researchers to ensure their understanding of the interview forms and how to collect and record data. However, to ensure the validity of the data, incomplete or missing data were verified by RS, PD, or UP. Rheumatologists responsible for collecting data were asked for any incomplete information to ensure validity.

Outcome measures

The primary outcome of interest was health utility measured by the EQ-5D-5L and valuated using the Thai EQ-5D-5L value set. Physical disability score measured by Thai HAQ-DI was used to reflect rheumatologic clinical condition (Osiri et al. 2009), while the PASI questionnaire was used to determine skin lesion severity. In addition, PsA disease activity and the global assessment of the disease activity were clinically evaluated by the physicians.

The EQ-5D-5L (EuroQol 1990) was used to assess the patients' health-related utility. It contained five dimensions: mobility, self-care, usual activities, pain/discomfort and anxiety/depression. Each dimension has one question with five response levels. Patients' responses to the EQ-5D-5L questionnaire, elicited from 1,207 in the general population residing in 12 provinces across all regions of Thailand were converted to the utility scores based on Thai algorithms. (Pattanaphesaj et al. 2018).

The Thai HAQ-DI was used to determine functional disability. It consists of eight domains: dressing and grooming, rising, eating, walking, hygiene, reach, grip, and activities (Osiri et al. 2009). The 4-point difficulty level of the individual items from each domain is ranked from 0 (no difficulty) to 3 (unable to do). The highest scores from each domain were then summed up and averaged to form a single disability index. The HAQ-DI scores ranges from 0 to 3, with the higher score reflecting greater disability.

The PASI (Feldman and Krueger 2005) was used to determine the severity of psoriatic skin lesions in such patients. It consist of four domains, including

percentages of skin involvement and the severity of skin lesions assessed by three clinical signs: erythema score, infiltration score and desquamation score (Feldman and Krueger 2005). The PASI score was calculated using an equation reported in the original study. For each body section; (head and neck, upper extremities, lower extremities and trunk), the percentage of affected skin area by psoriasis was estimated on a scale from 0 to 4 according to erythema score, infiltration score and desquamation score. The overall PASI score ranged from 0 to 72 (Feldman and Krueger 2005).

Statistical analyses

Baseline characteristics were presented as frequencies for categorical variables and mean + standard deviation (SD) for continuous variables. The Kruskal-Wallis test was used to assess the differences between the HAQ-DI, PASI and health utility among disease activity (remission, low and moderately active-to-active). Dunn's pairwise comparison with Bonferroni correction was used to test the differences between each comparison when a significant difference was observedd in disease severity.

A two-step regression approach was applied to determine the relationship between health utility and related factors. A univariate generalized linear model (GLM) with log-link function and gaussian distribution was performed to relate patients' health utility to each potential factor. Gaussian distribution was selected because it provided better goodness-of-fit according to Akaike's Information Criteria (AIC) and Bayesian Information Criteria (BIC). The P-value <0.20 for each factor in the univariate regression analysis was used as the criterion to select the factor for multivariate analysis. *P*-value <0.05 in the multivariate analysis indicated a significant relationship between patients' health disutility and the potential factors. Variance inflation factor (VIF) was used to assess multicollinearity among factors, while AIC and BIC were used to determine the model's goodness of fit. All analyses were performed using STATA, Version 15.0.

RESULTS

Patient characteristics

Since the COVID-19 outbreak, the management plans of all hospitals have been substantially altered. Physicians' appointments must be postponed for those without urgent hospital visits. Consequently, we decided to terminate patient enrollment in this study April 2020.

All invited patients agreed to participate in this study (100%). A total of 84 patients with an average age of 51.2 ± 12.5 years were included in the study. Forty-nine (58.3%) were female, 67 (79.8%) were in remission or exhibited low disease activity, and 54 (64.3%) presented no clinical deformity. The average duration of the disease was 9.5 ± 6.5 years. Most patients (70.2%) received single csDMARDs as their current treatments. Over one half received methotrexate (41/59 patients: 69.5%). Only five patients (5.9%) received single bDMARDs as their current treatment, including etanercept, secukinumab and guselkumab. Fourteen patients (16.7%) received both csDMARDs and bDMARDs. All baseline characteristics are presented in Table 1.

Table 1. Baseline characteristics of the studied patients.

Patient characteristic	Number (%) (N = 84)
Sex	
Female	50 (59.5)
Male	34 (40.5)
Age (Mean ± SD)	**51.2 ± 12.5**
<60 years	62 (73.8)
≤60 years	22 (26.2)
Healthcare scheme	
UHCS	31 (36.9)
CSMBS	30 (35.7)
SSS	13 (15.5)
Others	10 (11.9)
Duration of disease	**9.5 ± 6.5**
Type of psoriatic arthritis	
Peripheral arthritis	14 (16.7)
Peripheral arthritis+axial disease	14 (16.7)
Peripheral arthritis+dactylitis and/or enthesitis	25 (29.8)
Peripheral arthritis+axial disease+dactylitis and/or enthesitis	28 (33.3)
Axial disease	1 (1.2)
Axial disease+dactylitis and/or enthesitis	1 (1.2)
Dactylitis and/or enthesitis	1 (1.2)
Disease activity	
Remission	20 (23.8)
Low	47 (56.0)
Moderate	12 (14.3)
Severe	5 (6.0)
Clinical deformity	
No	54 (64.3)
Yes	30 (35.7)
Co-morbidities	
Hypertension	31 (36.9)
Dyslipidemia	31 (36.9)
Diabetes mellitus	12 (14.3)
Current treatments*	
Conventional synthetic DMARDs	59 (70.2)
Methotrexate	41 (69.5)
Sulfasalazine	9 (15.3)
Leflunomide	6 (10.1)
Cyclosporin A	3 (5.1)
Biologics	5 (5.9)
Etanercept	2 (40.0)
Secukinumab	2 (40.0)
Guselkumab	1 (20.0)
Conventional synthetic DMARDs + biologics	14 (16.7)
Methotrexate + Etanercept	3 (21.4)
Methotrexate + Infliximab	2 (14.3)
Methotrexate + Ixekizumab	1 (7.1)
Sulfasalazine + Etanercept	1 (7.1)
Sulfasalazine + Infliximab	3 (21.4)
Cyclosporin A + Guselkumab	2 (14.3)
Cyclosporin A + Secukinumab	1 (7.1)
Leflunomide + Etanercept	1 (7.1)
No specific treatment	6 (7.1)

Physical disability, disease activity and health utility

The HAQ-DI indicated that most patients were able to perform self-care activities without a need for assistance. Seventy-four patients (88.1%) did not require any assistance for dressing and grooming, and 48 patients (57.1%) did not require any assistance for rising. Information for other domains of HAQ-DI is presented in Table 2. The overall average HAQ-DI score was 0.49 ± 0.60. The average score for patients in remission, with low and moderately active-to-active disease activity was 0.20 ± 0.28, 0.36 ± 0.47, and 1.17 ± 0.71, showing a statistically significant difference ($P < 0.001$).

Table 2. HAQ-DI among patients with psoriatic arthritis.

	No assistance (%)	Need a special device (%)	Need help from another person (%)	Need both (%)
HAQ-DI				
Dressing and grooming	74 (88.1)	8 (9.5)	2 (2.4)	0 (0)
Rising	48 (57.1)	20 (23.8)	10 (11.9)	6 (7.1)
Eating	56 (67.5)	9 (10.8)	11 (13.3)	7 (8.4)
Walking	63 (75.0)	12 (14.3)	8 (9.5)	1 (1.2)
Hygiene	66 (78.6)	8 (9.5)	9 (10.7)	1 (1.2)
Reach	45 (53.6)	23 (27.4)	9 (10.7)	7 (8.3)
Grip	55 (65.5)	11 (13.1)	10 (11.9)	8 (9.5)
Activities	63 (75.0)	13 (15.5)	7 (8.3)	1 (1.2)

Note: Abbreviations: HAQ-DI: Health Assessment Questionnaire Disability Index; PASI: Psoriasis Area and Severity Index; SD: Standard deviation

Additional subgroup analyses demonstrated significant differences between low and moderately active-to-active disease activity ($P < 0.001$) and between remission and moderately active-to-active disease activity ($P < 0.001$). However, differences were not observed between patients with low disease activity and those with remission ($P = 0.301$).

The average PASI score was 5.31 ± 9.60, of which 73 (86.9%) had a PASI score <10. The average PASI score for patients with remission, low and moderately active-to-active disease activity was 2.94 ± 6.01, 5.34 ± 9.78, and 7.99 ± 12.08, respectively. The average PASI score for each HAQ-DI level did not significantly differ ($P=0.06$).

The average utility score measured by EQ-5D-5L was 0.87 ± 0.15. Forty-six (54.8%) had no problem with mobility, 70 (83.3%) in self-care, 54 (64.3%) in usual activities and 51 (60.7%) in anxiety, but 45 (53.6%) had a slight problem with pain/discomfort (Table 3). The overall mean utility was 0.87 ± 0.15. The mean utility among patients in remission was 0.92 ± 0.15, while that among patients with low disease activity and moderately active-to-active disease activity was 0.89 ± 0.12 and 0.72 ± 0.19, respectively. The mean utility was statistically significant ($P < 0.001$) among the three groups. The VAS for health utility indicated similar findings to the EQ-5D-5L health utility. The VAS score for patients in remission, low disease activity and moderately active-to-active disease activity were 83.50 ± 18.49, 78.17 ± 14.59 and 66.65 ± 13.96 ($P < 0.001$), respectively. The overall VAS score was 77.10 ± 16.33.

Our posthoc analysis indicated that the health utility measured by EQ-5D-5L significantly different between patients with low disease activity and those with moderately active-to-active disease activity ($P < 0.001$). A significant difference was also observed between patients in remission and patients with moderately active-to-active disease activity ($P < 0.001$). However, the difference was not significant between patients with low disease activity and those with remission ($P = 0.306$).

Table 3. Number and percentage of patients in the five domains of utility scores.

EQ-5D-5L	Dimensions, n(%)				
	Mobility	Self-care	Activity	Discomfort	Anxiety
Levels					
Without problem	46 (54.8)	70 (83.3)	54 (64.3)	24 (28.6)	51 (60.7)
With slight problems	23 (27.4)	10 (11.9)	23 (27.4)	45 (53.6)	24 (28.6)
With moderate problems	10 (11.9)	3 (3.6)	5 (6.0)	13 (15.5)	7 (8.3)
With severe problems	5 (6.0)	1 (1.2)	2 (2.4)	2 (2.4)	1 (1.2)
Unable to perform/ with extreme problems	0 (0.0)	0 (0)	0 (0)	0 (0)	1 (1.2)

Note: Abbreviations: EQ-5D-5L: EuroQoL; SD: Standard deviation, *Tested by Kruskal-Wallis

Health utility and its related factors

The univariate analyses indicated that cDAPSA, HAQ-DI score and PASI score were significant factors for health utility ($P < 0.05$). No significant relationship was found for age, sex, clinical deformity, type of PsA, diabetes, hypertension, dyslipidemia and history of receiving bDMARDs (Table 4).

Multivariate GLM analysis revealed that only HAQ-DI and PASI should be included in the final analysis because they could provide the lowest AIC and BIC. Thus, age and cDAPSA were not included in the final analysis. The final GLM analysis indicated that the β-coefficient of HAQ-DI was -0.213 (95%CI; -0.263 to -0.164; $P < 0.001$), while the β-coefficient of PASI was -0.006 (95%CI; -0.049 to -0.003; $P = 0.001$). All GLM analysis findings are reported in Table 4. The mean VIF was 1.01, indicating no significant multicollinearity among the factors.

Table 4. Two steps regression analysis model findings.

Variable	Univariate analysis		Multivariate analysis	
	Beta coefficient (95%CI)	*P*-value	Beta coefficient (95%CI)	*P*-value
Sex				
Male	Reference			
Female	-0.429 (-119 to 0.334)	.271	N/A	N/A
Age	-0.003 (-0.006 to 0.001)	.103	N/A	N/A
cDAPSA				
Remission	Reference			
Low disease activity	-0.033 (-0.119 to 0.053)	.455		
Moderately active-to-active disease activity	-0.249 (-0.355 to -0.142)	<.001	N/A	N/A
HAQ-DI	-0.232 (-0.282 to -0.183)	<.001	-0.213 (-0.263 to -0.164)	<.001
PASI	-0.010 (-0.015 to -0.005)	<.001	-0.006 (-0.049 to -0.003)	.001
Clinical deformity				
No	Reference			
Yes	-0.038 (-0.116 to 0.040)	.340	N/A	N/A
Type of PsA				
Peripheral +/- Dactylitis and/or enthesitis	Reference			
Axial +/- dactylitis and/or enthesitis or Dactylitis and/or enthesitis alone	-0.011 (-0.219 to 0.196)	.915		
Peripheral + axial +/- dactylitis and/or enthesitis	-0.022 (-0.099 to 0.550)	.573	N/A	N/A
Diabetes				
No	Reference		N/A	N/A

Variable	Univariate analysis		Multivariate analysis	
	Beta coefficient (95%CI)	*P*-value	Beta coefficient (95%CI)	*P*-value
Yes	0.062 (-0.064 to 0.187)	.257		
Hypertension				
No	Reference			
Yes	0.011 (-0.088 to 0.111)	.824	N/A	N/A
Dyslipidemia				
No	Reference			
Yes	0.022 (-0.079 to 0.123)	.660	N/A	N/A
Receiving bDMARDs				
No	Reference			
Yes	-0.053 (-0.142 to 0.036)	.240	N/A	N/A

Note: Abbreviations: cDAPSA: Clinical Disease Activity Index for Psoriatic Arthritis; bDMARDs: biologic disease-modifying antirheumatic disease; HAQ-DI: Health Assessment Questionnaire Disability Index; PASI: Psoriasis Area and Severity Index; PsA: Psoriatic arthritis.

DISCUSSION

This study found that patients with PsA in remission or with low disease activity had significantly lower HAQ-DI scores than those with moderately active-to-active disease activity. Most patients with PsA had low PASI scores, meaning our samples had mild skin lesions. The HAQ-DI score and PASI score positively related to patients' health disutility. Higher HAQ-DI and PASI scores indicated higher disutility resulting in worse patient health utility.

Our findings showed relatively high utility (0.87), possibly because 80% of patients with PsA in this study were in remission or had low disease activity. This was in line with a related Thai study that reported high utility among patients with low cDAPSA (Chiowchanwisawakit et al. 2019). This was also consistent with a study from Brazil indicating that patients with mild HAQ-DI had higher utility (0.79) than moderate (0.57) or high disability (0.44)(Moraes et al. 2021).

Our findings were similar to a related study from the UK (Corbett et al. 2017) reporting that patients' health utility was associated with HAQ-DI and PASI scores. However, the magnitudes of the effect differed slightly. The UK study reported the unstandardized β-coefficient of HAQ-DI as -0.298, while that of PASI was -0.004, while those for our study were -0.213 and -0.006, respectively. The differences meant that decreases in HAQ-DI and PASI scores among Thai patients had less impact on overall health utility than those among patients in the UK.

The magnitude of the reduced HAQ-DI score in this study was also in line with related studies from Canada (Kwok and Pope 2010) and Brazil (Moraes et al. 2021), revealing an increase in HAQ-DI was reduced by approximately 0.130 to 0.133 points. It indicated the clinical improvement of patients' function, resulting in a clinically significant perception of clinical improvement by the patients. This finding reflected a more meaningfully and better HR-QoL. Similarly, the HAQ-DI might vary among patients with different joint diseases. The average HAQ-DI in Thai PsA in this study (0.49 ± 0.60) was lower than that reported in a Spanish population (0.76 ± 0.67) (Gratacos et al. 2014). This might be due to several reasons, where differences in patients' characteristics were the main reason. In addition, the Thai healthcare system allows patients to easily access the primary care units based on their needs. For example, village health volunteers could contact patients at home.

Although a study of HRQoL for patients with PsA was conducted in Thailand (Chiowchanwisawakit et al. 2019), this study was conducted involving different aspects. First, this study's ultimate goal was to conduct the cost-utility analysis (CUA) of bDMARDs for patients with PsA. To conduct the CUA study, health utility was directly obtained from Thai patients with PsA as important information. Because the disease relates to rheumatologic and dermatologic clinical aspects,

the appropriate method to elicit utility value should be based onHAQ-DI and PASI assessments. In addition, evidence from patients with psoriasis indicated that psoriasis could impact patients' work, social lives and quality of life. It resulted in a physical and mental burden (Hazard et al. 2006; Augustin et al. 2008; Tang et al. 2013). Another aspect was related to the generalizability of the utility value in the Thai population. We believe that lifestyle, treatment context, income, and so on for patients visiting healthcare centers in Bangkok and other regions would be varied. This study closed this gap by collecting data from patients visiting three university-affiliated hospitals. Of those, two hospitals are located in Bangkok, and the other is in northern Thailand.

Because this study found a strong relationship between the HAQ-DI, PASI and health utility, we suggest that HAQ-DI and PASI instruments should be incorporated in routine monitoring practice. The HAQ-DI and PASI can be used to estimate health utility, an important input for further cost-effectiveness studies.

We performed univariate analysis to relate the use of bDMARDs to patients' health utility. We found no significant relationship between the bDMARDs and patients' health utility. It might be because the use of bDMARDs might directly relate to patients' health utility, but it might have affected patients' health utility by improving clinical conditions including both HAQ-DI and PASI.

Several limitations should be addressed in this study. First, although this study planned to collect data from three large university hospitals in Thailand, the actual number of patients could not be reached as the calculated sample size due to the COVID-19 outbreak. At the time of conducting this study, the COVID-19 outbreak could not be ended. A physician's appointment must be postponed for those without urgent hospital visits. Thus, we decided to terminate patient enrollment in this study in April 2020. However, regarding our observed utility value of 0.87 with an SD of 0.15, the posthoc power calculation was performed, and determined 100% power. Thus, the number of included patients was likely sufficient to produce an accurate estimate of patients' health utility. Second, this study required multi-setting interviews, which might have been a subject of inter-rater variability. However, exhaustive site visits and monitoring were performed to train the data collectors to ensure their understanding of the study method. This would minimize inter-rater variability in this study. Third, we collected data from three university hospitals. The findings might not be generalizable to different types of hospitals, such as district or provincial hospitals. The complexities of patients with PsA in hospitals might have differed from the study. Thus, future studies in different settings are still warranted. Finally, these findings should be generalized with caution to only settings in other Asian countries where the health system is similar to our study's settings.

CONCLUSION

Patients with PsA in Thailand showed high utility scores. However, most included patients were in remission or had low disease activity. Patients in remission or with low disease activity exhibited higher health utility than those with moderately active-to-active disease activity. The HAQ-DI and PASI strongly related to the patients' health utility. Therefore, the HAQ-DI and PASI instruments should be used in routine monitoring practices for patients with PsA, as their scores can be applied to estimate patients' health utility.

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CONFLICT OF INTEREST

All authors declare no conflict of interest.

Ethics approval and informed consent

The study protocol was approved by the Central Research Ethics Committee (CREC) of Thailand in 2019 (certificate number: COA-CREC004/2020).

Data availability

Data used in this study is confidential based on the data holder policy. The data is available upon the reasonable requests to corresponding author.

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