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Research Article

Utility score, medication adherence and dependent status among peripheral artery disease patients

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ABSTRACT

Peripheral artery disease (PAD) can be found in elderly patients over 65 years of age, who may develop foot wounds that can lead to amputation and greatly affect their quality of life. The aim of this research was to investigate the utility of patients with PAD, as well as to examine the medication adherence and other factors that affect their utility. This was achieved through an analytical cross-sectional study design, where data was collected by interviewing patients with PAD at Siriraj Hospital. This analytical cross-sectional research study involved 80 patients participating in the study, with 46 (57.50%) being males. The mean visual analog scale (VAS) score was 69.6±1.78, and the utility (EQ-5D-5L index) score was 0.71±0.03. Most of the patients (68 people, or 85.00%) had no dependence, while 10 people had severe dependence (12.50%), 1 person had moderate dependence (1.25%), and 1 person had complete dependence (1.25%). Additionally, 75 patients (93.75%) adhered to their medication regimen, while 5 patients had no medication adherence (6.25%). Our analysis revealed that the utility value of patients with peripheral artery disease was predicted by dependent variables, education level, and cerebrovascular disease (*P*-value <0.05). In conclusion, this study provides insights into utility, medication adherence, and dependence status of PAD patients. Over half had good quality of life, significant medication adherence was observed, and most patients showed non-dependence in daily activities. Educational level, occupation, and medication adherence were influential factors in utility values.

Keywords:
Peripheral artery disease, Utility, Dependent status, Medication adherence

1. INTRODUCTION

Peripheral artery disease (PAD) is a condition characterized by reduced blood flow to the toes, leading to symptoms such as leg pain during walking. In severe cases, patients may develop critical ischemic leg conditions, experiencing leg pain even at rest. This condition can be further complicated by the presence of ischemic wounds or necrosis, which significantly increases the risk of digital or limb amputation if timely interventions are not provided. It is important to note that individuals with PAD face a 40% chance of lower limb loss within six months if appropriate treatment is not administered, and the mortality rate increases to 20% following such amputations[1-2].

Various studies have investigated the impact of PAD on the quality of life of affected individuals. These studies have utilized different assessment tools to evaluate the well-being of patients at different stages of the disease. Koureas et al. conducted a study using the SF-36 quality of life model and found that individuals with PAD experienced a significant negative impact on treatment-related quality of life[3]. Similarly, Papas et al. employed the SF-36 quality of life scale and reported that these patients had higher scores in mental health but lower scores in physical role[4]. Another study by Wu et al. used the SF-12 quality of life test to assess the quality of life in patients with femoral artery involvement and leg pain during walking[5]. They observed a significant improvement in the quality of life

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among individuals who underwent stenting over a 12-month follow-up period[6]. These studies collectively demonstrate that commonly employed quality of life assessment tools for PAD research (SF-36, SF-12, and EQ-5D) provide valuable insights into the impact of PAD on various aspects of patients' well-being, enabling health-care professionals to tailor interventions and improve the overall quality of life for individuals with PAD. However, these studies did not measure quality of life in the format of 'utility', the parameter of which indicates health preference for each health states. Utility is important in cost-utility analysis used as a summary of health outcome.

PAD primarily affects the elderly population and often leads to a decline in independence. The Activities of Daily Living (ADL) assessment model, developed by Mahoney and Barthel (1965), is commonly used to evaluate the self-care and mobility progress of patients during rehabilitation. ADL includes tasks such as grooming, getting out of bed, using the restroom, controlling bowel and bladder functions, bathing, dressing, moving within the home, and ascending and descending stairs[7]. These activities serve as crucial indicators of a patient's dependence and overall functional health. Yamwong's study examined the relationship between personal factors and quality of life in older adults, emphasizing the importance of their ability to engage in daily activities, which was favorable in 86.12% of cases[8]. Furthermore, a study conducted in 2003 found that only 32% of patients who underwent below-knee amputation due to leg ischemia were active outside their homes after one year, and merely 10% of patients who had above-knee amputations were active outside their homes. These findings underscore the detrimental impact on the quality of life of patients who experience limitations in physical functioning[9].

According to the treatment guidelines provided by the American College of Cardiology/American Heart Association (2016), it is recommended that all patients diagnosed with PAD receive lipid-lowering medication[10]. Additionally, individuals with atherosclerosis and symptomatic manifestations should be prescribed antiplatelet agents such as aspirin and clopidogrel. Behavior modification measures should also be incorporated into their treatment plan. It is evident that medication adherence plays a crucial role in achieving clinical goals and significantly impacts treatment efficacy, surpassing the modification of any medical intervention[11]. In a study conducted by Darunthanom et al., which investigated drug utilization behavior and the level of medication adherence among elderly patients with at least two chronic diseases, as well as the correlation between personal factors and the level of medication adherence in this population, it was observed that the participants generally exhibited appropriate drug usage habits[12]. However, there was a high rate of inappropriate practice regarding checking the expiration date before using medications, reaching 90.30%. None of the individual factors examined showed statistically significant associations with the level of medication adherence.

Therefore, the objective of this study was to explore the utility, medication adherence, and dependence status of patients diagnosed with PAD.

2. MATERIALS AND METHODS

2.1. Study design and patient population

This research study is a cross-sectional analytical investigation that scrutinizes the utility, dependency, medication adherence, and the factors that impact the utility of patients diagnosed with PAD. The study was conducted on PAD patients who were treated at Siriraj hospital Thailand between October 2022 and January 2023.

Individuals eligible for participation in this study were required to meet the following criteria 1) be above 18 years of age, have a confirmed diagnosis of PAD (ICD-10 code I73.9), and received treatment at Siriraj Hospital for a minimum duration of 1 year, 2) proficiency in Thai language and the ability to effectively communicate and comprehend information and 3) prior to enrollment, participants must have provided informed consent expressing their willingness to partake in the research investigation.

Exclusion criteria: 1) PAD patients who refused to response to the questionnaire. 2) patients who had comorbidities that potentially influence quality of life: cancer, nephrotic syndrome, and autoimmune diseases.

Optimal sample size was calculated using the following equation: $n=(Z_{\alpha/2})^2 \times \sigma^2 / e^2$.

Parameters used for calculation were derived from Ezeofor et al[13], which reported the mean utility for PAD patients was 0.59±0.18. We determined an error of variance (e) at 20%. Therefore, we used the following parameters to calculate the sample size: $Z_{\alpha/2}=1.96$, $\sigma=0.18$ and $e=0.04$. This suggested the appropriate number of participants should be at least 78. Therefore, we targeted to 80 participants. The first author invited PAD patients met the inclusion criteria at the outpatient department during October 2022-January 2023 (4 months).

2.2. Research instruments

This study classified PAD patients into seven health states, modified from a previous study[13], US guideline[14], and PAD specialists' opinions. PAD patients expected to contribute similar utility were classed into the same states. The previous study reported that the different stage exhibits the different utility score: for example; Rutherford-based stage 5-6 normally have difficulties in living daily life[13]. PAD health states were namely: asymptomatic (Rutherford stage 0), claudication (Rutherford stage 1-4), critical limb ischemia (Rutherford stage 5-6), repeat

revascularization (patients need re-intervention), minor amputation, major amputation, and recovered. This study employed a four-part questionnaire to gather data, which included the following sections.

1) A General Patient Questionnaire gathering information on gender, age, education level, occupation, income, marital status, right to treatment, concomitant diseases, and overall health status.

2) A Patient Utility Questionnaire. The European Quality of Life Measure-5 Domain-5-Level (EQ-5D-5L) questionnaire, which was translated into Thai, was used in this study[15]. The questionnaire was divided into two parts for assessment. Part 1 consisted of questions related to health conditions across five dimensions which were mobility, self-care, usual activities, and pain/discomfort. Each dimension had five options, ranked according to severity level, ranging from 1 (no problem) to 5 (unable to perform the activity or experiencing the most problems). The utility scores were calculated based on the responses provided in the first section, using utility score tables specific to the country. Part 2 of the questionnaire involved a Visual Analog Scale (VAS) where participants rated their health condition on a scale from 0 (representing the worst health condition) to 100 (indicating the best health condition). Interpretation of the results considered a utility value of ≥0.7 as indicative of a good quality of life, while a utility value of <0.7 suggested a poor quality of life.

3) A Medication Adherence Questionnaire. The Medication Adherence Scale for Thais (MAST) questionnaire, developed by Suphachamroon was utilized in this study[16]. The questionnaire consisted of eight questions, with each item scored on a scale of 0-5. For items 1-6, respondents indicated the frequency of medication intake per month, with response options including more than 15 times/month, 10-15 times/month, 6-9 times/month, 3-5 times/month, 1-2 times/month, and never. In items 7-8, participants rated the frequency of certain behaviors using response options such as "very often, often, some, few, very little, and never at all," which were scored as 0, 1, 2, 3, 4, and 5, respectively. The total score for the questionnaire ranged from 0 to 40. A score of ≥34 suggested that the patient had a high level of adherence in medication use, while a score of <34 indicates a low level of medication adherence (less than 85%).

4) Evaluation of Practical Ability using the Barthel Activities of Daily Living (ADL) Index. The Barthel ADL Index was employed in this study to assess the patient's functional abilities in their daily routines over the preceding two weeks. The questionnaire consisted of a total of 10 questions, each carrying a maximum score of 20 points. The scores obtained allowed for the categorization of patients into four groups, based on their level of dependence. 1) group 1: scores ranging from 12 to 20 points indicated patients with a high level of independence in their daily activities 2) group 2: scores ranging from 8 to 11 points denoted patients with a moderate level of dependence 3) group 3: scores ranging from 5 to 8 points indicated patients with a severe level of dependence and group 4: scores ranging from 0 to 4 points signified patients with complete dependence on assistance for their daily activities. Patients scoring below 12 points on the ADL Index were considered dependent in terms of their functional abilities.

2.3. Statistical analysis

Statistical analysis was performed using STATA version 14. Descriptive data are presented as mean and standard deviation, or standard error of mean, or percentage as appropriate. For the factor analysis, binary logistic regression was used to determine the association between demographic and utility and medication adherence because the utility score was not distributed normally. An odds ratio (OR) and its 95% confidence interval (95% CI) were used to interpret the significance of an association, using a $P<0.05$ as the cut-off point for significance.

3. RESULTS

3.1. Demographic data of patients

A total of 80 participants were enrolled in the study, consisting predominantly of males (57.50%, n=46) with an average age of 72.91±1.22 years. Among the participants, 53.75% (n=43) had completed secondary school or its equivalent. They were covered by universal coverage, 62.50% (n=50), Civil Service Medical Benefits Scheme, 33.75% (n=27), and out-of-pocket 3.75% (n=3). The results for employment status, indicated that the majority of participants (80.00%, n=64) were engaged in various occupations, including self-employment (11.25%, n=9), government officials/state enterprise employees (3.75%, n=3), agricultural work (2.50%, n=2), private sector employees (1.25%, n=1), and general contractors/laborers. The average monthly income for the participants was 8,278.13 baht, while the average household income was 33,210.00 baht per household. In terms of medical conditions, a significant proportion of participants had comorbidities. Among the participants, 73.75% (n=59) had hypertension, 70.00% (n=56) had diabetes, and 41.25% (n=33) had heart disease. Additionally, 26.25% (n=21) had four comorbidities, and 16.25% (n=13) had five or more concurrent diseases, as presented in Table 1.

3.2. PAD health states

The findings of the study revealed the distribution across different health states of participants with PAD. Among the participants, 22.50% (n=18) were in the asymptomatic, 21.25% (n=17) were in the claudication, 13.75% (n=11) were in the critical limb ischemia, 3.75% (n=3)

Table 1. Baseline characteristics and clinical outcomes of participants (n=80).

Characteristics	No of participants (%) or mean±SD
Gender	
Male	46 (57.50)
Female	34 (42.50)
Average age (years)	72.91 ± 1.22
Marital Status	
Single	6 (7.50)
Married	70 (87.50)
Divorce	4 (5.00)
Education level	
Not studied	6 (7.50)
Primary school	43 (53.75)
Secondary school	28 (35.00)
Bachelor's degree or higher	3 (3.75)
Treatment right	
Civil Service Medical Benefits Scheme	27 (33.75)
Universal coverage	50 (62.50)
Out-of-pocket	3 (3.75)
Occupation	
None	64 (80.00)
Government officer	3 (3.75)
Private Employee	1 (1.25)
Self employed	9 (11.25)
Agriculture	2 (2.50)
Labor	1 (1.25)
Average patient's incomes	8,278.13 ± 2,019.83
Underlying disease	
Cardiovascular disease	33 (41.25)
Diabetes mellitus	48 (60.00)
Hypertension	56 (70.00)
Hyperlipidemia	59 (73.75)
Chronic kidney disease	17 (21.25)
Obesity	7 (8.75)
Cancer	3 (3.75)
Cerebrovascular disease	9 (11.25)
Gout	3 (3.75)
Asthma	1 (1.25)
Osteoporosis	1 (1.25)
Benign prostatic hypertrophy	1 (1.25)
Number of underlying diseases per patients	
No underlying disease	5 (6.25)
1	15 (18.75)
2	14 (17.50)
3	12 (15.00)
4	21 (26.25)
≥5	13 (16.25)

were in the repeat revascularization, 6.25% (n=5) were in the minor amputation, and 32.50% (n=26) were in the recovered state.

3.3. Quality of life and utility score

The patients demonstrated an average Visual Analog Scale (VAS) score of 69.6±1.78 points and an average EQ-5D-5L index utility score of 0.7±0.03 (Table 2). When examining the EQ-5D-5L index, it was observed that 62.50% (n=50) of the patients had a good quality of life (utility ≥0.7), while 37.50% (n=30) had a poor quality of life (utility <0.7). Furthermore, the analysis of utility values among patients at different stages of PAD revealed the following results. Patients in the asymptomatic stage had a utility score (mean±SD) of 0.89±0.18. Patients in the claudication, critical limb ischemia, repeat revascularization, minor amputation, and recovery stages had utility score of 0.64±0.30, 0.61±0.42, 0.74±0.09, 0.58±0.27, and 0.69±0.27, respectively. In addition, this study divided the severity of the disease according to Rutherford classification. (Table 3).

3.4. Medication adherence

The findings of the study regarding medication adherence revealed that out of the total sample of patients, 75 individuals exhibited a high level of medication adherence (scoring 34 points). The average score was 38.13± 2.05 points. Notably, the item with the lowest score was

Table 2. PAD patient's quality of life and utility score.

Domains	quality of life (mean±SD)	Utility (mean±SD)
Mobility	2.67±0.15	
Self-care	1.91±0.16	
Usual activities	1.91±0.14	
Pain/discomfort	2.11±0.11	
Anxiety/depression	1.61±0.09	
EQ-5D-5L index		0.71±0.03
Visual analog scale (VAS)	69.6±1.78	0.70±1.78

Remark: EQ-5D-5L index; a five-level version of the EuroQol five-dimensional descriptive system

Table 3. Utility score of patients with PAD at each stage of the disease.

Staging (n)	Rutherford classification	Utility score (mean±SD)
Asymptomatic (18)	stage 0	0.89±0.18
Claudication (17)	stage 1-3	0.64±0.30
Critical limb ischemia (11)	stage 5-6	0.61±0.42
Repeat revascularization (3)	N/A	0.74±0.09
Minor amputation (5)	N/A	0.58±0.27
Major amputation	N/A	-
Recovered (26)	N/A	0.69±0.27

Table 4. Medication adherence score.

Question	Average score (mean±SD)	Max score	Min score
1. Within the past month, how frequently did you forget to take your medication (excluding missed doses due to skipping meals)?	4.60±0.63	5	2
2. In the past month, how frequently did you modify your medication dosage according to your own judgment, either by taking more or less than the prescribed amount?	4.96±0.19	5	4
3. During the previous month, how frequently did you discontinue or cease taking your medication on your own accord?	4.96±0.19	5	4
4. During the previous month, how frequently did you fail to adhere to your medication schedule by not taking it within a one-hour window before or after your designated time?	4.00±0.95	5	1
5. During the past month, how frequently did you fail to consume all prescribed medications as directed?	4.89±0.39	5	3
6. During the previous month, how frequently did you miss consuming all meals, for instance, due to forgetting to have them, not being able to access them at work throughout the day, or neglecting to bring them along during extended travels?	4.83±0.44	5	3
7. How frequently do you fail to attend scheduled medical appointments (either missed or postponed)?	4.91±0.48	5	2
8. Do you refrain from taking medication or experience medication non-adherence due to infrequent attendance to scheduled medical appointments?	4.98±0.16	5	4
Average score	38.13±2.05	40	32

item number four, which assessed the frequency of medication non-adherence (The participants were not taking medications on time, more than one hour before or after the regular time) in the past month. The average score for this item was 4.00±0.95 points, as depicted in Table 4.

3.5. The dependence status based on their Barthel ADL Index score.

The results of the study on the practical ability of the Barthel ADL Index of PAD patients showed that patients indicated complete dependence (0-4 points) 1.25% (n=1), severe dependence (5-8 points) 12.50% (n=10), moderate dependence (9-11 points) 1.25% (n=1) and non-dependence (12-20 points) 85.00 % (n=68) as shown in Table 5 and Table 6.

3.6. Logistic regression analysis of utility score

The results of the multivariate analysis, specifically the logistic regression analysis using backward stepwise indicated likelihood ratio, revealed significant and factors associating utility values. These factors included educational level, occupation, and medication adherence. Patients with a primary school and lower were in the higher utility score (≥0.7) 5.07 times (95%CI 1.79-16.42) compared with the higher educational level. Additionally, patients with cerebrovascular disease demonstrated a decreased in utility score compared to those without the disease (OR=0.098, 95%CI0.01-0.94) (Table 7).

Table 5. The practical ability of the Barthel ADL index of patients with PAD.

Question	Number (%)
1. Feeding (Eat food when the table is prepared in front of you)	
Unable to put food in the mouth must have someone to feed.	2 (2.50)
You can scoop the food yourself, but you need someone to help you, for example, use a spoon to scoop it out or cut it into small pieces in advance.	2 (2.50)
Scoop food and help yourself normally.	76 (95.00)
2. Grooming (washed face, combed hair, brushed teeth, shaved in the past 24 - 28 hours)	
Need help	4 (5.00)
Do it yourself (including do it yourself if the equipment is provided)	76 (95.00)
3. Transfer (get up from the bed or from the bed to the chair)	
unable to sit (Always sit and fall) or have to use two people to help lift.	2 (2.50)
It requires a lot of help to sit, for example, it takes 1 strong or skilled person, or 2 normal people to support or push me up to sit.	7 (8.75)
Need some help such as telling me to follow or help support a little Or must someone take care of it for safety.	9 (11.25)
Can do it by yourself.	62 (11.75)
4. Toilet use (use the bathroom)	
Can't help myself	9 (11.25)
I can do some things myself (at least I can clean myself after I finish my errands), but I need help with some things.	11 (13.75)
Help yourself well (Able to sit and get off the toilet by himself. Can be cleaned after completing business and able to remove and put on clothes).	60 (75.00)
5. Mobility (moving within a room or house)	
Can't move anywhere	2 (2.50)
Have to use a wheelchair to help themselves move by themselves (No need to have a wheelchair) and must be able to enter and exit the corner of the room or the door.	8 (10.00)
Walk or move with help, such as being supported or being told to do so. or must pay attention to safety	14 (17.50)
Can walk or move on their own	56 (70.00)
6. Dressing (wearing clothes)	
Someone must wear it I could hardly help myself or little.	8 (10.00)
About 50% of the time I can help myself. The rest needs someone to help me.	11 (13.75)
Help yourself well (Including buttoning, zipping, or using adapted clothing.)	61 (76.25)
7. Stairs (Up and down one flight of stairs)	
Can't do	21 (26.25)
Need help	13 (16.25)
Able to go up and down on their own (If using a walking aid such as a walker, it must be able to go up and down as well)	46 (57.50)
8. Bathing	
Someone must help or make.	19 (23.75)
Can take a shower by yourself	61 (76.25)
9. Bowels (incontinence of defecation for the past 1 week)	
Incontinence or always needing a bowel movement	10 (12.50)
Can't hold back sometimes (less than once a week)	16 (20.00)
Can be held normally	54 (67.50)
10. Bladder (urinary incontinence in the past 1 week)	
Incontinence or inserting a urinary catheter but unable to take care of it yourself.	11 (13.75)
Can't hold back sometimes (less than once a day)	17 (21.25)
Can be held normally	52 (65.00)

Table 6. The dependence status based on their Barthel ADL Index score.

Dependence status	Number (%)
Complete dependence (0-4 points)	1 (1.25)
Severe dependence (5-8 points)	10 (12.50)
Moderate dependence(9-11 points)	1 (1.25)
Non-dependence (12-20 points)	68 (85.00)

Table 7. Associations between factors and utility score.

Variable	Utility score ≥0.7	Utility score <0.7	Unadjusted OR (95%CI)	Adjusted OR (95%CI)
Gender				
Male	36 (78.26)	10 (21.74)	5.14 (1.93-13.68)*	3.17 (0.96-10.52)
Female	14 (41.18)	20 (58.82)	1 (reference)	1 (reference)

Remark: **P*-value<0.2, ***P*-value<0.05, high level of medication adherence; low level of medication adherence

Table 7. Associations between factors and utility score. (cont.)

Variable	Utility score ≥0.7	Utility score <0.7	Unadjusted OR (95%CI)	Adjusted OR (95%CI)
Education level				
Primary school and lower	24 (48.00)	25 (83.33)	5.41 (1.79-16.42)*	5.07 (1.16-22.17)*
Higher primary school	26 (52.00)	5 (16.67)	1 (reference)	1 (reference)
Health insurance				
Non-Universal coverage	7 (23.33)	23 (46.00)	2.79 (1.01-7.70)*	2.73 (0.68-10.92)
Universal coverage	27 (54.00)	23 (76.67)	1 (reference)	1 (reference)
Occupation				
Working	3 (100.00)	0 (0.00)	12.43 (15.54-99.80)*	6.37 (0.65-62.64)
Not working	35 (54.69)	29 (45.31)	1 (reference)	1 (reference)
Cerebrovascular disease				
Yes	2 (22.22)	7 (77.78)	0.14 (0.03-0.71)*	0.098 (0.01-0.94)*
No	48 (67.61)	23 (32.39)	1 (reference)	1 (reference)
Medication adherence				
high level	49 (65.33)	26 (34.67)	7.54 (0.80-70.98)*	24.06 (0.44-1,296.12)
low level	1 (20.00)	4 (80.00)	1 (reference)	1 (reference)

Remark: **P*-value<0.2, ***P*-value<0.05, high level of medication adherence; low level of medication adherence

4. DISCUSSION

The findings of the study conducted at Siriraj Hospital regarding the utility values of patients with PAD revealed that out of the 80 participants, the majority were male, accounting for 46 individuals (57.50%), with an average age of 72.91±1.22 years. This aligns with the 2016 AHA/ACC treatment guidelines, which identify individuals over the age of 65 as a risk factor for PAD[10]. Consistent with a study by Namyotha et al., the majority of patients in our study were male, comprising 62.50% of the participants, with an average age of 65.84 years (SD=12.21)[17]. Moreover, a systematic review also reported a predominance of male participants in studies on PAD.

Peripheral arterial disease (PAD) is a prevalent medical condition that has the capacity to significantly impact the quality of life (QoL). Therefore, quality of life is a considerable outcome for PAD patients. A previous study measured quality of life of diabetic Egyptian patients with PAD by using SF-36, reported a score for general health was 15-75 which was significantly lower than that diabetic patients without PAD[18]. Another US study compared quality of life using SF-36 for PAD, CVD, and PAD with CVD patients an found that 59.8±1.0, 56.2±0.9, and 50.6±1.0 respectively[19]. One Thai study (n=82) reported an quality of life by SF-36 general health 75.08±7.06[20]. These three studies observed overall quality of life by using SF-36. However, the quality of life reported as utility is useful for economic evaluation and utility by state of disease is necessary. Our study used EQ-5D-5L which the value obtained can be converted to utility[21]. To our knowledge, there is only one study had ever measured the utility by disease states[13]. This point is acknowledged as the strength of our study.

We found the utility score of PAD patients indicated that the patients had an average visual analog scale (VAS) score of 69.6±1.78 points and an average utility EQ-5D-5L index of 0.71±0.03. When examining the EQ-5D-5L index, it was observed that 50 patients (62.50%) had a good quality of life. Furthermore, it was identified that the group of patients with PAD exhibited a lower level of health-related quality of life due to their health conditions. However, when analyzing the utility data based on the disease stage, it was found that patients in the asymptomatic stage of PAD had a higher utility value of 0.89, while patients in other stages exhibited values ranging from 0.58 to 0.74, suggesting an impact on their quality of life[22].

These results agree with a previous study conducted by Slovacek et al., which found that the utility value was 0.70 to 0.76 in stage IIa-IIb compared with 0.56 and 0.61 in stage III and IV patients, respectively and Weinstock et al. found the utility values of patients with PAD during claudication and limb ischemia to be 0.71 and 0.47, respectively[23-24]. The results showed that with increasing age and a serious stage of PAD in accordance with the Fontaine classification, quality of life declined because PAD was a chronic disorder characterized by exertional limb pain, loss of limb, and a high mortality rate.

Regarding medication adherence demonstrated high level of medication adherence, this might be due to most participants were non-dependent, as found that most participant had ADL total score above 11. However, a previous study conducted by Tantipiwattanasakul et al. highlighted the positive impact of having a caregiver involved in medication use could positively influenced medication adherence (P=0.026)[25]. In addition, patients with PAD had a lower quality of life than the general population due to leg pain at rest or leg ulcers. During the follow-up of treatment, other patients who had amputations were seen, resulting in better patient adherence in the use of medicines. Moreover, it was evident that patients afflicted with PAD experienced a diminished quality of life in comparison to the general population, largely attributable to the presence of distressing symptoms such as leg pain at rest or the occurrence of leg ulcers. Notably, throughout the course of treatment follow-up, a noteworthy observation was made regarding the experiences

of other patients who underwent amputations. Intriguingly, it was noted that this particular subgroup exhibited improved patient adherence to medications use, which may be considered a positive outcome in the management of their condition.

Moreover, Barthel Activities of Daily Living (ADL) index assessment. The findings revealed that the majority of patients exhibited non-dependence. Additionally, 11 patients demonstrated severe and complete dependence. A number of studies have shown that people with PAD, regardless of the presence/absence or types of leg symptoms, have reduced physical function[26-27]. In community-dwelling older adults, low and borderline low ABI suggestive of PAD were independently associated with poorer systemic physical function compared to those with normal ABI[27]. In addition, the patients in this study had stroke in 9 cases (11.25%). This results in the patient being more likely to become dependent. Although the patient is dependent, the patient tries to perform daily activities on his own as much as possible. These results are consistent with a previous study conducted by Sawatpol et al., which emphasized the importance of implementing appropriate care strategies for dependent elderly individuals, with a particular focus on their daily activities[28]. Safer et al. found that peripheral vascular disease (PVD) presence determined the poorer status of functional performance scores for basic activities of daily living (BADL) in demented individuals but not the level of instrumental activities of daily living (IADL)[29]. PAD patients with higher physical activity during daily life have reduced mortality and cardiovascular events compared with PAD patients with the lowest physical activity, independent of confounders[30]. This point highlighted the importance of awareness among patients and caregiver to maintain the good care of their legs to delay moving towards complete dependence.

In terms of factors associated the utility score, the results revealed that educational level, occupation, and medication adherence use significantly influenced the utility values of the patients. Specifically, patients who participated in the study exhibited a 7.18 times higher likelihood of having a better quality of life compared to those who did not participate. Furthermore, in the univariate analysis, patients with high level of medication adherence had a 7.54 times higher in utility score compared to those with a lower level of medication adherence. These findings indicate the multidimensional impact of various factors, encompassing both physical and mental aspects, on the patients' quality of life and economic well-being[31]. Similar research conducted by Baker also underscored the correlation between education level, occupation, and the quality of life of patients with other medical conditions, further supporting the significance of these factors[32].

This is the first study in Thailand measuring utility based on PAD health states-the results will be useful for economic evaluation. Several limitations however exist. The sample size is small, particularly for repeat revascularization, minor and major amputation. The data was collected by cross-sectional approach at out-patient service, limited to demonstrate long-term utility. Medication adherence was also assessed and identified as a potential factor for utility in the univariate analysis. We suggest to monitor medication adherence routinely during patient service. Further studies may consider to interview patients for additional information such as the number of medicines used, adverse reactions from medication, smoking, etc.

5. CONCLUSION

In conclusion, the results of this study shed light on various aspects related to the quality of life, medication adherence, and dependence status of patients with PAD. We found over half of the patients exhibited a good quality of life. Additionally, the study highlighted the importance of medication adherence, with a considerable number of patients demonstrating high adherence levels. Regarding patients' dependence status, most patients displayed a level of non-dependence in their activities of daily living, although a proportion exhibited varying degrees of dependence. Furthermore, the logistic regression analysis identified significant factors influencing utility values, including educational level, occupation, and medication adherence.

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Conflict of interest
None to declare.

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Ethics approval
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