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Factors influencing the Quality of Life of Patients with Pulmonary Hypertension at a University Hospital

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Abstract

Introduction: Patients with pulmonary hypertension (PH) are affected by symptoms such as fatigue, weakness, shortness of breath, depression due to dependence on others, and limitations in daily life activities, etc.
Objectives: To study the factors that influence the quality of life (QoL) of patients with pulmonary arterial hypertension (PAH) and chronic thromboembolic pulmonary hypertension (CTEPH).
Methods: This study employed a retrospective cross-sectional design using data from outpatient medical records of patients who attended the pulmonary vascular disease clinic (PVD Clinic) at a university hospital. The sample consisted of 78 patients aged 18 years and older who were diagnosed with PAH or CTEPH between January 2024 and December 2025. A questionnaire, consisting of three parts, was used as the research instrument: demographic characteristics, health assessment, and emPHasis-10, QoL assessment scale. Data analysis used descriptive statistics, including frequency, percentage, mean, and standard deviation.
Results: Patients with PAH had 64.1% and CTEPH had 35.9%. The assessment of patient QoL revealed that patients who underwent treatment over the 24-month period demonstrated a mean QoL score at a high level (M = 1.20, SD = 0.88). The factors that statistically significantly influenced QoL care among patients with PH ($p < 0.05$) included BMI, six-minute walk distance (6MWD), types of PH, physical limitation, Digoxin, and PAH-therapy. Collectively, these factors explained 28.8% ($R^2 = 0.288$) of the variance in patient's QoL, with a standard error of the estimate of 2.79 (SEE = 2.79).
Conclusion: The identification of factors influencing QoL among patients with PH offers meaningful implications for the prevention and management of health problems from the initial stage of health assessment. Family members and healthcare professionals may utilize these findings to develop more effective healthcare strategies and policies. Ultimately, such efforts are expected to sustainably promote and enhance the QoL for this patient population.

Keywords: *pulmonary hypertension, pulmonary arterial hypertension, chronic thromboembolic pulmonary hypertension, quality of life, emPHasis-10, outpatient.*

INTRODUCTION

Pulmonary hypertension (PH) is a complex cardiovascular condition that significantly impairs right ventricular function and the circulatory system. The populations most affected include patients with pulmonary arterial hypertension (PAH) and chronic thromboembolic pulmonary hypertension (CTEPH). Common symptoms include fatigue, dyspnea, reduced exercise capacity, and limitations in daily activities, all of which adversely affect patients' quality of life (QoL) across physical, emotional, social, and economic domains [1].

Pulmonary arterial hypertension (PAH) is caused by pathological changes in the small pulmonary arteries, including vasoconstriction, vascular remodeling, and luminal narrowing, resulting in progressively increased pulmonary arterial pressure. According to current diagnostic criteria, PAH is defined by a mean pulmonary arterial pressure (mPAP) greater than 20 mmHg, as measured by right heart catheterization [2]. Increased pulmonary vascular resistance leads to an elevated workload on the right ventricle, potentially resulting in right heart failure and life-threatening complications. However, early diagnosis is often delayed due to nonspecific symptoms that may be misattributed to other conditions such as asthma or age-related decline. Consequently, many patients present at advanced stages of the disease. Current management strategies include targeted pulmonary vasodilator therapies (oral, inhaled, and parenteral), supportive treatments such as diuretics and anticoagulants, oxygen therapy, and lifestyle modifications, including avoidance of strenuous activities, infection prevention, and contraception for high-risk women [3].

Chronic thromboembolic pulmonary hypertension (CTEPH) is a distinct and potentially curable subtype of PH if diagnosed and treated appropriately at an early stage. If left untreated, it may lead to right ventricular failure and death. CTEPH commonly develops acute pulmonary embolism. Although thrombi typically resolve spontaneously or with anticoagulant therapy, incomplete resolution in some patients leads to fibrotic obstruction of pulmonary arteries. This results in increased vascular resistance and sustained elevation of pulmonary arterial pressure, ultimately causing right ventricular overload and failure. Early symptoms are often nonspecific, such as fatigue, dyspnea, or decreased exercise tolerance, and may be misdiagnosed as asthma, pulmonary disease, or normal aging, contributing to delayed diagnosis. Current treatment options include: (1) medical therapy, particularly targeted pulmonary vasodilators and lifelong anticoagulation; (2) balloon pulmonary angioplasty (BPA) for inoperable cases or distal lesions; and (3) pulmonary endarterectomy (PEA), the gold standard treatment with curative potential [4, 5]. In addition to medical treatment, patient self-care—such as symptom monitoring, sodium and fluid restriction in cases of edema, and appropriate exercise—is essential.

Assessment of QoL in patients with PAH and CTEPH is crucial, as clinical parameters alone cannot fully capture patient's lived experiences. QoL assessment serves several purposes: (1) reflecting treatment outcomes from the patient's perspective, as patients may continue to experience fatigue or psychological distress despite clinical improvement; (2) supporting clinical decision-making, such as medication adjustment or inclusion of cardiopulmonary rehabilitation; (3) evaluating emotional and social well-being, given the high prevalence of anxiety and depression among patients with chronic illness; and (4) predicting prognosis, as poorer QoL is associated with higher rates of rehospitalization and mortality.

Despite advances in diagnosis and treatment, including targeted therapies and continuous hemodynamic monitoring, clinical outcomes alone do not adequately reflect patient's real-life experiences, particularly in terms of QoL. This is especially relevant in the Thai context, where data remain limited. Therefore, QoL assessment should be integrated into holistic care models to support individualized care planning. Holistic care encompasses four domains: (1) physical (e.g., need for rest, physical strength, ability to breathe comfortably during exertion), (2) emotional (e.g., frustration due to breathlessness and fatigue), (3) social (e.g., dependence on others and perceived burden), and (4) role and economic functioning (e.g., confidence in public, ability to communicate, and maintaining daily life) [1, 6].

Several instruments are commonly used to assess QoL in patients with PH. These include: (1) the emPHasis-10 questionnaire, a disease-specific tool designed for patients with PAH and CTEPH, known for its simplicity, brevity, and strong psychometric properties [7]; (2) the 6-minute walk test/distance (6MWT/6MWD), which evaluates functional capacity by measuring walking distance and endurance [8]; and (3) the World Health Organization functional classification (WHO-FC), which categorizes patients into four classes (I–IV) based on symptom severity and functional limitations.

In tertiary care hospitals, which serve large and diverse patient populations, studying QoL in these patients is essential for both clinical practice and health policy development. Therefore, this study aims to examine the QoL and factors influencing the QoL of patients with PH, consists of both PAH and CTEPH. The goal of improving patients' QoL is to develop more effective and contextually appropriate care strategies.

QUESTIONS

1. How the quality of life among patients with PAH and CTEPH in outpatient department a university hospital?
2. What factors influence the QoL of patients with PAH and CTEPH in outpatient department a university hospital?

OBJECTIVES

1. To examine the quality of life among patients with PAH and CTEPH in outpatient department a university hospital.
2. To study the factors that influence the QoL of patients with PAH and CTEPH in outpatient department a university hospital.

CONCEPTUAL FRAMEWORK

This study is guided by the QoL assessment framework proposed by Borgese et al. (2021), utilizing the emPHasis-10 questionnaire as the primary instrument to evaluate quality of life among patients with PH [9]. In addition, the holistic health care approach is adopted as the conceptual framework for this study.

This framework posits that improvement in one dimension of health may positively influence other dimensions. Similarly, addressing problems in one aspect of health can help reduce the impact on other aspects [6]. This holistic approach to QoL care is consistent with the conceptual framework underlying the QoL assessment for patients with pulmonary arterial hypertension [7], which employs the emPHasis-10 instrument. The tool comprises four key components: physical assessment, represented by fatigue; emotional assessment, represented by breathlessness; social assessment, represented by confidence; and functional capacity assessment, represented by control. These components can be summarized within the research conceptual framework as illustrated in Figure 1.

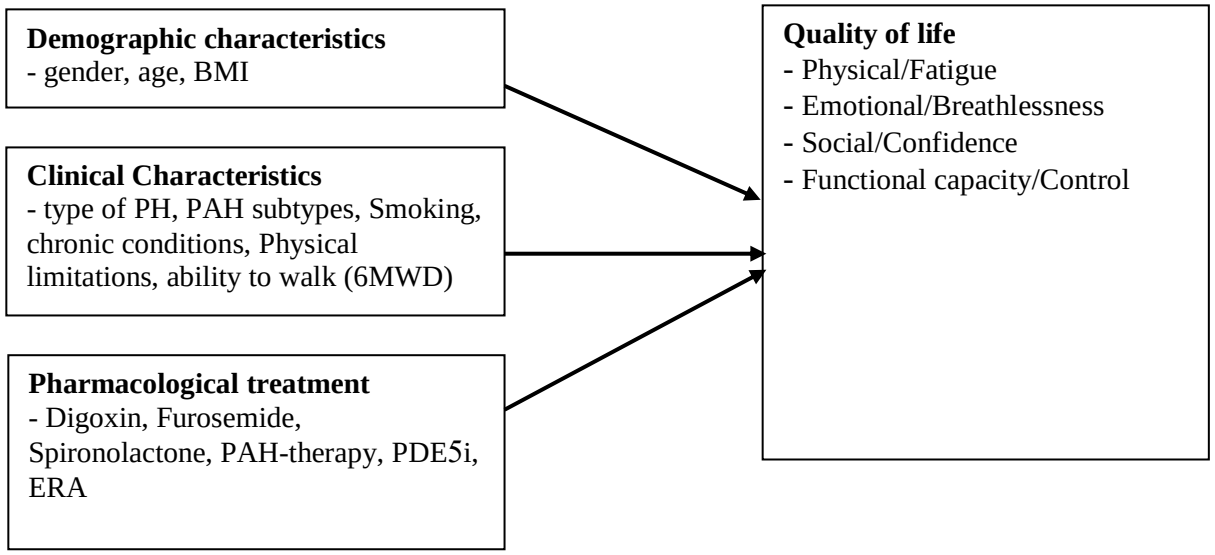

Figure 1. Conceptual Framework

METHODS

Study Design

This study employed a retrospective cross-sectional design, analyzing data from a single time point in the past using medical records. The study aimed to assess health status, pharmacological management, and health-related quality of life (HRQoL) among patients with PAH and CTEPH. The emPHasis-10 questionnaire was used as the primary instrument for evaluating quality of life.

Population and Sample

Population: The target population consisted of patients diagnosed with PAH or CTEPH who received treatment and follow-up care in outpatient department a university hospital.

Inclusion Criteria, Participants were included if they met the following criteria: Diagnosed with PAH or CTEPH according to established international diagnostic criteria (e.g., WHO classification/guidelines). Had at least one recorded assessment of quality of life using the emPHasis-10 questionnaire in their medical records. Were adults aged 18 years or older. Had complete clinical and demographic data as required for the study.

Exclusion Criteria, Participants were excluded if they met any of the following criteria: Incomplete or missing medical records that prevented retrieval of essential data. Deceased prior to the study period.

Sample Size Calculation: A purposive sampling or consecutive sampling method was employed, including all eligible patients who met the inclusion criteria within the specified study period. The sample size for estimating a population mean was calculated using the standard formula:

$$n = \left(\frac{Z\sigma}{E}\right)^2$$

Where:

- n = required sample size
- Z = Z-score corresponding to the desired confidence level (95% confidence level, $Z = 1.96$)
- σ = standard deviation (SD) of the emPHasis-10 score in the population; an SD of 9.0 was obtained from previous studies in patients with PH/PAH
- E = allowable error (precision), set at 2 points

By substituting the values into the formula:

$$n = \left(\frac{1.96 \times 9.0}{2}\right)^2 = 78$$

Therefore, the required sample size for this study was 78 participants.

Research Instruments

The instrument used to assess quality of life was the emPHasis-10 questionnaire, developed by the National Health Service (NHS), United Kingdom [7]. This disease-specific tool was designed to evaluate QoL in patients with PAH or CTEPH, and has been widely used internationally due to its simplicity, brevity, and responsiveness to clinical changes.

The emPHasis-10 consists of 10 items, each rated on a 6-point Likert scale ranging from 0 to 5. The total score ranges from 0 to 50, with higher scores indicating poorer quality of life or greater disease impact [9].

The interpretation of total scores is categorized into three levels:

- Scores of 0–16 indicate low-risk (better quality of life)
- Scores of 17–33 indicate moderate-risk
- Scores of 34–50 indicate high-risk (poorer quality of life)

In addition, the mean score interpretation can also be classified into three levels:

- Mean score of 0.00–1.67 indicates high quality of life
- Mean score of 1.68–3.34 indicates moderate quality of life
- Mean score of 3.35–5.00 indicates low quality of life

This study collected longitudinal data over a 24-month period, with quality of life assessed every 6 months at five time points: baseline, 6 months, 12 months, 18 months, and 24 months.

Data Collection

After obtaining approval from the Institutional Review Board (IRB) of Khon Kaen University, data access was granted through coordination with relevant departments (e.g., medical records unit and PH center) in accordance with approved protocols. Medical record data were obtained from outpatients who attended the pulmonary vascular clinic at a university hospital between January 2024 and December 2025.

Data sources included:

1. Electronic Medical Records (EMR) and/or paper-based medical records, used to extract demographic data, clinical information, and emPHasis-10 scores.
2. A structured Data Collection Form developed by the researchers to systematically record extracted data.

The medical record review process included the following steps:

1. Identification of medical record numbers of all eligible patients within the specified study period.
2. Data extraction conducted by trained researchers using the data collection form.

3. Extracted data included demographic characteristics, clinical variables, and emPHasis-10 scores recorded closest to other clinical assessments (e.g., 6-minute walk distance [6MWD]).
4. Data management procedures included verification of data completeness and accuracy, followed by entry into statistical analysis software.

Data Analysis

Descriptive statistics were used to summarize demographic and clinical characteristics, including frequency, percentage, mean, standard deviation. Also, the relationships between emPHasis-10 scores and key clinical variables—such as World Health Organization Functional Class (WHO-FC), and 6-minute walk distance (6MWD)—were analyzed using either Spearman's rank correlation coefficient or Pearson's correlation coefficient, as appropriate. Comparisons of emPHasis-10 scores across groups were conducted using the Kruskal–Wallis H test. Finally, multivariate regression analysis (MRA) was performed to identify independent predictors of QoL.

ETHICS

This study was approved by the Human Research Ethics Committee of Khon Kaen University (Approval No. HE691103; February 24, 2026). The researchers ensured the protection of participants' rights by maintaining confidentiality and anonymity. All data extracted from medical records were de-identified through coding procedures to prevent identification of individual patients. The data were securely stored and used solely for research purposes.

RESULTS

The study findings are presented in four parts as follows:

Part 1: Demographic Characteristics and Health Status

The majority of participants were female (n = 63, 80.8%), while males accounted for 15 participants (19.2%). The mean age of participants was 49.12 years (SD = 14.41), with approximately half aged ≤50 years and the other half aged >50 years. The mean age at diagnosis was 46.36 years (SD = 14.31), with most patients falling within the age range of 31–60 years (68.0%). Regarding health insurance coverage, most patients were covered by the Universal Coverage Scheme (n = 42, 53.8%), followed by the Civil Servant Medical Benefit Scheme (18.0%) and Social Security Scheme (n = 3, 3.8%). Notably, 19 patients (24.4%) had no recorded insurance information. The mean body mass index (BMI) was 22.27 kg/m² (SD = 4.78), which falls within the normal range. However, 14 patients (17.9%) were under-weight, and 29 patients (37.0%) were over-weight. Details are presented in Table 1.

Table 1: Demographic Characteristics and Health Status (N=78)

Variable	n	%
Gender		
Male	15	19.2
Female	63	80.8
Age (years) (M = 49.12, SD = 14.41)		
≤ 40	22	28.2
41-50	17	21.8
51-60	22	28.2
> 60	17	21.8
Age at Diagnosis (years) (M = 46.36, SD = 14.31)		
≤ 30	11	14.1
31-40	18	23.1
41-50	17	21.8
51-60	18	23.1
> 60	14	17.9
Health Insurance		
Universal Coverage Scheme	42	53.8
Civil Servant Medical Benefit Scheme	14	18.0
Social Security Scheme	3	3.8
Not specified	19	24.4
Body Mass Index (BMI) (M = 22.27, SD = 4.78)		
< 18.50	14	17.9
18.5 – 22.90	35	44.9
23.00 – 24.90	11	14.0
25.00 – 29.90	15	19.2

Variable	n	%
≥ 30.00	3	3.8

Part 2: Clinical Characteristics

Most patients were diagnosed with pulmonary arterial hypertension (PAH) (64.1%), while 35.9% had chronic thromboembolic pulmonary hypertension (CTEPH). Among PAH subtypes, the most common condition was PAH associated with congenital heart disease (48.0%). The majority of patients were non-smokers (64.1%), and nearly all had no comorbidities (97.4%). Regarding functional capacity, most patients reported mild limitations in physical activity. They were comfortable at rest but experienced fatigue, palpitations, or dyspnea during ordinary physical activity (69.2%). The mean 6-minute walk distance (6MWD) was 320.96 meters (SD = 90.38). Details are presented in Table 2.

Table 2: Clinical Characteristics of Patients (N = 78)

Variable	n	%
Type of PH		
PAH	50	64.1
CTEPH	28	35.9
PAH Subtypes		
Idiopathic PAH (iPAH)	19	38.0
PAH associated with connective tissue disease (CTD)	7	14.0
PAH associated with congenital heart disease (CHD)	24	48.0
Smoking Status		
Current or former smoker	28	35.9
Non-smoker	50	64.1
Comorbidities		
Present	2	2.6
None	76	97.4
Physical Limitation		
No limitation	14	18.0
Mild limitation	54	69.2
Marked limitation	9	11.5
Unable to perform any activity	1	1.3
6MWD (meters) (M = 320.96, SD = 90.38)		
≤ 200	11	14.1
201-300	16	20.5
301-400	38	48.7
> 400	13	16.7

Note. SD = standard deviation; PAH = pulmonary arterial hypertension; CTEPH = chronic thromboembolic pulmonary hypertension; CTD = connective tissue disease; CHD = congenital heart disease.

Part 3: Number, percentage, and QoL Assessment

The assessment of quality of life among patients with pulmonary arterial hypertension revealed that, over the 24-month treatment period, the majority of patients reported a high level of quality of life (71.8%), followed by a moderate level (26.9%), and a low level (1.13%). Overall, patients demonstrated a mean quality of life score at a high level (M = 1.20, SD = 0.88).

When categorized into 4 items, all items were similarly rated at a high level, as follows: 1) Breathlessness: encompassing irritability associated with breathlessness and shortness of breath during conversation (M = 1.03, SD = 0.89), 2) Fatigue: comprising the need for daytime rest, a feel exhausted, and a lack of physical energy (M = 1.36, SD = 0.83), 3) Control: including breathlessness when climbing a single stair and PH completely controls (M = 1.25, SD = 1.04), and 4) Confidence: encompassing a lack of confidence in public settings, completely dependent, and a feeling of being a burden (M = 1.12, SD = 0.96). Details are presented in Table 3.

Table 3: Number, percentage, and mean QoL scores of patients. (N = 78)

Items	High QoL		Moderate QoL		Low QoL		M	SD
	n	%	n	%	n	%		
Breathlessness	61	78.2	16	20.5	1	1.3	1.03	0.89
Fatigue	54	69.2	23	29.5	1	1.3	1.36	0.83
Control	54	69.2	22	28.2	2	2.6	1.25	1.04

Items	High QoL		Moderate QoL		Low QoL		M	SD
	n	%	n	%	n	%		
Confidence	58	74.4	18	23.1	2	2.6	1.12	0.96
QoL (mean score)	56	71.8	21	26.9	1	1.3	1.20	0.88

Note. Higher mean scores indicate poorer QoL.

Part 4: Association of Demographic Characteristics, Clinical, Pharmacological Treatment, and QoL

Categorical variables were analyzed using the chi-square test. The results showed that factors significantly associated with quality of life among patients with pulmonary hypertension ($p < .05$) included type of pulmonary hypertension, level of physical activity limitation, use of digoxin, use of phosphodiesterase type 5 inhibitors (PDE5 inhibitors), and PAH-specific therapy. Details are presented in Table 4.

Table 4: Associations Between Categorical Variables and QoL (N = 78)

Variable	Low Risk		Moderate–High Risk		χ^2	p-value
	n	%	n	%		
Gender						
Male	12	15.38	3	3.85	1.753	0.186
Female	39	50.00	24	30.77		
Type of PH						
PAH	28	35.90	22	28.20	5.420	0.020*
CTEPH	23	29.49	5	6.41		
PAH Subtypes						
iPAH	19	24.36	11	14.10	2.585	0.275
PAH with CTD	3	3.85	7	8.87		
PAH with CHD	22	28.20	16	20.52		
Smoking Status						
Smoker	22	28.20	6	7.69	3.356	0.067
Non-smoker	29	37.18	21	26.92		
Comorbidities						
Present	2	2.56	-	-	1.087	0.297
None	49	62.82	27	34.62		
Physical Limitation						
None	13	16.67	1	1.28	6.150	0.046*
Mild	33	42.31	21	26.92		
Severe	5	6.41	5	6.41		
Digoxin						
Yes	7	8.97	10	12.82	5.628	0.018*
No	44	56.41	17	21.80		
Furosemide						
Yes	21	26.92	15	19.23	1.469	0.226
No	30	38.46	12	15.39		
Spironolactone						
Yes	26	33.33	15	19.23	0.148	0.700
No	25	32.05	12	15.39		
PAH-therapy						
Single drug	40	51.28	15	19.23	4.443	0.035*
Combination therapy	11	14.10	12	15.39		
Combination Treatment						
PAH + other drugs	10	12.82	8	10.26	0.999	0.318
PAH only	41	52.56	19	24.36		
PDE5i						
Yes	51	65.39	25	32.05	3.877	0.050*
No	-	-	2	2.56		
ERA						
Yes	9	11.54	9	11.54	2.447	0.118
No	42	53.85	18	23.07		

*Note. *p < 0.05.*

Part 5: Factors Influencing QoL

The factors that significantly influenced quality of life care among patients with pulmonary arterial hypertension ($p < .05$) comprised two categories: 1) Demographic characteristics; including body mass index (BMI), 2) Clinical characteristics; including type of PH, 6MWD, and physical activity limitation, and 3) Pharmacological treatment factors; including the administration of Digoxin and treatment with PAH-therapy. It is also found that all factors in the model of research hypothesis can explain the variation of the QoL of patients with PH equal 28.8% (R2 = 0.288), and the standard error of estimate was 2.79 (SEE = 2.79). The equation for the QoL of patients with PH can be written as follows:

$$\mathbf{Y = 1.711 - .804X_1 - .707X_2 + .013X_3 + .760X_4 + .047X_5 + .523X_6}$$

Y refers to the QoL of patients with PH.

X_1 means that when patient' s BMI increases by one level, it will result in a reduce in their QoL by 0.804 units.

X_2 means that when patient' s type of PH increases by one level, it will result in a reduce in their QoL by 0.707 units.

X_3 means that when patient' s MWD6 (assessment: tolerance for performing daily activities) increases by one level, it will result in an increase in their QoL by 0.013 units.

X_4 means that when the level of no physical limitation of patients increases by one level, it will result in an increase in their QoL by 0.288 units.

X_5 means that when patient' s digoxin increases by one level, it will result in an increase in their QoL by 0.760 units.

X_6 means that patient' s PAH-therapy increases by one level, it will result in an increase in their QoL by 0.760 units.

These factors include demographic, clinical, and pharmacological treatment have a statistically significant influence on the QoL of patients ($p < 0.05$), ranked from least to most as follows: PAH-therapy (Beta = 0.214), MWD6 (Beta = 0.315), no physical limitation (Beta = 0.329), Digoxin (Beta = 0.331), types of PH (Beta = 0.388), BMI (Beta = 0.442). Details the factors and QoL are presented in Table 5.

Table 5: Factors Influencing QoL

Factors	Unstandardized Coefficients		Standardized Coefficients	t	*p-value*
	β	SE	β		
(Constant)	1.711	0.368		4.654	0.000
X_1: BMI	- 0.804	0.277	- 0.442	- 2.899	0.005
X_2: Types of PH	- 0.707	0.195	- 0.388	- 3.623	< 0.001
X_3: MWD6	0.013	0.011	0.315	2.869	0.005
X_4: No physical limitation	0.288	0.098	0.329	2.951	0.004
X_5: Digoxin	0.760	0.329	0.331	2.312	0.025
X_6: PAH-therapy	0.523	0.277	0.214	1.890	0.036

*Note: $R = 0.537$, $R^2 = 0.288$, R^2 adjust = 0.141, SEE = 2.79, *p-value < 0.05.*

DISCUSSION

The QoL among patients with PH receiving hospital treatment was over a 24-month period. Overall, the majority of patients reported a high level of QoL, with only a minority reporting moderate (26.90%) and low (1.30%) levels (Table 3). Within this group, male patients accounted for 3.85% and female patients for 30.77% of those with suboptimal QoL (Table 4). Patients with a high QoL were able to perform daily activities effectively, experienced fewer symptoms, or had better symptom control. In contrast, those with lower quality of life tended to experience more severe symptoms, leading to difficulties in daily living and self-care. These findings are consistent with previous research by Taichman (2005), which demonstrated that lower QoL, as measured by instruments such as the SF-36, is associated with survival outcomes. The SF-36 assesses multiple dimensions, including physical, mental, and functional health [10]. Additionally, the study reported that patients who received health promotion interventions showed significantly improved QoL compared to the control group ($p < .05$) [11].

The factors that statistically significantly influenced the QoL of patients with PH ($p < 0.05$), whereby an increase in these factors was associated with a decline in patient QoL, included BMI and type of PH. Specifically, patients with a higher BMI or increased body weight experienced a deterioration in QoL, while a greater number of PH subtypes was similarly associated with reduced QoL. These findings are consistent with a study examining the relationship between BMI and survival rates in patients with PAH, which found that BMI was significantly associated with age and obesity, and exerted a statistically significant effect on patient survival ($p < 0.001$) [12]. Furthermore, a study investigating the effects of a Basalop (Laos dancing) exercise program on blood pressure and BMI among hypertensive patients found that, following the intervention, patients with comparable BMI levels demonstrated significantly lower blood pressure than the control

group ($p < 0.05$) [13], indicating an improvement in QoL. Exercise also serves as a health-promoting activity that enhances patient safety and improves both physical and psychological functioning [14]. This reflects a holistic approach to patient care by healthcare professionals, including more effective nursing care [6, 15]. This concept can be explained by the fact that physical aspects reduce fatigue, emotional aspects reduce irritability and breathlessness, social aspects promote self-confidence, and competency aspects enhance the ability to control the severity of illness [7].

The factors that statistically significantly influenced the QoL of patients with PH ($p < 0.05$), whereby an increase in these factors was associated with an improvement in patient QoL, included 6MWD and the absence of physical activity limitations. Specifically, patients without physical limitations reported a greater sense of energy, an enhanced capacity to engage in physical activities, the ability to exercise, a longer distance covered within the 6-minute walk test, and improved self-care ability [16, 17]. In addition, pharmacological treatment factors were found to contribute to improved QoL, namely Digoxin administration and PAH-therapy. These findings are consistent with a study examining the effects of Bosentan-therapy in patients with congenital heart disease complicated by PAH at the Sirikit Heart Center of the Northeast, Khonkaen university, which demonstrated statistically significant clinical improvement ($p < 0.001$), resulting in enhanced QoL as evidenced by improved exercise capacity, better right ventricular function, reduced mean pulmonary arterial pressure, and decreased pulmonary vascular resistance [18]. Furthermore, a study on Vardenafil (VDF), which has limited bioavailability due to poor solubility and extensive hepatic metabolism, found that the sublingual formulation yielded favorable therapeutic outcomes [19]. These findings collectively indicate that pharmacological treatment can improve the QoL of patients with PH; however, the route of administration and the type of medication must be appropriately individualized for each patient.

LIMITATIONS

This study utilized retrospective data from medical records and employed a cross-sectional design. Therefore, the findings reflect previously occurring conditions and may be subject to limitations in data completeness and causal interpretation. Additionally, the results may not be generalizable to other populations or settings without appropriate contextual adaptation. Future studies should consider prospective designs and include additional variables to better understand causal relationships and improve the applicability of findings.

CONCLUSION

This study found that most patients with PH were female, with a mean age of 49.12 years (SD = 14.41), and were diagnosed at a mean age of 46.36 years (SD = 14.31). The average BMI was 22.27 kg/m² (SD = 4.78), and most patients were covered by universal health coverage. PAH was more common than CTEPH. Approximately 35.9% of patients had a history of smoking. Most patients had mild limitations in physical activity and an average 6-munute walk distance of 320.96 meters (SD = 90.38).

This research found that the overall QoL of PH patients was high (M = 1.20, SD = 0.88), with only a small percentage having a low QoL. Factors that significantly influenced the QoL of PH patients ($p < 0.05$) included BMI, type of PH, 6MWD, physical limitations, receiving Digoxin, and PAH-therapy.

REFERENCES

1. Ford HJ, Brunetti C, Ferrari P, Meszaros G, Moles VM, Skaara H, et al. Exploring the patient perspective in pulmonary hypertension. European respiratory journal. 2024;64(4): 1-20.
2. Simonneau G, Montani D, Celermajer DS, Denton CP, Gatzoulis MA, Krowka M, et al. Hemodynamic definitions and updated clinical classification of pulmonary hypertension. Eur Respir J. 2019;53(1)1801913; doi. 10.1183/13993003.01913-2018
3. Durongpisitkul K, Sompradeekul S, Nanagara R, Jakrapanichakul D, Wanitkun S, Limsuwan A, et al. Executive Summary Thai Pulmonary Hypertension Guidelines 2020. J Med Assoc Thai. 2021;104(4): 679-94. http://www.jmatonline.com
4. Gall H, Hoeper MM, Richter MJ, Cacheris W, Hinzmann B, Mayer E. An epidemiological analysis of the burden of chronic thromboembolic pulmonary hypertension in the USA, Europe and Japan. Eur Respir Rev. 2017;26(143):160121. doi. 10.1183/16000617.0121-2016
5. Panyawachiraphon N. Chronic thromboembolic pulmonary hypertension. Thai Journal of Tuberculosis Chest Diseases and Critical Care. 2017;36(2):69-78. (in Thai)
6. Wonginchan A, Tangpukdee J, Wonginchan S, Kearttiwongkru S, Konggungong S. Influencing Factor on School-Age Children's Holistic Health Care Who Using Online Media by Working-Age Parents in Northeast Thailand. Advances in Public Health. 2024; 10:1-7. doi.10.1155/2024/6615784.
7. Borgese M, Badesch D, Bull T, Chakinala M, DeMarco T, Feldman J, et al. EmPHasis-10 as a measure of health-related quality of life in pulmonary arterial hypertension: data from PHAR. European Respiratory Journal. 2021;57(2): 1-14.

8. Demir R, Küçükoğlu MS. Six-minute walk test in pulmonary arterial hypertension. Anatol J Cardiol. 2015;15(3):249-54. doi: 10.5152/akd.2015.5834. PMID: 25880178; PMCID: PMC5337064.
9. Hendriks PM, van Thor MC, Wapenaar M, Chandoesing P, van den Toorn LM, van den Bosch AE, et al. The longitudinal use of EmPHasis-10 and CAMPHOR questionnaire health-related quality of life scores in patients with pulmonary arterial hypertension and chronic thromboembolic pulmonary hypertension. Respiratory Medicine. 2021; 186:106525.
10. Taichman DB, Shin J, Hud L, Archer-Chicko C, Kaplan S, Sager JS, et al. Health-related quality of life in patients with pulmonary arterial hypertension. Respiratory research. 2005 Aug 10;6(1):92.
11. Benismaall A, Ruangdej K, Lim A, Chaosuansreecharoen P. An Effective Medical Care Program to Promote Health Behaviors and Quality of Life of Chronic Obstructive Pulmonary Disease Patients: A Case Study of Thungyangdaeng Hospital, Pattani Province. Nursing Journal of the Ministry of Public Health. 2013; 21(2): 39-49. (in Thai)
12. Weatherald J, Huertas A, Boucly A, Guignabert C, Taniguchi Y, Adir Y, et al. Association between BMI and obesity with survival in pulmonary arterial hypertension. Chest. 2018;154(4):872-81.
13. Teepala Y, Juntarawijit Y, Yunak R. Effects of Paslop dancing exercise program on blood pressure and body mass index for people living with hypertension. Nursing Journal. 2020; 47(3): 109-121. (in Thai)
14. Kagioglou O, Mouratoglou SA, Giannakoulas G, Kapoukranidou D, Anifanti M, Deligiannis A, et al. Long-term effect of an exercise training program on physical functioning and quality of life in pulmonary hypertension: a randomized controlled trial. BioMed research international. 2021;2021(1):8870615.
15. Wonginchan A, Haungthaisong U, Wonginchan S. The Influence of Online Media Use and Parental Education on the Holistic Self-Care of Secondary School Students in Post-COVID-19 Northeast Thailand. Ianna Journal of Interdisciplinary Studies. 2026; 8(1): (January 2026) 588– 600. doi.10.5281/zenodo.17732907
16. Aueyingsak S, Khankaew K, Teerawattananant W, Singsangtam P, Sanmueang A, Yasud M, Ekphaphan N, Pussadhamma B. Validity and reliability testing of the Thai version of the emPHasis-10 questionnaire for patients with pulmonary arterial hypertension. Journal of Patient-Reported Outcomes. 2026: 1-8. doi.10.1186/s41687-026-01017-0
17. Huang YC, Lin TY, Wu HT, Chang PJ, Lo CY, Wang TY, et al. Cardiorespiratory coupling is associated with exercise capacity in patients with chronic obstructive pulmonary disease. BMC Pulmonary Medicine. 2021;21(1):22 (1-10).
18. Phetcharat S, Makarawate P, Toimamueang U, Thepsuthammarat K. Effect of bosentan treatment: Case study among patients with pulmonary arterial hypertension associated with congenital heart disease in Queen Sirikit Heart Center of the Northeast. Journal of Community Health Development, Khon Kaen University. 2020; 8(4): 437-450. (in Thai)
19. McGee M, Whitehead N, Martin J, Collins N. Drug-associated pulmonary arterial hypertension. Clinical Toxicology. 2018 Sep 2;56(9):801-9.