



Factors influencing disease-related knowledge and health empowerment on health behavior compliance among patients after percutaneous coronary intervention in Korea: a cross-sectional study

Hyeon-Jung Lee¹ , Insook Lee²

¹Department of Cardiovascular Laboratory, Samsung Changwon Hospital, Changwon, Korea

²Department of Nursing, Changwon National University, Changwon, Korea

ABSTRACT

Purpose: This study investigated the influence of disease-related knowledge and health empowerment on health behavior compliance among patients who underwent percutaneous coronary intervention.

Methods: This descriptive correlational study involved 155 patients who underwent coronary intervention at a tertiary hospital. Data were collected using structured questionnaires measuring health behavior compliance, disease-related knowledge, and health empowerment from May to August 2024. Data were analyzed with descriptive statistics, the independent t-test, one-way analysis of variance, Pearson correlation coefficients, and multiple regression analysis using SPSS ver. 27.0.

Results: Participants showed mean scores of 0.67 ± 0.20 (out of 1) for disease-related knowledge, 3.25 ± 0.99 (out of 5) for health empowerment, and 1.76 ± 0.52 (out of 3) for health behavior compliance. Educational level ($t = -5.05$, $P < 0.001$) and monthly income ($F = 11.90$, $P < 0.001$) showed significant differences according to health behavior compliance. Multiple regression analysis revealed that health empowerment ($\beta = 0.69$, $P < 0.001$) and disease-related knowledge ($\beta = 0.17$, $P = 0.006$) were significant predictors of health behavior compliance, explaining 65% of variance ($F = 57.50$, $P < 0.001$).

Conclusion: These findings demonstrate that health empowerment and disease-related knowledge significantly affect health behavior compliance in post-coronary intervention patients. Healthcare providers should implement comprehensive interventions aimed at enhancing these factors to improve patient outcomes.

Keywords: Coronary artery disease; Health behavior; Percutaneous coronary intervention; Surveys and questionnaires; Treatment adherence and compliance

INTRODUCTION

Background

Acute coronary syndrome is a critical emergency condition requiring immediate intervention, with percutaneous coronary intervention (PCI) serving as the primary treatment approach in emergency settings. According to the Korea Dis-

ease Control and Prevention Agency, acute myocardial infarction cases in Korea have increased by 54.5% over the past decade, with mortality rates reaching 16.0% within 1 year and rising to 36.7% among patients aged 65 years and older [1]. Similarly, the American Heart Association reports that coronary artery disease remains the leading cause of death worldwide, emphasizing the urgent need for effective acute

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Correspondence to: Insook Lee (dobest75@changwon.ac.kr)

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and post-acute care management strategies [2]. This trend highlights the critical necessity of improving acute and long-term management strategies.

Although PCI has transformed acute cardiac care through its minimally invasive approach and improved survival rates [3,4], significant challenges persist regarding postprocedural outcomes. Clinical data indicate that 9.6% of patients experience adverse events, such as acute complications and recurrence, within the first year following PCI [5]. Readmission rates exhibit a concerning progression, from 3.3% to 15.8% at 1 month to 31.5% at 6 months post procedure [6]. Additionally, mortality rates associated with recurrent events are approximately four times higher than those of initial incidents [7].

The European Society of Cardiology emphasizes that successful post-PCI outcomes depend not only on the initial emergency intervention but also on patients' ability to understand and manage their health after discharge [8]. This dual emphasis is particularly vital during the initial 6 months following PCI [6], when the risk of acute complications—including stent thrombosis and sudden cardiac events—is highest [9,10].

Disease-related knowledge and health empowerment have emerged as crucial factors for preventing acute complications and reducing readmission rates. Recent evidence indicates that patients with greater disease-related knowledge display significantly improved self-management capabilities [10–12]. Similarly, patients with enhanced health empowerment demonstrate approximately 45% better adherence to recommended health behaviors [13]. Furthermore, comprehensive patient education initiated during acute care significantly decreases emergency department visits and readmission rates [12,13].

While acute care research has extensively explored clinical interventions, the association between disease-related knowledge and health empowerment among post-PCI patients remains relatively unexplored, particularly within emergency and critical care contexts. Understanding this relationship is essential for developing interventions that effectively transition patients from acute care into sustainable long-term health management. Thus, this study investigates the influence of disease-related knowledge and health empowerment on health behavior compliance among post-PCI patients, emphasizing acute care contexts. The findings will provide essential insights for developing comprehensive nursing interventions that bridge emergency care with long-term health management for this high-risk patient group.

Objectives

This study aimed to investigate the influence of disease-related knowledge and health empowerment on health behavior compliance among post-PCI patients. The specific objectives were as follows: (1) examine the levels of disease-related knowledge, health empowerment, and health behavior compliance among patients within 12 months post-PCI; (2) analyze the differences in these variables according to demographic factors (age, sex, education level, and income) and clinical characteristics (time since PCI, comorbidities, and complications); (3) investigate the relationships among disease-related knowledge, health empowerment, and health behavior compliance in the post-acute care phase; and (4) identify factors influencing health behavior compliance among post-PCI patients to inform the development of strategies aimed at improving acute care outcomes.

METHODS

Ethics statement

This study was approved by the Institutional Review Board of Samsung Changwon Hospital (No. SCMC 2024-04-017). Written informed consent for publication of the research details was obtained from all individual participants after a thorough explanation of the study's purpose and procedures. The researchers provided detailed information about the voluntary nature of participation, potential risks and benefits, and participants' rights to withdraw from the study at any time. Both oral and written informed consent were documented prior to study participation. No personally identifiable information was collected during the study. Participants reviewed all study documentation and agreed to the publication of their anonymized responses. The study was conducted in accordance with the principles of the Declaration of Helsinki and reported in compliance with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines.

Study design and setting

This descriptive correlational study examined the influence of disease-related knowledge and health empowerment on health behavior compliance among patients following PCI. Data collection took place from May 23 to August 5, 2024, targeting patients who underwent PCI between July 1, 2023, and April 30, 2024. Following institutional review board approval and departmental permission, potential participants were approached during their scheduled outpatient visits.

Research staff provided detailed study information to eligible participants and obtained written informed consent from those agreeing to participate. Data were collected in a private area within the outpatient clinic using structured questionnaires requiring approximately 15 minutes to complete. For participants experiencing difficulty with self-administration, research staff read questions aloud and recorded responses. Participants had opportunities to ask questions throughout the process. To ensure confidentiality, completed questionnaires were immediately sealed in individual envelopes and securely stored.

Participants

Participants were patients undergoing follow-up after PCI at the cardiology department of a tertiary hospital. Selection criteria included the following: (1) adults aged ≥ 18 years; (2) alert mental status with the ability to communicate; (3) within 12 months post-PCI; (4) no intensive care unit (ICU) admission after PCI; and (5) understanding of and written consent for study participation. The rationale for selecting patients within 12 months post-PCI was based on evidence indicating that although the risk of acute complications is highest within the first 6 months, health behavior patterns continue to evolve throughout the first year [14]. This time-frame allows exploration of compliance trajectories during the early acute phase (1–4 months), the adjustment phase (5–8 months), and the maintenance phase (9–12 months) [15]. Patients with ICU admission experience were excluded due to significant confounding variables such as post-intensive care syndrome and associated cognitive factors, which affect learning processes and health behavior adoption [16].

Variables and data collection

Outcome variables were items included in the questionnaire. Data are responses from participants to the survey questionnaires.

General characteristics

The study collected demographic data including age, sex, education level, religion, living arrangements, occupation, and monthly household income. Clinical characteristics comprised diagnosis, time since PCI, comorbidities, body mass index, family history of cardiovascular disease, and disease-related concerns.

Health behavior compliance

We assessed health behavior compliance using Choi [17]'s

validated instrument, which consists of 31 items covering eight domains: treatment adherence, continuous disease management, dietary control, exercise, daily life management, sleep, stress management, and emergency management (Material S1). Items were scored on a 4-point Likert scale (0 [strongly disagree] to 3 [strongly agree]). The instrument demonstrated excellent internal consistency in this study (Cronbach $\alpha=0.96$).

Disease-related knowledge

Disease-related knowledge was measured using Kim [18]'s instrument, which evaluates knowledge in five domains: disease characteristics (four items), risk factors (eight items), diet (seven items), medication (six items), and daily life and exercise (six items) (Material S2). Each correct response was scored 1 point; incorrect responses or "I don't know" responses received 0. The instrument demonstrated good reliability in this study (Kuder-Richardson formula 20=0.86).

Health empowerment

Health empowerment was assessed using a modified version of the Diabetes Empowerment Scale-Short Form developed by Anderson et al. [19], adapted for coronary artery disease patients (Material S3). The adaptation process included content validation by an expert panel comprising one nursing professor, two master's-prepared nurses, and five cardiologists. The Item-level content validity index (I-CVI) achieved 0.80. The eight-item instrument employs a 5-point Likert scale (1 [almost never] to 5 [almost always]). Internal consistency reliability was excellent (Cronbach $\alpha=0.94$).

Statistical analysis

The required sample size was estimated using G*Power ver. 3.1.9.2 (Heinrich Heine University Düsseldorf) for multiple regression analysis. Based on the parameters for multiple regression analysis (medium effect size, $f^2 = 0.15$; significance level, $\alpha=0.05$; power, $1-\beta=0.80$; and 15 predictor variables), a minimum of 139 participants was needed. Accounting for a potential 10% dropout rate as reported by Jung et al. [12], 155 questionnaires were distributed. All questionnaires were completed and included in the final analysis.

Several potential sources of bias should be acknowledged. Selection bias may have arisen due to recruitment from a single tertiary hospital, limiting generalizability to other health-care settings. The use of self-administered questionnaires introduces the possibility of self-report and social desirability biases, while recall bias may have affected the accuracy of

reported health behaviors. Additionally, unmeasured confounding variables may have influenced the observed relationships among study variables.

Data were analyzed using IBM SPSS ver. 27.0 (IBM Corp). Descriptive statistics were used to summarize participant characteristics and primary study variables. Group differences in health behavior compliance were assessed using independent t-tests and analysis of variance with Scheffé post hoc tests. Pearson correlation coefficients were calculated to examine associations among primary variables. Multiple regression analysis using the enter method was conducted to identify factors associated with health behavior compliance. Statistical significance was set at $P < 0.05$.

RESULTS

Demographic and clinical characteristics

The study sample comprised predominantly male participants (107 of 155 participants, 69.0%), with a mean age of 64.31 ± 11.10 years. Most participants had completed middle or high school education (96 participants, 61.9%), were employed (106 participants, 68.4%), and living with family members (135 participants, 87.1%). Monthly household income was distributed across three categories: less than US \$1,500 (44 participants, 28.4%), between US \$1,500 and \$2,500 (56 participants, 36.1%), and more than US \$2,500 (55 participants, 35.5%).

Clinical diagnoses included myocardial infarction (83 participants, 53.5%) and angina pectoris (72 participants, 46.5%). Most participants (63 participants, 40.6%) were within 5 to 8 months post-PCI, with a mean period of 5.99 ± 3.41 months. Comorbidities were present in 138 participants (89.0%), with hypertension being the most prevalent (85 participants, 61.6%). Obesity (body mass index $> 25 \text{ kg/m}^2$) was present in 59 participants (38.1%) (Table 1).

Disease-related knowledge, health empowerment, and health behavior compliance

Participants demonstrated moderate levels of disease-related knowledge (0.67 ± 0.20 ; possible range, 0–1). At the domain level, the highest accuracy was found in risk factor awareness (0.76 ± 0.25) and the lowest in characteristics of disease (0.59 ± 0.37). Health empowerment scores averaged 3.25 ± 0.99 out of a possible 5 points. Overall health behavior compliance had an average score of 1.76 ± 0.52 (possible range, 0–3) (Table 2).

Table 1. General and illness-related characteristics (n=155)

Characteristic	Value
Sex	
Male	107 (69.0)
Female	48 (31.0)
Age (yr)	64.31 ± 11.10
≤ 50	24 (15.5)
61–60	26 (16.8)
61–70	69 (44.5)
≥ 71	36 (23.2)
Occupation	
No	49 (31.6)
Yes	106 (68.4)
Religion	
No	51 (32.9)
Yes	104 (67.1)
Education level	
High school or less	96 (61.9)
Junior college or more	59 (38.1)
Household income (US\$)	
$< 1,500$	44 (28.4)
1,500–2,500	56 (36.1)
$> 2,500$	55 (35.5)
Living arrangement	
Living alone	20 (12.9)
Living with family members or others	135 (87.1)
Diagnosis	
Angina pectoris	72 (46.5)
Myocardial infarction	83 (53.5)
Time since PCI (mo)	5.99 ± 3.41
1–4	51 (32.9)
5–8	63 (40.6)
9–12	41 (26.5)
Comorbidity	
No	17 (11.0)
Yes	138 (89.0)
Body mass index (kg/m^2)	
< 23	49 (31.6)
23–25	47 (30.3)
> 25	59 (38.1)
Family history of CVD	
No	110 (71.0)
Yes	45 (29.0)
Experienced concern about sudden death	
No	75 (48.4)
Yes	80 (51.6)

Values are presented as number (%) or mean \pm standard deviation. PCI, percutaneous coronary intervention; CVD, cardiovascular disease.

Factors associated with health behavior compliance

Health behavior compliance varied significantly by educational level ($t=-5.05$, $P<0.001$) and monthly household income ($F=11.90$, $P<0.001$). Post hoc analyses revealed that individuals with monthly incomes of US \$1,500 or higher demonstrated significantly higher compliance than those with less than US \$1,500 ($P<0.001$). However, no statistically significant differences in health behavior compliance were observed according to clinical characteristics, including time since PCI ($F=0.30$, $P=0.744$) (Table 3).

Correlations among disease-related knowledge, health empowerment, and health behavior compliance

Pearson correlation analyses revealed significant positive relationships among all primary variables. Health empowerment demonstrated a strong positive correlation with health behavior compliance ($r=0.79$, $P<0.001$). Disease-related knowledge showed moderate positive correlations with both health behavior compliance ($r=0.56$, $P<0.001$) and health empowerment ($r=0.55$, $P<0.001$) (Table 4).

Factors influencing health behavior compliance

Multiple regression analysis identified health empowerment as the strongest predictor of health behavior compliance ($\beta=0.69$, $P<0.001$), followed by disease-related knowledge ($\beta=0.17$, $P=0.006$). The model explained 65% of the variance

in health behavior compliance ($F=57.50$, $P<0.001$, adjusted $R^2=0.65$). Diagnostic tests confirmed the model's assumptions: independence (Durbin-Watson test=2.05), normality of residuals (standardized residuals within ± 3), homoscedasticity ($P>0.05$, Breusch-Pagan test), and absence of multicollinearity (tolerance, 0.49–0.78; variance inflation factor, 1.28–2.03) (Table 5).

DISCUSSION

This study examined the influence of disease-related knowledge and health empowerment on health behavior compliance among post-PCI patients, yielding several significant findings relevant to acute cardiac care practice. Among 155 post-PCI patients, most were male, employed, and living with family. Health behavior compliance was significantly associated with education and income. Disease-related knowledge and health empowerment were positively correlated with compliance, with empowerment emerging as the strongest predictor ($\beta=0.69$, $P<0.001$). The regression model explained 65% of the variance. Participants demonstrated moderate knowledge (mean, 0.67) and empowerment (mean, 3.25), with highest knowledge in risk factors and lowest in disease characteristics.

Participants demonstrated moderate levels of health behavior compliance (1.76 ± 0.52). This consistently moderate

Table 2. Disease-related knowledge, health empowerment, and health behavior compliance (n=155)

Variable	Score	Skewness	Kurtosis
Disease-related knowledge ^{a)}	0.67±0.20	-0.60	-0.48
Characteristics of disease	0.59±0.37	-0.50	-1.21
Risk factor awareness	0.76±0.25	-1.06	0.43
Diet	0.65±0.21	-0.50	-0.36
Medication	0.65±0.24	-0.08	-0.86
Daily life and activity	0.72±0.23	-0.89	0.26
Health empowerment ^{b)}	3.25±0.99	-0.04	-0.82
Health behavior compliance ^{c)}	1.76±0.52	0.51	-0.10
Prescription adherence	2.00±0.62	0.13	-0.08
Continuous disease management	1.63±0.63	0.10	-0.14
Control of diet	1.77±0.67	0.14	-0.20
Physical exercise	1.76±0.70	0.08	-0.35
Daily life management	1.82±0.66	-0.17	0.22
Sleep	1.65±0.70	0.29	-0.39
Stress management	1.95±0.55	-0.03	-0.11
Emergent condition management	1.45±0.75	0.38	-0.15

Values are presented as mean±standard deviation.

Possible range are as follows: ^{a)}0–1 for overall and each domain; ^{b)}1–5; and ^{c)}0–3 for overall and each domain.

Table 3. Health behavior compliance according to general and illness-related characteristics (n=155)

Variable	Score	Test statistic ^{a)}	P-value ^{b)}
Sex		-0.32	0.748
Male	1.75±0.51		
Female	1.78±0.54		
Age (yr)		2.18	0.093
≤50	1.84±0.38		
61–60	1.91±0.58		
61–70	1.75±0.53		
≥71	1.60±0.50		
Occupation		-0.70	0.484
No	1.71±0.51		
Yes	1.78±0.53		
Religion		1.30	0.197
No	1.83±0.53		
Yes	1.72±0.52		
Educational level		-5.05	<0.001
High school or less	1.60±0.45		
Junior college or more	2.00±0.53		
Household income (US\$)		11.90	<0.001 ^{c)}
<1,500	1.47±0.47		
1,500–2,500	1.80±0.47		
>2,500	1.94±0.51		
Living arrangement		-1.17	0.244
Living alone	1.63±0.61		
Living with family members or others	1.77±0.51		
Diagnosis		-1.05	0.294
Angina pectoris	1.71±0.53		
Myocardial infarction	1.80±0.51		
Time since PCI (mo)		0.30	0.744
1–4	1.73±0.47		
5–8	1.79±0.56		
9–12	1.73±0.53		
Comorbidity		0.56	0.576
No	1.82±0.45		
Yes	1.75±0.53		
Body mass index (kg/m ²)		1.10	0.336
<23	1.70±0.49		
23–25	1.84±0.51		
>25	1.74±0.54		
Family history of CVD		-1.51	0.137
No	1.71±0.47		
Yes	1.87±0.62		
Experienced concern about sudden death		1.44	0.153
No	1.69±0.53		
Yes	1.81±0.51		

Values are presented as mean±standard deviation.

PCI, percutaneous coronary intervention; CVD, cardiovascular disease.

^{a)}Independent t-test was used for two-group comparisons (t-statistic) and analysis of variance was used for multigroup comparisons (F-statistic).

^{b)}Scheffé post hoc test. ^{c)}Individuals with monthly incomes of US \$1,500 or higher demonstrated significantly higher compliance than those with less than US \$1,500.

Table 4. Correlation among disease-related knowledge, health empowerment, and health behavior compliance (n=155)

Variable	Disease-related knowledge		Health empowerment		Health behavior compliance	
	r	P-value	r	P-value	r	P-value
Disease-related knowledge	1	-	0.55	<0.001	0.56	<0.001
Health empowerment	0.55	<0.001	1	-	0.79	<0.001
Health behavior compliance	0.56	<0.001	0.79	<0.001	1	-

Table 5. Multiple regression analysis of factors affecting health behavior compliance (n=155)

Factor	B	SE	β	t	P-value	Tolerance	VIF
Constant	0.29	0.10	-	2.82	0.005	-	-
Educational level (junior college or more vs. high school or less)	0.11	0.06	0.11	1.83	0.069	0.78	1.28
Household income (US\$)							
1,500–2,500 vs. <1,500	-0.07	0.07	-0.06	-0.96	0.341	0.57	1.75
>2,500 vs. <1,500	-0.08	0.07	-0.08	-1.11	0.269	0.49	2.03
Disease-related knowledge	0.45	0.16	0.17	2.81	0.006	0.62	1.61
Health empowerment	0.36	0.03	0.69	11.49	<0.001	0.63	1.59

R=0.81, R²=0.66, adjusted R²=0.65, F=57.50, P<0.001, Durbin-Watson=2.05.
SE, standard error; VIF, variance inflation factor.

compliance level, observed over the past decade, indicates room for improvement in post-PCI patient care. Active compliance with recommended health behaviors has been shown to reduce cardiac event recurrence by 42% and improve 5-year survival rates by 23% [20,21]. Current guidelines emphasize that optimal health behavior compliance is associated with significantly reduced adverse cardiac events and improved long-term outcomes [8,22]. Thus, adherence to recommended health behaviors is crucial for successful post-PCI recovery and reduced readmission rates.

Health empowerment emerged as the strongest predictor of health behavior compliance ($\beta=0.69$, $P<0.001$). This finding aligns with previous research by Ko and Kang [13], demonstrating that empowered patients exhibited 45% greater adherence to recommended health behaviors. Similarly, Wang et al. [23] and Guo et al. [24] reported significantly lower readmission rates among patients with high empowerment scores. Given the critical importance of health empowerment, we recommend specific strategies for enhancing empowerment among post-PCI patients: (1) implementing daily 15- to 20-minute empowerment sessions during hospitalization (days 1–5) that focus on problem-solving skills rather than mere knowledge transfer, as Crawford Shearer et al. [25] demonstrated that brief, focused sessions significantly improve self-efficacy even in acute care settings; (2) establishing a structured follow-up program during the discharge transition (weeks 1–4), including telephone consultations at 48 to 72 hours, 1 week, and 2 weeks post discharge, as Wood

et al. [26] found that this approach strengthens patients' problem-solving abilities regarding post-discharge issues; and (3) incorporating group-based empowerment activities during regular outpatient visits (months 1–12), focusing on peer support and shared problem-solving, as Anderson et al. [27] demonstrated that interactive approaches are more effective than traditional education methods. These strategies should be systematically integrated into standard post-PCI care protocols, as studies have shown they contribute not only to improved health behavior compliance but also to reduced readmission rates and enhanced self-management skills.

Disease-related knowledge demonstrated a significant but smaller effect ($\beta=0.17$, $P=0.006$) compared to health empowerment. This suggests that knowledge alone contributes less to improved outcomes than an integrated knowledge-empowerment approach [10–13]. The moderate level of knowledge observed in this study (0.67 ± 0.20) mirrors findings from recent acute care studies, suggesting a consistent gap in patients' understanding of complex medical concepts [4]. Risk factor awareness exhibited the highest accuracy (0.76 ± 0.25), while characteristics of disease showed the lowest (0.59 ± 0.37). This pattern aligns with previous research showing better patient understanding of preventive measures compared to more complex pathophysiological concepts [22]. The moderate knowledge levels highlight a need for more comprehensive education strategies in acute care settings, particularly regarding fundamental disease understanding

and management principles.

Our analysis, which dichotomized educational level (\leq high school vs. \geq junior college), revealed that patients with junior college education or higher demonstrated significantly better health behavior compliance in univariate analysis ($t=-5.05$, $P<0.001$) compared to those with lower educational levels. However, this relationship was not statistically significant in multiple regression analysis ($\beta=0.11$, $P=0.069$) when controlling for other variables. This finding partially aligns with previous research in confirming the bivariate relationship between education and health behaviors established by Kim and Lee [11] and Jung et al. [12]; however, it differs in that this relationship did not remain significant after adjusting for health empowerment and disease-related knowledge. The diminished effect of education in our multivariate model suggests health empowerment might mediate the relationship between educational background and health behavior compliance. Clinically, this implies that although patients with different educational backgrounds may initially exhibit varying compliance levels, targeted interventions that enhance empowerment could potentially bridge these educational disparities. For patients with lower educational attainment, clinicians should implement tailored educational approaches using visual materials and simplified explanations while simultaneously building self-efficacy and empowerment skills.

While significant differences in health behavior compliance across income levels emerged in bivariate analysis ($F=11.90$, $P<0.001$), multiple regression analysis did not identify income level as a significant predictor (between US \$1,500 and \$2,500: $\beta=-0.06$, $P=0.341$; more than US \$2,500: $\beta=-0.08$, $P=0.269$). This finding contrasts with prior studies by Park et al. [9] and Ko and Kang [13], which reported income as a key influencing factor. Several reasons may explain this discrepancy. First, Korea's universal healthcare coverage may have mitigated accessibility gaps related to income differences in our sample. Second, the strong influence of health empowerment likely overshadowed the effects of income, suggesting empowerment might mediate the relationship between socioeconomic factors and compliance behaviors. This finding carries important clinical implications, suggesting interventions focused on enhancing health empowerment rather than directly addressing income disparities may effectively improve health behaviors across all socioeconomic groups in healthcare systems with universal coverage.

These findings indicate that improving health behaviors in PCI patients requires an integrated approach beyond mere

knowledge transfer. Educational interventions should incorporate empowerment principles and practical self-management skills, shifting away from traditional information-driven models. A comprehensive educational program incorporating disease-specific knowledge education and empowerment strategies is essential, with particular emphasis on practical problem-solving exercises and the development of self-management skills.

Health behavior compliance scores did not differ significantly according to time since PCI ($F=0.30$, $P=0.744$). Although our data did not demonstrate changes in compliance levels, previous research has shown psychosocial factors influencing health behaviors diminish over time [28]. Thus, intervention timing might be crucial, with the immediate post-PCI period potentially representing a critical window for establishing sustainable health behaviors.

Based on the findings of this study, we propose a three-phase intervention approach. In the acute phase (hospitalization), healthcare providers should initiate empowerment-focused education immediately post procedure when motivational readiness is typically highest. Brief daily empowerment sessions (15–20 minutes) during hospitalization significantly enhance self-efficacy [29]. Initial assessments using validated brief instruments provide a foundation for tailored interventions. In the transition phase (hospital to home), healthcare teams should implement a structured transition program involving telephone follow-ups at 48 to 72 hours, 1 week, and 2 weeks post discharge. An empowerment-based approach to strengthen problem-solving abilities for issues post discharge is particularly effective during this period [26]. In the maintenance phase (outpatient follow-up), clinicians should promote sustained compliance through group-based empowerment sessions during regular outpatient visits, emphasizing problem-solving and self-management skills rather than mere knowledge transfer [27].

The study findings have several important implications for acute cardiac care practice. Healthcare providers should develop and implement rapid assessment tools to evaluate patient empowerment levels during acute care stays, enabling early identification of patients requiring additional support. Empowerment strategies should be systematically integrated into standard post-PCI care protocols [12], as these approaches can contribute to improved health behavior compliance [13] and enhanced emergency preparedness and self-management skills [22]. Additionally, educational interventions should be tailored to patients' socioeconomic backgrounds while maintaining the required intensity in

acute care settings.

Limitations

This study has several limitations. The single-center design at one tertiary hospital may limit its generalizability to other acute care settings. The cross-sectional design prevents an examination of causal relationships between health empowerment and compliance behaviors over time. Specifically, there is potential bias related to varying PCI timeframes among participants (1–4 months, 5–8 months, and 9–12 months). Additionally, the self-reported nature of our data may introduce social desirability and recall biases, potentially affecting the validity of findings related to health behavior compliance. Our study did not collect data on the number of PCI procedures and stent placements, which could be important variables influencing compliance behaviors. Previous research suggests that patients who underwent multiple PCI procedures or received multiple stents might exhibit different patterns of health behavior compliance due to heightened disease severity awareness.

While we excluded patients who had been admitted to the ICU, these high-risk patients might have greater needs for disease-related knowledge and health empowerment. Future research should explore these variables among PCI patients with ICU experiences and include additional clinical variables, such as the number of procedures and stent placements, to develop a more comprehensive understanding of how procedural complexity influences patients' disease-related knowledge, health empowerment, and subsequent compliance behaviors. Longitudinal studies are also recommended to investigate changes in relationships among these variables over time and to track individual patients' recovery trajectories.

Conclusions

This study demonstrates that health empowerment and disease-related knowledge significantly influence health behavior compliance among post-PCI patients, with health empowerment identified as the strongest predictor. These findings highlight the necessity for comprehensive interventions integrating both knowledge enhancement and empowerment strategies within acute care settings. Future research should focus on developing and evaluating targeted interventions that can be effectively implemented in acute care, emphasizing support for patients' transition from acute to outpatient care through enhanced empowerment and education strategies.

ARTICLE INFORMATION

Author contributions

Conceptualization: all authors; Data curation: all authors; Formal analysis: all authors; Methodology: all authors; Supervision: IL; Writing–original draft: all authors; Writing–review & editing: all authors. All authors read and approved the final manuscript.

Conflicts of interest

The authors have no conflicts of interest to declare.

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The authors declare that they have used generative artificial intelligence, specifically the large language model Claude (Anthropic), to assist with the translation and editing of the English language in drafting the manuscript. All academic content and analyses were conducted by the authors, and the generative artificial intelligence tool was used solely as an auxiliary means for improving linguistic expression and English proofreading.

Data availability

Data analyzed in this study are available from the corresponding author upon reasonable request.

Additional information

This study is based on a reanalysis and reorganization of Hyeon-Jung Lee's master's thesis completed in 2024.

Supplementary materials

Material S1. Health behavior compliance questionnaire.

Material S2. Knowledge of coronary artery disease questionnaire.

Material S3. Health Empowerment Scale-Short Form.

Supplementary materials are available from <https://doi.org/10.17479/jacs.2025.0005>.

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