

Psychological factors associated with functional recovery among patients with a peripheral arterial disease after lower extremity bypass



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Functional recovery, described by walking ability, is one of the significant outcomes for patients with peripheral arterial disease (PAD) after lower extremity bypass. Little is known about associated factors that help to improve this outcome. The purpose of this study was to examine factors associated with functional recovery among patients with PAD after lower extremity bypass, such as postoperative period, social support, and depression. Data were collected in a University Hospital in Bangkok, Thailand. A sample of 77 patients with PAD receiving lower extremity bypass treatment was recruited into the study. The interview questionnaires consisted of demographic characteristics, Medical Outcome Study social survey, Thai Geriatric Depression Scale, and Walking Impairment Questionnaire. Reliability of each instrument was 0.97, 0.87, and 0.92, respectively. Pearson's correlation was performed to identify the factors associated with functional recovery. The mean values of age, postoperative period, and walking ability score were 63.92 years (standard deviation [SD] = 11.21), 4.19 years (SD = 3.52), and 62.52 (SD = 13.83). Functional recovery and social support were significantly associated with depression ($r = -0.272$, $P < .05$; $r = -0.463$, $P < .01$, respectively). The postoperative period was also significantly associated with social support ($r = 0.247$, $P < .03$). In conclusion, psychological factors were significantly related to functional recovery among patients with PAD after lower extremity bypass. Therefore, health-care providers should consider these factors during discharge planning, and screening depression score as baseline should be performed. (J Vasc Nurs 2018;37:3-10)

Peripheral arterial disease (PAD) is an important manifestation of atherosclerosis disease. It is estimated to affect approximately 8.5 million Americans older than 40 years,¹ and it has been estimated that 202 million people worldwide have PAD.² PAD is associated with significant morbidity, mortality, and quality of life (QOL) impairment.^{1,2} The World Health Organization (WHO) has revealed that the greatest number of PAD patients were located in Southeast Asia and the Western Pacific regions, which comprises the low-income and middle-income countries. However, the true variation in prevalence between countries is

not clearly known according to measurements and selected population.³ In Thailand, the prevalence of PAD was 102 per 100,000 populations.⁴ The classic symptoms of PAD are intermittent claudication (IC) and critical limb ischemia (CLI).⁵ IC is a symptom that describes muscle pain on mild exertion, which occurs during exercise. CLI also refers to limb threat and is an advanced stage of PAD. It is defined as a triad if involves ischemic rest pain, arterial ischemic ulcer, and gangrene.^{5,6} CLI has a negative prognosis within a year after the initial diagnosis, with 1-year amputation rates of approximately 12% and mortality of 50% at 5 years and 70% at 10 years.⁵

Patients with more severe PAD had greater functional impairment.⁷ Moreover, advanced stages of PAD and their comorbidities also related to complexity of treatments and management, prolonged postoperative length of stay, and poor functional recovery outcomes after surgery.^{5,6} Interestingly, Thai patients with PAD often presented with CLI, including high-risk factors such as aging, tobacco smoking, and their comorbidities, that is, diabetes, hypertension, dyslipidemia, or coronary artery disease (CAD).^{4,8,9}

There are several possible treatments and management strategies for patients with PAD, including lifestyle changes such as cessation of smoking, an exercise program, control of blood sugar level, and low-salt and low-fat diet. However, in patients with severe PAD and CLI, more intensive vascular management, including revascularization by arterial bypass, endovascular procedure, and/or amputation, are needed.⁵ Lower extremity

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bypass surgery is the traditional procedure which is a treatment option when PAD affects the legs and feet. It is a well-established and highly effective procedure.⁶ Generally, the primary goals of lower extremity bypass surgery are to improve walking distance, diminish symptoms of IC, or increase limb salvage of patients with PAD and CLI.^{5,6} Therefore, patients who have undergone successful bypass surgery should expect to have significant functional recovery, including pain relief, improved wound healing, improved walking ability, and long-term freedom from amputation as long as the graft continues to function.^{5,6}

Functional recovery is defined as the patient's ability to perform normal daily activities required to meet basic needs, fulfill usual roles, and maintain health and well-being.¹⁰ Prior studies have revealed that important outcome measures of lower extremity bypass surgery were the technical and clinical success rates such as limb salvage; graft patency; revascularization^{5,6}; and improved wound healing, walking ability, and QOL.¹¹

Walking ability is a component of functional status.⁵ It is an important expected outcome after surgery for patients with PAD. However, this outcome might not be achieved when related to signs and symptoms before surgery, especially among those who presented with CLI.^{5,6} Sometimes, even after revascularization, the impaired circulation of the lower extremity cannot meet the energy needs of the active musculature, leading to pain during ambulation (claudication). Consequently, these patients have walking ability dysfunction such as reduced walking speed, reduced walking distance, and limitations in stair climbing, as well as difficulty in completing activities of daily living that require the lower extremities.¹²

A variety of studies have demonstrated that psychosocial factors play a significant role in recovery and are predictive of surgical outcomes, even accounting for several clinical factors.¹³ Anxiety, depression, and lack of social support in particular are described as well-known risk factors in the course of recovery after surgery.^{14–16} Walburn et al¹⁷ reported that psychological distress resulting from the experience of surgical complications also led to delays in patients' recovery from surgery as increased levels of stress delay wound healing.^{17,18}

Social support is one of the psychological factors that are associated with QOL and physical functioning among patients with PAD. Social support generally refers to the availability of the relationships that convey to an individual the feeling that he or she is cared about, valued, or loved.¹⁹ Most of the literature on social support and cardiovascular disease refers to support provided by the significant others in the lives of the patient or that support supplied by health-care professionals in medical or postmedical discharge settings. Remes et al²⁰ demonstrated that social support is important for PAD patients with revascularization when under stressful situations. This study also reported that PAD patients with revascularization commonly perceived support from a close person outside of the family, such as a home nurse or other caring professionals. However, many of them felt that they did not get support. Lack of social support led to lower QOL and decline in walking ability among PAD patients after revascularization.²⁰ Another study revealed that patients who perceived having low social support had increased 2-year progression of coronary atherosclerosis, as confirmed by coronary angiography.²¹

Many studies have demonstrated that depression is related to poor prognosis in patients with established CAD and PAD. Grenon et al²² reported that depressive symptoms were significantly associated with the prevalence of PAD among patients with CAD at baseline, and modifiable cardiovascular risk factors are partly responsible for this association.

In patients with existing PAD, previous studies have found that those with depression have worse functional outcomes, greater need for revascularization, poorer QOL outcomes after revascularization, and higher risk for adverse events after revascularization.^{22–28} McDermott et al²⁹ found that depression was present in 22% of patients with PAD and that depressive symptoms were associated with greater impairment in lower extremity functioning. Therefore, depression can impair the health and QOL in patients even after PAD treatment. In addition, Pinto et al¹⁶ also demonstrated that depression or anxiety led to prolonged recovery or long-lasting disability (eg, severe postoperative pain and permanent disfigurement). Cherr et al²⁸ demonstrated that patients with depression were at a significantly increased risk for recurrent symptomatic PAD (hazard ratio, 1.77; 95% confidence interval, 1.03–3.02; $P = .04$) and failure of revascularization (hazard ratio, 2.18; 95% confidence interval, 1.22 to 3.88; $P < .01$).

In summary, prior studies have reported multiple factors associated with functional recovery among patients with PAD after surgery. However, little is known about factors associated with functional recovery among this group of Thai patients. Therefore, this study aimed to describe and examine factors associated to functional recovery among patients with PAD after lower extremity bypass surgery.

METHODS

This was a descriptive study. Data collection was conducted after research approval was obtained from the ethics committees of the Mahidol University (774/2556:EC4). This investigation conforms to the principles outlined in the Declaration of Helsinki. Written informed consent was obtained from all participants before data collection.

SAMPLING PROCEDURE

A convenience sampling procedure was used to enroll Thai patients aged 18 years and older. They were diagnosed with PAD, have undergone lower extremity bypass surgery, and were undergoing follow-up in surgical clinics of a tertiary care hospital in Bangkok, Thailand. The target sample comprises patients who met these inclusion criteria: 1) undergoing only one bypass surgery intervention; 2) attending an outpatient clinic for follow-up treatment; and 3) being cognitively intact. Cognition was screened in patients aged 60 years and older using the Mini-Mental State Examination score Thai version (MMSE-T).³⁰ Anyone with a score more than 14 of 30 was included.

The following were the exclusion criteria: 1) patients who had undergone a prior lower extremity vascular surgical endovascular procedure or transmetatarsal (below-the-knee or above-the-knee) amputation; 2) patients having pain or discomfort during walking from their comorbidities, such as arthritis, lower back pain, musculoskeletal problems, and neuropathy.

The required sample size was calculated based on the power analysis for multiple regressions; the significance level was 0.05, power of test, 0.8, and moderate effect size, 0.13.³¹ This sample size of 77 patients had sufficient power to find a significant difference in the tested correlates if such a difference exists.

MEASUREMENTS

Each patient's demographic and clinical information was derived from medical records by an investigator using an investigator-designed questionnaire. Of particular interest was the participant's smoking history as it is linked to the onset of PAD. The functional recovery outcome measured was the walking ability, details of which were obtained by interview using the Walking Impairment Questionnaire¹² (WIQ) measurement, Thai version.³² The WIQ was developed as a simple self-administered tool to measure the level of pain, walking distance, walking speed, and stair-climbing capacity in patients with PAD in the outpatient setting and validated in patients with IC.¹²

The WIQ consists of four subcategories: pain, distance, walking speed, and stair-climbing ability. In the WIQ, the participant is asked to assess the presence or absence of pain while walking and the degree of difficulty in walking specific distances (ranging from walking indoors to 1,500 feet or five blocks) on a graded scale from zero to four. A score of zero represents the inability to walk the distance in question, and a score of four represents no difficulty to walk. In the WIQ speed score, the participant is asked to assess the degree of difficulty in walking one block at specific speeds ranging from walking slowly to jogging on a graded scale ranging from zero to four. In the WIQ stair-climbing score, the participant is asked to report the degree of difficulty climbing specific numbers of flights of stairs ranging from one to three flights on a graded scale ranging from zero to four. Lower WIQ speed scores represent the inability of walking indoors to 1,500 feet. Lower WIQ stair-climbing scores also represent the inability to climb stairs, from one to three flights of stairs.¹² The maximum score of all domains is 80. Scores of 0–27 are considered low level of walking ability and functional recovery; 28–54 indicate moderate level of walking ability and functional recovery; and 55–80 indicate high level of walking ability and functional recover. In this study, the reliability of the WIQ (Thai version) score was tested using Cronbach's alpha coefficient. It was equal to 0.92.

In addition to these physical parameters, psychological factors of social support and depression were measured. The Medical Outcome Study (MOS) social survey,³³ Thai version,³⁴ was used to measure social support scores by interview. The MOS social interview survey contains 19 items measuring five dimensions of social support on a rating scale ranging from one to five: 1) emotional support (the expression of positive affect, empathetic understanding, and the encouragement of expressions of feelings); 2) informational support (the offering of advice, information, guidance, or feedback); 3) tangible support (the provision of material aid or behavioral assistance); 4) positive social interaction (the availability of other persons to do fun things with you); and 5) affectionate support (involving expressions of love and affection); the maximum score is 95. Scores of 19–34 indicate the lowest level of social support; 35–49 indicate low level of social support; 50–64 indicate moderate level of

TABLE 1

CHARACTERISTICS OF PARTICIPANTS (N = 77)

<i>Demographics factors</i>	<i>Values</i>
Age, mean(±standard deviation), y	63.9 (±11.2)
Gender, n (%)	
Male	55 (71.4)
Female	22 (28.6)
Marital status, n (%)	
Single	18 (23.4)
Married	59 (76.6)
Occupation, n (%)	
Unemployed	17 (22.08)
Employee	29 (37.66)
Agriculturist	10 (12.99)
Government officer	11 (14.28)
Merchant	10 (12.99)
Household income (Baht/mo), n (%)	
Less than 5,000	18 (23.38)
5,001–10,000	32 (41.56)
10,001–30,000	23 (29.87)
More than 30,000	4 (5.19)
Educational level, n (%)	
None	7 (9.09)
Elementary school	40 (51.95)
High school	20 (25.97)
Bachelor's degree or above	10 (12.99)
Type of payment, n (%)	
Self-payment	5 (6.49)
Social security	5 (6.49)
Reimbursement	27 (35.06)
Universal coverage	39 (50.65)
Tobacco use, n (%)	
Never smoked	21 (27.3)
Ever smoked	56 (72.7)
Smoking duration, mean (±standard deviation) y	23.56 (±18.68)
Pack-years of smoking, mean (±standard deviation) pack-year	22.15 (±24.02)

social support; 65–79 indicate high level of social support; and 80–95 indicate the highest level of social support. The reliability of the MOS social survey (Thai version) score was tested using Cronbach's alpha coefficient. It was equal to 0.97.

Depression symptoms among participants were obtained by interview using the Geriatric Depression Scale³⁵ Thai version (TGDS).³⁶ TGDS is a self-report scale for Thai elderly to assess

TABLE 2

CLINICAL AND PSYCHOLOGICAL CHARACTERISTICS OF PARTICIPANTS (N = 77)

<i>Clinical factors</i>	<i>Values</i>
Comorbidity, n (%)	
No comorbidity	11 (14.29)
Had comorbidity*	66 (85.71)
Hypertension	41 (62.12)
Type II diabetes mellitus	37 (56.06)
Dyslipidemia	54 (81.82)
Heart disease	16 (24.24)
Chronic kidney disease	4 (6.06)
Number of comorbidities*	
1 Disease	21 (31.81)
2 Diseases	22 (33.33)
3 Diseases	15 (22.73)
4 Diseases	5 (7.58)
5 Diseases	3 (4.55)
Chief complaint, n (%)	
Intermittent claudication	24 (31.2)
Critical limb ischemia [†]	53 (68.8)
Rest pain	11 (20.75)
Tissue loss	42 (79.25)
Ischemic ulcer	37 (88.10)
Gangrene	5 (11.90)
Location of occlusive lesion	
Aortoiliac arterial occlusion	14 (18.18)
Iliofemoral arterial occlusion	9 (11.69)
Femoropopliteal arterial occlusion	37 (48.06)
Bilateral femoropopliteal arterial occlusion	9 (11.69)
Popliteal arterial occlusion	4 (5.19)
Tibioperoneal arterial occlusion	4 (5.19)
Vascular intervention	
Aortofemoral arterial bypass grafting	11 (14.29)
Femoropopliteal arterial bypass grafting	43 (55.84)
Femorofemoral arterial bypass grafting	6 (7.79)
Popliteal arterial bypass grafting	7 (9.09)
Axillofemoral/popliteal arterial bypass grafting	8 (10.39)
Tibioperoneal arterial bypass grafting	2 (2.60)
Postoperative time	
Less than 1 y	2 (2.60)
1–5 y	56 (72.73)

(Continued)

TABLE 2

CONTINUED

<i>Clinical factors</i>	<i>Values</i>
6–10 y	15 (19.48)
More than 10 y	4 (5.19)
Postoperative time, mean (±SD), y	4.19 (±3.52)
MOS social support survey score, mean (±SD), points	82.64 (±12.76)
TGDS score, mean (±SD), points	4.22 (±4.50)

MOS = medical outcome study; TGDS = geriatric depression scale Thai version.

*One sample had more than 1 disease.

[†]One sample had more than 1 sign and symptom.

the self-feeling in the previous week's events. TGDS contains a 30-item questionnaire, in which participants are asked to respond by answering yes or no. Of the 30 items, 10 items indicate the presence of depression when answered negatively, whereas the rest indicate depression when answered positively. Scores of 0–12 are considered normal; 13–18 indicate mild depression; 19–24 indicate moderate depression; and 25–30 indicate severe depression. The reliability of the TGDS score was tested using split-half correlation coefficients. It was equal to 0.87.

STATISTICAL ANALYSIS

The demographic and clinical characteristics of participants were analyzed using descriptive statistics. The relationship between the participants' WIQ ability score, TGDS score, and MOS survey score were analyzed using Pearson's product-moment correlation. All statistical analyses used a significance level of 0.05. Analyses were conducted using the IBM SPSS Statistics version 23.0 (IBM Co., Armonk, NY).

RESULTS

The characteristics of the sample are shown in Table 1. Most of the patients were male (71.4%) and older; the mean of age was 63.92 years (standard deviation [SD] = 11.21). Nearly, three-fourth of the patients had ever smoked; the mean of smoking duration was 23.55 years (SD = 18.68). One-third of the patients smoked for more than 30 years. Approximately 40% of the patients smoked one pack per day. Pack-years of cigarette used among patients who ever smoked were 22.15 (SD = 24.02).

The participants' clinical characteristics are displayed in Table 2. The majority of the patients had at least one comorbidity (85.71%). Nearly 82% of the patients were diagnosed with dyslipidemia. Hypertension and diabetes mellitus also presented in more than 50% of the patients. Approximately 68% of them had two or more cardiovascular diseases. Table 2 also reveals that nearly 70% of the participants came to visit the physician when they presented with CLI, rest pain, or tissue loss (ischemic ulcer or gangrene). Femoropopliteal arterial occlusion formed

the majority of clinical occlusive lesions (48.06%). Consequently, more than 50% of them had undergone femoropopliteal arterial bypass grafting as an operative procedure. Approximately 72% of the patients had a postoperative period between 1 to 5 years. The mean of the postoperative period was 4.19 years (SD = 3.52).

In addition, the mean of the MOS social support score and TGDS score was 82.64 (SD = 12.76) and 4.22 (SD = 4.53), respectively. It meant that patients with PAD after surgery had high levels of social support, and most had a normal depressive score.

Functional recovery among patients with PAD after lower extremity bypass surgery as measured by the WIQ is described in Table 3. The mean score of functional recovery was 62.52 (SD = 13.83). This means that patients with PAD after surgery had good walking ability and good functional recovery. Almost all patients (96.10%) could walk around their house without leg pain. More than three-fourth of the patients had walking distance between 50 to 150 feet. Nearly 90% of the patients could walk one block slowly. However, only 9% could walk quickly or jog one block. Climbing one flight of stairs without difficulty was possible for most of the participants (79.10%) after surgery.

Pearson's product-moment correlation was used to examine factors associated with functional recovery among patients with PAD after lower extremity bypass surgery (Table 4). The results showed that functional recovery and social support were significantly associated with depression ($r = -0.272$ [$P < .05$] and $r = -0.463$ [$P < .01$], respectively). The postoperative period was also significantly associated with social support ($r = 0.247$, $P < .05$).

DISCUSSION

This study's findings show that Thai patients with PAD who underwent lower extremity bypass were older. In addition, the findings also present that Thai patients with PAD had risk factors similar to those for cardiovascular disease, including dyslipidemia, hypertension, and diabetes mellitus. More than half of them had comorbidity of more than two diseases. The majority of patients were ex-smokers, with a long period of smoking duration and a high number of pack-years at 22 years of age. Therefore, these results are strongly congruent with current evidence worldwide that the prevalence of PAD gradually increases with age, and the risk factors are likely for cardiovascular disease.^{5,6}

This study demonstrates clinical characteristics among Thai patients with PAD. Patients with PAD who received revascularization presented with CLI, rest pain and ischemic ulceration. Femoropopliteal arterial occlusion formed the highest percentage of occlusive lesions. These findings about clinical characteristics of patients are congruent with many previous studies of Thai patients with PAD.^{4,7-9} Because their diseases had reached CLI, they required more intensive vascular management.^{4,7,8} The American Heart Association guidelines⁶ reported that patients with CLI are at increased risk for amputation, and femoropopliteal arterial occlusion has lower patency rate than aortoiliac artery occlusion. However, this study shows the benefit of bypass surgeries.

The results show a good level of functional recovery after bypass grafting. The majority of Thai patients with PAD after lower extremity bypass had a postoperative period of 1 to 5 years. The mean of postoperative time was 4.19 (SD = 3.52). Approx-

TABLE 3

WALKING ABILITY CHARACTERISTICS AND FUNCTIONAL RECOVERY SCORE AMONG PATIENTS WITH PAD AFTER LOWER EXTREMITY BYPASS (N = 77)

Characteristics	Values
Walking impairment questionnaire domain	
Pain, n (%)	
Pain-free during walking	74 (96.10%)
Mild pain during walking	2 (2.60%)
Walking difficulty due to pain	1 (1.30%)
Walking distance without difficulty, n (%)*	
Walking indoors such as around their house	70 (90.90%)
Walking 50 feet	67 (87.00%)
Walking 150 feet (1/2 block)	62 (80.50%)
Walking 300 feet (1 block)	52 (67.50%)
Walking 600 feet (2 blocks)	43 (55.80%)
Walking 900 feet (3 blocks)	33 (42.90%)
Walking 1,500 feet (5 blocks)	27 (35.10%)
Walking speed without difficulty, n (%)*	
Walking one block slowly	69 (89.60%)
Walking one block at an average speed	49 (63.60%)
Walking one block quickly	18 (23.40%)
Walking or jogging one block	7 (9.10%)
Stair climbing without difficulty, n (%)†	
Cannot climb stairs	16 (20.80%)
Climbing one flight of stairs	61 (79.20%)
Climbing two flights of stairs	41 (67.20%)
Climbing three flights of stairs	19 (31.15%)
Functional recovery score, mean (±SD), points	62.52 (±13.83)

PAD = peripheral arterial disease; SD = standard deviation.

*One sample can answer all items.

†Only sample who can climb stairs (n = 61) can answer all items.

imately 96% of the patients could walk pain-free. Three-fourth of them could walk around their house. More than half of them could walk the longest walking distance 600 feet (two blocks). However, the majority of the patients could walk only at slow speed. More than half of them could climb one to two flights of stairs without difficulty. These findings were mostly similar but a few differed slightly from those of Ruangwiset et al³⁷ who

TABLE 4

FACTORS ASSOCIATED WITH FUNCTIONAL RECOVERY AMONG PATIENTS WITH PAD AFTER LOWER EXTREMITY BYPASS

<i>Variables</i>	<i>Mean</i>	<i>SD</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
Postoperative period	4.19	3.52	1			
Social support scores	82.64	12.76	0.247*	1		
Depression scores	4.22	4.50	-0.104	-0.463 [†]	1	
Functional recovery scores (WIQ scores)	62.52	13.83	-0.133	-0.168	-0.272*	1

PAD = peripheral arterial disease; SD = standard deviation; WIQ = walking impairment questionnaire.

*Significance level at 0.05.

[†]Significance level at 0.01.

also studied walking ability among Thai patients with PAD after lower extremity endovascular surgery. Their similar findings were that patients with PAD could walk around their house at slow speed after operation. However, in their study, their patients could not walk due to pain from nonhealing ulcers. In addition, level of walking ability, walking distance, and stair climbing were different. The findings of this study report that PAD patients after a bypass surgery could walk without pain and climb one to two flights of stairs without difficulty. This study found higher levels of walking ability score and walking distance. It could be assumed that at least four years after a surgery, Thai patients with PAD could walk pain-free around their house, with the longest walking distance of about 600 feet. Therefore, the lower extremity bypass surgery is an appropriate procedure among this group of patients. Congruently, Gerhard-Herman et al⁶ revealed that bypass graft surgery is a good fit for patients with femoral arterial occlusion, who have diabetes and present with CLI.

Moreover, this study also reveals that this group of patients received high levels of social support and that social support was significantly associated with postoperative time ($r = 0.247$, $P < .05$). Thus, it can be summarized that Thai patients with PAD who received good social support have a better outcome from their surgery.

The findings also show that Thai patients with PAD after lower extremity bypass had a low level of depression score. In addition, depression was inversely significantly associated with functional recovery and social support ($r = -0.272$ [$P < .05$] and $r = -0.463$ [$P < .01$], respectively). It could be assumed that those Thai patients with PAD after surgery who had a high perception of social support may have helped to decrease their depression score. A high level of social support and low level of depression may also help to improve functional recovery. These results could be explained as follows. Prior existing studies stated that depressed PAD patients were younger,^{28,38} women had more depressive symptoms than men, depression was associated with PAD severity and symptoms, and depression exerted a negative influence on walking ability and physical function among this group of patients.^{38,39}

However, the demographics of this study's participants were quite different. The majority of the participants were older men,

living with their spouses and with a high level of perceived social support. Strong family support (from wife and children) may have helped to decrease depressive symptoms among Thai patients after surgery. In addition, the essential goal of lower extremity surgery is to relieve one's physical symptoms; improving blood flow should reduce ischemic pain, assist wound healing, and preserve limb functions. Consequently, as the results of this study show, patients could walk pain-free after revascularization, and they had a high level of functional recovery.

LIMITATIONS

There were several limitations of this study. First, the study was conducted in Bangkok, Thailand, and thus cannot be generalized to the entire country. Second, the validation of the WIQ instrument was not tested and compared between WIQ scores and other baseline instruments such as treadmill or 6-minute walk. However, the significant reason was that the treadmill and 6-minute walk tests were not practical in the vascular clinics because most of the Thai patients presented with CLI. Third, the walking ability, walking speed, and stair climbing before surgery were not assessed as the baseline. Screening all walking capacity before the surgery may help to show more clearly the outcome after surgery. Fourth, it was difficult to control extraneous variables, for example, patients' medical regimens for comorbid conditions and the timing of medication administration. These factors may have affected the results.

CONCLUSION

Psychological factors were associated with functional recovery among Thai patients with PAD after lower extremity bypass. Therefore, health-care providers should take such factors into consideration at discharge planning, and screening depression score as baseline should be performed.

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