The Patient Psychology Factors on Physical Function Among Patients Post Total Knee Arthroplasty in Vietnam

Phan Hoang Trong[1], Nguyen Hung Hoa[2]

[1] Ph.D., Nurse Anesthetist Department, Pham Ngoc Thach Medical University, Vietnam
[2] Ph.D., Nurse Anesthetist Department, Ho Chi Minh City University of Medicine and Pharmacy, Vietnam
Corresponding Author: Nguyen Hung Hoa

Abstract
*Total knee arthroplasty (TKA) is a popular surgery treated for Osteoarthritis (OA) to improve the quality of life for patients. In Vietnam, osteoarthritis incidence increases over time; however, the total knee arthroplasty in Vietnam is recently implemented, and medical document reports lack knowledge about nursing care for post-TKA patients. **Aim**: This study analyzed the Correlation between Anxiety and Depression to the physical function among Vietnamese TKA patients at a discharged time. **Methodology**: A crossectional correlation design involving TKA patients in Orthopedic hospitals in three months. The Hospital Anxiety and Depression Scale (HASD) used to measure the variables. **Result**: Pearson correlation test's result showed that Anxiety, Depression was relevant to Physical Function with the result of r =.386, r =.300 (p<.05), respectively. **Conclusion**: Anxiety and Depression influence to Physical function of Vietnamese patients post TKA.*
Keywords: Total Knee Arthroplasty, Anxiety, Depression.

I. Introduction

Total knee arthroplasty (TKA) is a popular surgery especially treated for Osteoarthritis (OA) in the orthopedic surgical field. It is conducted and widespread throughout the world to improve the quality of life of OA patients. In the United States, an estimation was 4.7 million people received TKA (3.0 million women and 1.7 million men) in 2010. The prevalence of TKA was increasing when people were getting older, reaching 10.38% for total knee replacement at eighty-year-old [1]. In Asia, the TKA population is estimated to double from 6.8% to 16.2% in 2040 [2]. In Vietnam, the incidence of knee osteoarthritis is around 23%, and most patients were aged 25 to 50, 14% in women and 5 % in men [3]. However, the total knee arthroplasty in Vietnam is implemented recently, and medical document reports not enough knowledge about TKA surgery. Studies in Vietnam support evidence that the number of TKA patients in some hospitals is around 40-70 cases each year [4, 5]. After TKA, patients improve the range of motion. However, the length of hospital stay and follow-up times in Viet Nam is too long, around 11-14 days and 24-26 months [4, 6, 7] compared to other countries as 4-7 days and six months [8, 9].

TKA is the optimal option to reduce pain, improve mobility, and maintain patient safety and satisfaction [10, 11]. It also enhances life expectancy post-TKA. Over 65-year-old patients can live more than 15 years post-TKA, and younger patients could live longer [12].TKA surgery is major surgery requiring patients to prepare physically and psychologically to recover. Patients' physical function level will decide the length of stay and cost of treatment with TKA [2, 13]. Therefore, the essential roles of orthopedic surgical nurses are assessing and supporting patients to improve physical function post-surgery.

Physical function is one of the criteria to prove the success of TKA surgery. It is defined as "any bodily movement produced by skeletal muscles that result in energy expenditure" [14]. Physical function can also be described as the ability of a person to use their physical muscles and joint strength to do normal daily activities. The high level of physical function post-TKA indicates the recovery health status of patients, and based on that, the physician will decide hospital discharge.

In Vietnam, most physicians study the range of motion and complications in patients post-TKA. However, the other aspects of care such as pain, wound healing, psychological factors, physical function post-TKA are not significantly concern. Besides that, the physical function early post-TKA will influence the further improvement of patients later. Knowing the psychological factor related to physical function early post-TKA, the more effective that nurses can advise and care for patients better in the hospital to improve patients' physical function, release the dependent to healthcare providers and recover better at home.

II. Methodology

Research design

This study adopted a descriptive correlational research design. According to Polit and Beck in 2006, the descriptive study aims to observe, describe, and document aspects of a situation. Thus descriptive correlational design is interested in describing the relationship among variables without establishing the causal connection [15]. This study identified the psychological factors correlated to the patient's physical function post-TKA seven days, such as Depression and Anxiety. As purposely measuring variables to see the relationships from psychological factors to physical function before discharge, the crossectional design is applied, which only collects data one time on day seven post-TKA.

Study participants

The patients after TKA surgery spent the normal recovery process at Orthopedic Surgical Department in the Orthopedic Hospital in Ho Chi Minh City from day 5 to day 7. On day 5, patients were explained and invited to participate in this research. On day 7, they were asked to answer the questionnaire, which focuses on their personal information, Depression, Anxiety, and physical function. Comparing with other countries, the length of stay in Vietnam is longer than in other countries, around 4-6 days [9]. Therefore, assessing the factors and physical function at day 7 is the medium range to identify the recovery of patients.

Inclusion criteria:
+ Inpatients post TKA from day seven days
+ Patients >16 and < 70 years old who read and write Vietnamese
+ The patient voluntarily participated in the study.

Exclusion criteria
+ Patients <16 and > 70 years old
+ Patients with complications soon after surgery
+ Patients with communication or mental problems
+ Patients have other comorbidities

Sampling issues

Sampling method

The convenient sampling is the most convenient and economical way to get available participants in a short period. However, the price of the convenient sampling is that available subjects might be typical of the population, which increases the risk of bias [16]. The convenient sampling method was used to get enough sample size adapting for the correlational study. The researcher then tried to pay attention to the heterogeneous participants that might influence the final data.

Sample size

The estimated sample size based on the equal following the general sample size estimate for medical research [17]

$$n = Z^2_{(1-\alpha/2)} \frac{p(1-p)}{d^2}$$

n: estimated sample size.
α: statistically significant level in study α = 0.05.
$Z(1-\alpha/2)$, with alpha =0.05, Z =1.96
p: percentage of patients with TKA in Vietnam is 0.14 [3]
d: accuracy, with p=0.14 selected d=0.05
The estimated sample size in the study was n = 185 patients
Acquire 10% of atrition= 18 patients
The expected sample size was 203 participants for this study

Research variables

Anxiety and Depression: Anxiety is an emotional status that existed post-TKA. Conceptually, it was seen as a mood disorder when patients experienced TKA. Anxiety or depression post-TKA leads to the impairment of physical function in the recovery process [18]. Operational contributes to anxiety post-TKA was measured by The Hospital Anxiety and Depression Scale (HADS). HADS consists of two subscales, which were two mains concepts anxiety and Depression. Each item answered patients on a four-point (0–3) response category, so the possible scores ranged from 0 to 21 for Anxiety and 0 to 21 for Depression. The total score was the sum of each subscale that had an equal number of items. Internal consistency is high for the anxiety

component, with Cronbach's alphas ranging from 0.84 to 0.90 and tested in large samples of the community [19].

Physical function: Physical function by conceptualization is considered the ability of a person to use their muscles and joint strength to adapt to do the usual daily activities post-TKA. Operationally, this variable was a ratio type collected data by the revised KOOS- Activities of Daily Living (KOOS-ADL), one subscale of KOOS. The KOOS questionnaire was developed in the 1990s to assess patients' opinions about their knee and associated problems. Since 1998, the psychometric properties (KOOS)have been assessed in more than twenty individual studies worldwide. KOOS-ADL is also used in knee OA patients 18-79 age with includes 15 items asking about the difficulty when doing daily activities in the last week. In this revised version, KOOS-ADL had 15 items which format in 4 Likert scales from 0-4 present for none, a mild, moderate, and severe level of complex function. It takes only 5 minutes to complete—the total score of KOOS-ADL calculated sum of 15 items. The minimum is 0, and the maximum is 60. A higher score indicated a lower physical function. KOOS-ADL has high test-retest reliability. In patients with a knee injury, ICCs for the activities daily living subscale were 0.84-0.94 [14, 20]. The KOOS'ADL convergent and divergent construct validity have been determined compared to different subscales of SF-36 and the Lysholm knee scoring scale and WOMAC.

Ethical issues

The ethical research board approved this study of the Orthopedic Hospital where the collecting data conducted. After that, the researcher ware referred to the patients. The information about the purpose of this study and the consent form were sent to patients by the researcher. When participants agreed to participate in the study, they signed the consent form to make sure they volunteered to join the study. Patients had all rights to refuse to participate, to stop involving in the study at any time, or refused to answer any questions without explanation. No physical examinations, no harmful or invasive procedures were conducted on patients in this study. All medical treatment and care for all participants by the registered nurses and doctors in the ward were as routine care.

III. Results

Demographic data of the participants.

Overall, participants consisted of over 80% middle age and old patients compared to 8.9% for young patients. The youngest patient in this study was 28 years old, and the oldest was 68 years old. Only one-third of participants were male, and others were female. Among all patients, over half were overweight, 7.3% obese, whereas 33.5% were average.

Regarding the characteristics related to TKA, almost all patients Post-TKA in this study mainly displayed a moderate level with 60.3%. The mild and severe pain level took only 18%, and there was only four-person (2%) reported that they were not painful. Taking consideration of Anxiety and Depression, there were similarly distributed between two factors. The percentage of a mild level of Anxiety and Depression were 48.7% and 47.7%, while the moderate level were 31.4% and 49.2%, respectively. There was 24 person none anxious whereas, no person expressed none depression at the staging post-TKA. The consequence of the reduction of physical function, the highest level was mild with 60.7%, continuously was the moderate level with 33.3%, and routine physical function with 6.3%. No patient who expressed severe mal physical function in this study resulted from these statistical numbers presented in table 1 below.

Table 1: The characteristic of the patients

Characteristic	Frequency	
	n	%
Age		
16-29 (Young)	17	8.9
30-49 (Middle)	85	44.5
50-69 (Old)	89	46.6
Gender		
Male	46	24.1
Female	145	75.9
BMI		
18-22(Normal)	63	33.0
23-26 (Overweight)	97	50.8
27-30 (Obesity)	31	16.2
Post-TKA pain		

None (0 score)	4	2.1
Mild pain (4-9 score)	24	18.8
Moderate (11-29 score)	117	60.3
Severe (30-40 score)	36	18.8
Anxiety		
None (0 score)	24	12.6
Mild (1-7 score)	60	31.4
Moderate (8-14score)	73	48.7
Severe (15-21 score)	14	7.3
Depression		
None (0 score)	0	0.0
Mild (1-7 score)	94	49.2
Moderate (8-14 score)	91	47.7
Severe (15-21)	6	3.1
Physical function		
None (0-15 score)	12	6.3
Mild (16-30 score)	116	60.7
Moderate (31-45 score)	63	33.3
Severe (46-60 score)	0	0

N=191

Correlation between the demographic data (Age, Gender, BMI, and Pain management methods) to Physical function post-TKA

The demographic data, including Age, Gender, BMI, were the nonparametric data. Therefore Spearman test was used to test these correlations. The results presented that only BMI significantly correlated to Physical function with r=.384(sig p<.001). Age and Gender were not correlated with physical function post-TKA with the result of p>.05. The statistical number presented in table 2 below.

Table 2: Spearman correlation of Age, Gender, BMI, Pain management methods to physical function post-TKA

	Age	Gender	BMI	Physical function
Age	1			
Sig(2-tailed)				
Gender	.225	1		
Sig(2-tailed)	.002			
BMI	.046	.117	1	
Sig(2-tailed)	.530	.107		
Physical function	.122	.130	**.384**	1
Sig(2-tailed)	.093	.073	.000	

N=191

**. Correlation is significant at the 0.01 level (2-tailed).

Correlation between Anxiety and Depression to Physical function

Consider to the assumption how to test the Correlation between independent and dependent variables, the Parametric Distribution test using Skewness and Kurtosis and Q-Q Plot applied for continuous variables such as Anxiety, Depression, and Physical Function. The most commonly used critical values are ± 2.58 (.01 significance level) and ± 1.96, which corresponds to a .05 error level [21]. For Skewness, the values presented in each variable were -.119 for Anxiety, -.019 for Depression, and -.252 for Physical function. Regarding the Kurtosis test, the values were -1.280, -1.025, -.797 for Anxiety, Depression, and Physical function. All continuous variables in this study existed Skewness and Kurtosis values not exceeding +/- 1.96, proving the normal distribution.

The statistic test also showed the description of all continuous variables in this study with Anxiety and Depression with a Mean of 7.76 (SD 5.27) and 7.57 (SD 3.84), respectively. Whereas Physical function was the highest Mean score of 26.75 (SD 6.46). The statistical number presented in table 3

Table 3: The distribution of variables Anxiety, Depression, Wound Status and Physical Function

Aspects	Mean	Standard Deviation	Skewness	Kurtosis	Range
Anxiety	7.76	5.27	-.119	-1.280	0-21
Depression	7.57	3.84	-.019	-1.025	0-21
Physical Function	26.75	6.46	-.252	-.797	0-60
N (Listwise) = 191					

Consider the factors related to the physical function of patients post-TKA, the Pearson correlation (2-tailed) test showed the findings of this Correlation. The result presented that Anxiety and Depression were two factors correlated to the impairment of physical function after patients overcame the TKA surgery. Pain Post-TKA was the most substantial factor impacting Physical function with r = .605 (sig $p<.001$). Anxiety and Depression were relevant to Physical Function with the result of r=.386, r=.300 (sig $p<.001$), respectively.

Besides that, some relevant correlations were noted in the matrix, such as Anxiety and Depression with r=. 843(sig $p<.001$). The results showed in table 4 below:

Table 4: Pearson correlation between Pain post-TKA, Anxiety, Depression and Wound status to Physical function

	Anxiety	Depression	Physical function
Anxiety Sig(2-tailed)	1		
Depression Sig(2-tailed)	.843** .000	1	
Physical function	.386**	.300**	1
** Correlation is significant at the .01 level Sig(2-tailed)	.000	.000	

IV. Discussion

Discussing the result findings of demographic data

Discussing Gender, the participants in this study had a ratio of one/third between male and female. The partial is the same as other studies in Vietnam [4, 6]. The explanation for this might come from the social aspects; Vietnamese female was commonly housework, farmer, or worker who have to do heavy work for a long time which might cause the Osteoarthritis. One risk behavior is mostly seen in Vietnamese women that they usually do housework like washing dishes and washing clothes by sitting (without the chair). The nutrition and calcium support or health promotion/health checkups were still low in Vietnamese women.

The age of participants who were applied TKA almost existed in the middle (44,5%) and old (46.6%) among 191 patients. These findings were not congruent with the results of other research in Thong Nhat and Medicine and Pharmacy University Hospitals in which the mean score of age usually 68 years old among 45-48 participants [4, 6]. Assumptions for this result were depending on the Orthopedic Hospital was the biggest Orthopedic center in the South of Vietnam where responses treatment for half resident of the countries. Besides, convenient sampling methods focusing on three months in the same hospital might increase the percentage of the Middle age group among participants. Moreover, consider the age that patients could be implemented TKA, in Vietnam was not over 68, in the opposite, it was 80 in other countries [8, 11]. It brings the thought that health promotion program in the Vietnamese population was not working effectively to prevent and cure for Osteoarthritis. Patients occurred the disease in middle age and suffered the TKA early to impact their quality of life. It was also seen that the quality of treatment and care were not adapting yet for the old group >69 people.

As regards BMI, the participants almost fifty percentage at BMI=23-26 which rank on the overweight level. Overweight was a causing factor of Osteoarthritis. However, it still not carefully concern by most of the Vietnamese people.

Discussion on the Correlation of demographic variables to Physical function post-TKA

Age and Gender in this study were not relevant factors to patients' physical function with the low correlation r=.122(p=.093), r=.130(p=.073), respectively. These findings were the opposite of the previous research suggested that the higher age cause, the worse of physical function post-TKA 5-7 days measured by WOMAC [8] and older females increased higher risk of poor physical function post-TKA 2-5 years by KOOS [11]. These study findings suggested that the physical function post-TKA seven days might be different from physical function after one or more years and the use of different instruments. Besides, the different sample sizes in many studies caused difficulty to assume the Correlation between factors.

Vietnamese patients with BMI over 27-30 showed a higher risk of reducing physical function post-TKA following these research findings. However, in other countries, patients might have a higher BMI level at 34-40 that can cause effects on physical function [11]. These findings were accepted because the BMI level of Vietnamese patients might be different from foreigners.

Discussion on the Correlation of Anxiety and Depression to Physical function post-TKA

Incidence of Anxiety and Depression in this study approximately 80% at seven days post-TKA. It considered that Anxiety and Depression were two essential factors that need to control post-TKA. The incidence of Anxiety and Depression after TKA one year only took 30% on population [18]. The evidence implied the Anxiety and Depression occurred more seriously in early-stage post-TKA few days. Healthcare giver needs to support patients appropriate to overcome this significant problem.

V. Conclusion

This study focused on finding out the related factor to physical function post-TKA 7days. The result showed that BMI, Anxiety, Depression were three factors correlated to physical function in which Pain post-TKA was the most significant. The physical function of TKA patients did not only depend on the effectiveness of the TKA surgery but relevant aspects related to TKA such as Anxiety and Depression. Therefore, a comprehensive program needs to instruct for patients before, during, and after TKA to improve the physical function that improves the effectiveness of treatment and care.

References

[1] H. Maradit Kremers *et al.*, "Prevalence of Total Hip and Knee Replacement in the United States," *J Bone Joint Surg Am,* vol. 97, no. 17, pp. 1386-97, Sep 2, 2015.

[2] S. M. Kurtz *et al.*, "International survey of primary and revision total knee replacement," *Int Orthop,* vol. 35, no. 12, pp. 1783-9, Dec 2011.

[3] L. T. Ho-Pham and T. V. Nguyen, "The Vietnam Osteoporosis Study: Rationale and design," *Osteoporosis and Sarcopenia,* vol. 3, no. 2, pp. 90-97, 2017/06/01/ 2017.

[4] B. H. T. Khanh, L. T. Viễn, Đ. Đ. Triết, and N. Đ. Thành, "Kết quả thay khớp gối bước đầu tại bệnh viện Đại Học Y Dược thành phố Hồ Chí Minh," *Tạp chí y học thực hành,* vol. 8, 2012.

[5] N. M. Khánh, "Đánh giá bước đầu kết quả điều trị thoái hóa khớp gối bằng phẫu thuật nội soi tại bệnh viện Việt Đức " *Tạp chí y hoc* vol. 1, no. 1, 2016.

[6] V. t. Toàn and P. N. Tuấn, "Đánh giá kết quả thay khớp gối toàn phần tại Bệnh Viện Thống Nhất thành phố Hồ Chí Minh," *Nghiên cứu y học,* vol. 18, no. 3, pp. 85-88, 2014.

[7] N. T. Tấn, L. dũng, and L. T. Hiền, "Đánh giá bước đầu phẫu thuật thay khớp gối toàn phần tại bệnh viện Đại học Y Dược Cần Thơ," *Tạp chí y dược học Cần Thơ,* vol. 8, pp. 49-56, 2017.

[8] S. M. Robbins, R. Rastogi, and T.-L. McLaughlin, "Predicting Acute Recovery of Physical Function Following Total Knee Joint Arthroplasty," *The Journal of Arthroplasty,* vol. 29, no. 2, pp. 299-303, 2014.

[9] J. R. Cook, M. Warren, K. J. Ganley, P. Prefontaine, and J. W. Wylie, "A comprehensive joint replacement program for total knee arthroplasty: a descriptive study," *BMC Musculoskelet Disord,* vol. 9, p. 154, Nov 19, 2008.

[10] T. L. Kahn and R. Schwarzkopf, "Does Total Knee Arthroplasty Affect Physical Activity Levels? Data from the Osteoarthritis Initiative," (in eng), *J Arthroplasty,* vol. 30, no. 9, pp. 1521-5, Sep 2015.

[11] J. A. Singh, M. O'Byrne, S. Harmsen, and D. Lewallen, "Predictors of moderate-severe functional limitation after primary Total Knee Arthroplasty (TKA): 4701 TKAs at 2-years and 2935 TKAs at 5-years," *Osteoarthritis and Cartilage,* vol. 18, no. 4, pp. 515-521, 2010/04/01/ 2010.

[12] S. H. Shah, B. E. Schwartz, A. R. Schwartz, B. A. Goldberg, and S. J. Chmell, "Total Knee Arthroplasty in the Younger Patient," (in eng), *J Knee Surg,* vol. 30, no. 6, pp. 555-559, Jul 2017.

[13] L. van den Belt, P. van Essen, P. J. Heesterbeek, and K. C. Defoort, "Predictive factors of length of hospital stay after primary total knee arthroplasty," (in eng), *Knee Surg Sports Traumatol Arthrosc,* vol. 23, no. 6, pp. 1856-62, Jun 2015.

[14] R. J. Paxton, E. L. Melanson, J. E. Stevens-Lapsley, and C. L. Christiansen, "Physical activity after total knee arthroplasty: A critical review," *World J Orthop,* vol. 6, no. 8, pp. 614-22, Sep 18, 2015.

[15] D. F. Polit and C. T. Beck, "Essential of Nursing Research: Methods, Appraisal and Utilization." Lippincott Williams & Wilkins, 2006, p.^pp. Pages.

[16] D. F. Polit and C. T. Beck, "Essential of Nursing Research: Methods, Appraisal and Utilization." Lippincott Williams & Wilkins, 2006, p.^pp. Pages.

[17] L. H. Ninh, "The sampling and estimate sample size methods in biology- medical research.." Ha Noi, 2011, p.^pp. Pages.

[18] T. Duivenvoorden *et al.*, "Anxiety and depressive symptoms before and after total hip and knee arthroplasty: a prospective multicentre study," *Osteoarthritis Cartilage,* vol. 21, no. 12, pp. 1834-40, Dec 2013.

[19] R. P. Snaith, "The Hospital Anxiety And Depression Scale," *Health and Quality of Life Outcomes,* vol. 1, no. 29, 2003.

[20] R. J. Parker, "Evidence-Based Practice: Caring for a Patient Undergoing Total Knee Arthroplasty," *Orthopaedic Nursing,* vol. 30, no. 1, pp. 4-8, 2011.

[21] J. F. Hair, J. W. C. Black, B. J. Babin, and R. E. Anderson, "Multivariate data analysis," (Multiple Regression Analysis. 2014, p.^pp. Pages.