

## **An Experimental Analysis of Clinical Satisfaction of Total Knee Replacement in Patients with Degenerative Arthritis**

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### **Abstract**

*This study was carried out by experimental analysis of the clinical satisfaction of total knee replacement in patients with degenerative arthritis. The participants in this study were 136 patients diagnosed with degenerative osteoarthritis who had undergone total knee replacement at least 6 weeks previously by orthopedic surgery at a general hospital in a metropolitan area. The data were collected by interview and self-administered questionnaire from February 17 to March 31, 2014. Regarding knowledge information, the greater the knowledge information of patients, the greater their satisfaction with total knee replacement ( $t=0.46$ ,  $p<0.05$ ). The  $R^2$  represents 0.168 in independent variable including a multiple regression model and 16.8% in decision,  $R^2$ . Therefore, the study is needed systematic patient management to increase the satisfaction of total knee replacement and apply its related factors.*

**Keywords:** *Total knee replacement, Clinical satisfaction, Degenerative arthritis, Patients Management*

### **1. Introduction**

Degenerative arthritis results from the damage in cartilage, which is caused by the accumulation of acids. When the cartilage, which acts as a buffer between joints, is damaged, it later leads to the outbreak of inflammatory changes. The types of arthritic disease and its causes vary widely. One of the major types of arthritis is degenerative arthritis, which occurs mainly due to abrasions or infections in joints and the aging process. In case of rheumatoid arthritis, which is an autoimmune disease, it affects not only the joints, but also different parts of the body [1, 2].

Especially during the rainy season, the change in air pressure and high humidity give rise to the increase in pressure and expands the inner part of the joints, thereby stimulating the nervous system and elevating the pain. Then, is there no way to alleviate the pain. Knee replacement, or knee arthroplasty, is a surgical procedure to replace the weight-bearing surfaces of the knee joint to relieve pain and disability. It is most commonly performed for osteoarthritis, and also for other knee diseases such as rheumatoid arthritis and psoriatic arthritis. In patients with severe deformity from advanced rheumatoid arthritis, trauma, or long-standing osteoarthritis, the surgery may be more complicated and carry higher risk. Osteoporosis does not typically cause knee pain, deformity, or inflammation and is not a reason to perform knee replacement [2, 3].

Knee replacement rates among arthritis patients have increased sharply over the past two decades, with substantial upward trends in readmissions and revision complications too, a study showed. Knee replacement, or knee arthroplasty, is a surgical procedure to replace the weight-bearing surfaces of the knee joint to relieve pain and disability. It is most commonly performed for osteoarthritis, and also for other knee diseases such as rheumatoid arthritis and psoriatic arthritis. In patients

with severe deformity from advanced rheumatoid arthritis, trauma, or long-standing osteoarthritis, the surgery may be more complicated and carry higher risk.

Other major causes of debilitating pain include meniscus tears, cartilage defects, and ligament tears. Debilitating pain from degenerative arthritis is much more common in the elderly. Knee replacement surgery can be performed as a partial or a total knee replacement. In general, the surgery consists of replacing the diseased or damaged joint surfaces of the knee with metal and plastic components shaped to allow continued motion of the knee. The operation typically involves substantial postoperative pain, and includes vigorous physical rehabilitation. The recovery period may be 6 weeks or longer and may involve the use of mobility aids such as walking frames, canes, and crutches to enable the patient's return to preoperative mobility [4, 5].

The number of total knee replacement procedures went up 243,802 from 1993 to 2013 and the per capita rate rose 97% to 62.4 per 10,000 enrollees, according to an analysis of fee-for-service medical records, hospital stays posted over the period are most commonly caused by rising readmissions and complications in revision procedures, particularly infections[6, 7]. The importance of clinical service has always been emphasized as society's basic infrastructure essential in keeping its people healthy.

However market liberalization and the local Korean medical service market are forced to grapple with foreign competition. Patient satisfaction is important in an effort to decrease medical costs and to improve patient care, a multicenter randomized study was launched nine years ago to determine if satisfied patients led to an actual improved quality of care, healthcare cost savings, and increased life expectancy. Patient satisfaction appears to be directly related to increased mortality and morbidity [8, 9].

However, there have been few studies into the clinical satisfaction of patients receiving a total knee replacement operation and a practical solution should be sought for urgent problems ; therefore, an investigation was carried out by experimental analysis of the clinical satisfaction of total knee replacement in patients with degenerative arthritis. The experiences of total knee replacement operations described in this paper are expected to contribute to improvement in the quality of life of degenerative arthritis patients.

## **2. Materials and Methods**

### **2.1 Materials**

An experimental analysis was carried out for degenerative arthritis patients to determine clinical satisfaction. First, problems were identified in the initial planning stage through need-assessment of the respondents, and then procedures were undertaken for conducting problem analysis and goals set for clinical satisfaction [Fig.1]. Second, the elements of clinical satisfaction were identified and data gathered. Third, an experimental stage was implemented with the application of a preliminary program and its evaluation in the field. This analysis was conducted through a review of existing literature, assessment of patients' needs, available updates on clinical satisfaction, web site analysis and solicitation of expert advice throughout the process.

### **2.2 Investigation Materials**

The participants in this study were 136 patients diagnosed with degenerative osteoarthritis who had undergone total knee replacement at least 6 weeks previously by orthopedic surgery at a general hospital in a metropolitan area. The data were collected by interview and self-administered questionnaire from February 17 to March 31, 2014.

## 2.3 Study Methods

To measure the clinical satisfaction of total knee replacement a questionnaire tool was used. The SPSS(Ver.18) program was used for data analysis and a t-test or ANOVA was used to observe any statistically significant difference between the general characteristics of the study subjects and clinical satisfaction of total knee replacement. This study was performance using a multiple regression model to determine factors influencing clinical satisfaction of the experience of total knee replacement. Data analysis of t-test or ANOVA was performed with the level of statistical significance for testing at 0.05%.

## 3. Results

### 3.1 General Characteristics of Subjects in This Study

Table 1 represents general characteristics of subjects in this study. The subject's gender was analyzed. The rate of response with 52.2% of male showed more than the rate of response with 47.8% of female. Age groups were divided into four groups. That is, they divided less than 49 years, 50 to 59 years, 60-69 years, and 70 years old or more. The rate of response(33.8%) over the age of 70 years were higher than the rate of response(8.8%) below the age of 49 years. In a marital status, the rate(84.6%) of married respondents was a higher rate than the rate of response(15.4%) in unmarried respondents.

On the other hand, for the rate of response whether other diseases have or don't have them, The rate of respondents(93.4%) with other diseases was higher than the rate of respondents(6.6%) without other diseases.

**Table 1. General Characteristics in This Study Subjects**

Variables	Category	N(%)
Gender	Male	71(52.2)
	Female	65(47.8)
Age	≤49	12(8.8)
	50-59	24(17.6)
	60-69	54(39.7)
	≥70	46(33.8)
Marital status	Unmarried	21(15.4)
	Married	115(84.6)
Other disease	Yes	127(93.4)
	No	9(6.6)
Education	Under middle	43(31.6)
	High school	59(43.4)
	Over college	34(25.0)
Exercise	Exercise	32(23.5)
	Non-exercise	104(76.5)

Total	136(100.0)
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### 3.2 Characteristics of Subjects Related to Total Knee Replacement

Table 2 represents the characteristics of subjects related to total knee replacement. The proportion of respondents that shared much knowledge(84.6%) was greater than the proportion of respondents that showed shared little knowledge(15.4%). Also the proportion(32.4%) of responses of patients in fair health was higher than that of those (18.4%) in bad health.

**Table 2. Characteristics of Subjects Related to Total Knee Replacement**

Variables	Categories	N(%)
knowledge	Much	115(84.6)
	Little	21(15.4)
Health status	Good	44(32.4)
	Fair	67(49.3)
	Bad	25(18.4)
Satisfaction after surgery	Satisfaction	35(25.7)
	Appropriate	72(52.9)
	Unsatisfaction	29(21.3)
Kindness of Medical Personnel	Good	71(52.2)
	Fair	49(36.0)
	Bad	16(11.8)
Side effect after surgery	Yes	21(15.4)
	No	115(84.6)
Complication after surgery	Yes	14(10.3)
	No	122(89.7)

### 3.3 Effect of General Characteristics on Clinical Satisfaction

The effect of general characteristics on clinical satisfaction is shown in Table 3. For age, clinical satisfaction had the highest mean score at the age of 60-69 years( $4.75 \pm 0.51$ ), followed by the age over 70 years( $4.19 \pm 0.34$ ). The quality of operation had the lowest percentage at the age under 49 years( $3.06 \pm 0.42$ ) for all case combined. Satisfaction of service showed a significantly higher result in accordance with aging than other factors( $F=0.46$ ,  $p<0.05$ ). The patients' perception in relation to general characteristics, mean score( $4.29 \pm 0.51$ ) of male respondents showed a significantly higher than the mean score( $3.64 \pm 0.47$ ) of female respondents( $t=0.69$ ,  $p<0.05$ ).

**Table 3. Effect of General Characteristics on Clinical Satisfaction**

Variables	Quality	Satisfaction	Perception
	Mean±S.D.	Mean±S.D	Mean±S.D
Age/yrs.			
≤49	$3.06 \pm 0.42$	$3.82 \pm 0.35$	$4.09 \pm 0.52$
50-59	$4.68 \pm 0.39$	$4.16 \pm 0.42$	$4.76 \pm 0.39$
60-69	$3.95 \pm 0.36$	$4.75 \pm 0.51$	$4.32 \pm 0.47$

≥70	3.72±0.47	4.19±0.34	4.18±0.42
	F=0.31	F=0.46*	F=0.39
Gender			
Male	3.29±0.42	3.26±0.29	4.29±0.51
Female	4.57±0.35	3.91±0.35	3.64±0.47
	t=-1.43	t=-2.30	t=0.69*
Education			
Under middle	3.92±0.41	4.17±0.45	3.84±0.35
High school	4.25±0.35	4.02±0.42	4.06±0.42
Over college	3.87±0.42	4.57±0.48	4.51±0.47
	F=0.30	F=0.49	F=0.68
Monthly income			
≤199	3.19±0.42	4.29±0.37	3.07±0.49
200-399	3.25±0.39	3.41±0.82	4.91±0.56
≥400	4.19±0.85	4.57±0.69	4.26±0.42
	F=1.94	F=1.27	F=0.73
Exercise			
Exercise	2.81±0.37	4.52±0.52	4.18±0.35
Non-exercise	3.57±0.62	3.19±0.71	3.16±0.37
	F=0.58	F=0.64*	F=0.73*

\*  $P < 0.05$

### 3.4 Effect of Factors Related to Total Knee Replacement on Clinical Satisfaction

Clinical satisfaction and factors related to total knee replacement are shown in Table 4. Regarding knowledge information, the greater the knowledge information of patients, the greater their satisfaction with total knee replacement ( $t=0.46$ ,  $p < 0.05$ ). For perception of knowledge information, the greater the patients' perception about knowledge information, the greater is their satisfaction with total knee replacement ( $t=-0.39$ ,  $p < 0.05$ ). For health status, the better the health of the patients, the greater is their satisfaction with total knee replacement ( $t=2.87$ ,  $p < 0.01$ ).

**Table 4. Effect of Factors Related to Total Knee Replacement on Clinical Satisfaction**

Variables	Quality	Satisfaction	Perception
	Mean±S.D.	Mean±S.D.	Mean±S.D.
knowledge information			
Many	4.18±0.42	4.59±0.39	3.16±0.49
Few	3.54±0.37	3.16±0.35	4.72±0.41
	t=0.52	t=0.46*	t=-0.39*
Health status			
Good	3.52±0.31	3.14±0.40	3.28±0.32
Fair	4.15±0.39	4.59±0.38	4.65±0.49
Bad	3.73±0.46	2.16±0.41	1.49±0.37
	F=0.39	F=2.87**	F=1.42
Health promoting behaviors			
Good	4.25±0.32	3.91±0.55	4.64±0.44
Fair	3.96±0.47	4.82±0.38	3.17±0.42
Bad	2.18±0.36	1.16±0.42	3.54±0.36
	F=1.72*	F=0.62	F=1.95
Kindness of medical Personnel			
Good	4.72±0.40	4.72±0.39	4.92±0.41
Fair	4.36±0.48	4.18±0.37	3.62±0.47

Bad	1.94±0.35 F=1.28**	1.70±0.41 F=3.28**	3.25±0.42 F=0.68
Side effect after surgery			
Yes	3.62±0.57	3.59±0.41	3.82±0.36
No	1.95±0.24 t=1.52**	4.63±0.85 t=-2.40	4.56±0.42 t=-1.92*
Nutrition after surgery			
Yes	3.24±0.39	1.52±0.52	4.15±0.42
No	1.51±0.42 t=0.37**	4.84±0.47 t=-1.49**	2.94±0.39 t=0.68**

\*  $P < 0.05$  \*\*  $P < 0.01$

### 3.5 Multiple Regression Analysis of Clinical Satisfaction of Surgery

Multiple regression analysis of the clinical satisfaction of surgery is represented in Table 5. The  $R^2$  represents 0.168 in independent variable including a multiple regression model and 16.8% in decision,  $R^2$ . In terms of age, there was a significant increase in satisfaction of surgery quality for females of 60-69 years old compared with males ( $p < 0.05$ ).

**Table 5. Multiple Regression Analysis of Clinical Satisfaction of Surgery**

Variables	Quality	Satisfaction	Perception
	Mean±S.D.	Mean±S.D.	Mean±S.D.
Gender (focusing on male)			
Female	-0.163(1.527)	-0.002(0.049)	-0.028(0.427)
Age/yr (focusing on the age over 70 years)			
≤49	-0.031(0.086)	-0.037(0.142)	-0.176(2.51)
50-59	-0.015(0.091)	-0.015(0.039)	-3.824(2.69)*
60-69	0.018(0.147)*	0.294(0.006)	-5.762(1.80)
Education (focusing on over college)		α	
Under middle	-0.057(0.079)*	0.025(0.176)	0.041(0.192)
High school	-0.004(0.064)	-0.019(0.153)	-0.027(0.146)
Income (focusing on over 400 million won)			
≤199	-0.041(0.037)	0.172(0.119)	0.482(1.287)
200-399	-0.036(0.085)	-0.194(0.164)	1.279(1.350)
Exercise			
Non-exercise	-0.052(0.003)	-0.028(0.001)	-0.031(0.219)*
Clinical satisfaction			
Knowledge Information	1.284(1.056)	-0.064(0.074)	-0.068(0.052)
Health status	0.592(0.742)	-0.031(-0.125)	0.154(0.164)
Health promoting behaviors	-0.003(1.295)	-0.065(0.003)*	-0.018(0.001)
Kindness of medical personnel	-0.017(0.183)	-0.002(0.001)	0.001(0.001)
Side effect after surgery		-0.194(0.036)*	0.052(0.045)
Complication after surgery			0.648(0.073)
R-square	0.168	0.275	0.417
F	1.625	4.352*	6.189*

\*  $P < 0.05$

## 4. Discussion

This study his paper is to investigate the experimental analysis of clinical satisfaction on total knee replacement in patients with degenerative arthritis. This study investigates contributing factors for quality of life, satisfaction and perception of operation in patients who received surgery.

This study will provide a fundamental references for researchers and assist in the provision of more effective intervention in patient care. The results showed that there was a significant increase in satisfaction of total knee replacement surgery with age. For patients' perception in relation to general characteristics, there was a significantly higher mean score for males than for females. These findings are similar to those of previous studies on other surgery patients [10, 11]. This suggests that this study shows the most efficient way of utilizing clinical research of total knee replacement.

On the other hand, in this study, multiple regression analysis was performed to find factors that contribute to quality of life and clinical satisfaction after total knee replacement. The main factors affecting satisfaction with clinical service were age, gender and the time period after surgery. The results indicate a 16.8% level of satisfaction with clinical service. In addition, the functional scores of the questionnaire items show that the most significant factors are age, exercise and education. The finding are consistent with the results of earlier research and suggest a need for systematic patient management [11, 12]. Therefore, a program should be implemented for the groups who are characterized as having lower levels of satisfaction in terms of surgery and patients' perception.

As there is no effective treatment in curing degenerative arthritis, people often take painkillers. However, consuming pain-relieving pills, which are acidic, is not recommendable since it may accelerate the irritation of joints. Instead, exercising such as walking and swimming promotes the circulation of blood, strengthens the muscles and reduces the pain. Indeed, building strong and healthy bones is significant in preventing degenerative arthritis.

Nutrition education program in patients with degenerative arthritis is important after total knee replacement. Calcium is the most important nutrition in an arthritis patient. Consuming too much salty or fast (instant) food aggravates degenerative arthritis. This is because sodium element in the food removes the calcium in bones. Also, when the acidity increases, the body lacks alkalinity and this hinders neutralization. Here again, calcium in the body is lost in order to compensate the loss and to maintain the pH balance. Therefore, one should remember that maintaining pH balance and the calcium content is crucial. One way of doing so is by drinking the Antioxidant Alkaline Water every day and avoiding food or drinks with caffeine [12, 13].

The complication rate following total knee replacement is low. Serious complications, such as a knee joint infection, occur in fewer than 2% of patients. Major medical complications such as heart attack or stroke occur even less frequently. Chronic illnesses may increase the potential for complications. Although uncommon, when these complications occur, they can prolong or limit full recovery [14, 15].

Patients should discuss their surgery thoroughly with orthopedic surgeon prior to surgery. Blood clots may develop in leg veins. Infection may occur in the wound or deep around the prosthesis. It may happen while in the hospital or after you go home. It may even occur years later. Minor infections in the wound area are generally treated with antibiotics. Major or deep infections may require more surgery and removal of the prosthesis. Any infection in your body can spread to your joint replacement. Blood clots in the leg veins are the most common complication of knee replacement surgery. These clots can be life-threatening if they break free and travel to patients' lungs.

Orthopedic surgeon should outline a prevention program, which may include periodic elevation of your legs, lower leg exercises to increase circulation, support stockings, and medication to thin patients' blood. Although implant designs and materials, as well as surgical techniques, continue to advance, implant surfaces may wear down and the components may loosen. Additionally, although an average of 115° of motion is generally anticipated after surgery, scarring of the knee can occasionally occur, and motion may be more limited, particularly in patients with limited motion before surgery. A small number of patients continue to have pain after a knee replacement. This complication is rare, however, and the vast majority of patients experience excellent pain relief following knee

replacement. While rare, injury to the nerves or blood vessels around the knee can occur during surgery.

Therefore, the study is needed systematic patient management to increase the satisfaction of total knee replacement and apply its related factors.

## 5. Conclusion

This study was carried out by experimental analysis of the clinical satisfaction of total knee replacement in patients with degenerative arthritis. The participants in this study were 136 patients diagnosed with degenerative osteoarthritis who had undergone total knee replacement at least 6 weeks previously by orthopedic surgery at a general hospital in a metropolitan area. The data were collected by interview and self-administered questionnaire from February 17 to March 31, 2014.

The SPSS program was used for data analysis and a t-test or ANOVA was used to observe any statistically significant difference between the general characteristics of the study subjects and clinical satisfaction of total knee replacement. This study was performance using a multiple regression model to determine factors influencing clinical satisfaction of the experience of total knee replacement. The results of this study are follows.

Firstly, the proportion of respondents that shared much knowledge(84.6%) was greater than the proportion of respondents that showed shared little knowledge(15.4%). Also the proportion(32.4%) of responses of patients in fair health was higher than that of those (18.4%) in bad health.

Secondly, for age, clinical satisfaction had the highest mean score at the age of 60-69 years( $4.75 \pm 0.51$ ), followed by the age over 70 years( $4.19 \pm 0.34$ ). The quality of operation had the lowest percentage at the age under 49 years( $3.06 \pm 0.42$ ) for all case combined. Satisfaction of service showed a significantly higher result in accordance with aging than other factors( $F=0.46$ ,  $p<0.05$ ).

Thirdly, regarding knowledge information, the greater the knowledge information of patients, the greater their satisfaction with total knee replacement( $t=0.46$ ,  $p<0.05$ ). For perception of knowledge information, the greater the patients' perception about knowledge information, the greater is their satisfaction with total knee replacement( $t=-0.39$ ,  $p<0.05$ ).

Fourthly, the  $R^2$  represents 0.168 in independent variable including a multiple regression model and 16.8% in decision,  $R^2$ . In terms of age, there was a significant increase in satisfaction of surgery quality for females of 60-69 years old compared with males( $p<0.05$ ).

Therefore, the study is needed systematic patient management to increase the satisfaction of total knee replacement and apply its related factors.

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