Predicting Factors of Health-related Quality of Life among Female Patients of Degenerative Arthritis with Total Knee Arthroplasty

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Abstract

The purpose of this study was to understand the effect that pain, disabilities of activities of daily living, perceived health status and depression have on health-related quality of life, using female patients of degenerative arthritis who underwent total knee arthroplasty. As a subjective study, a questionnaire was distributed among 153 female patients aged 65 or older who had undergone total knee arthroplasty for their degenerative arthritis. These patients had visited university hospitals or senior citizens' welfare centers in city M in Gyeongbuk Province, city C in Chungbuk Province and Daejeon. The collected data were analyzed for descriptive statistics, t-test, ANOVA, Pearson's correlation coefficients and stepwise multiple regression. There was a significantly high correlation between health-related quality of life and pain (\(r=-.497, p<.001\)), inconvenience in daily life (\(r=-.660, p<.001\)), perceived health status (\(r=.515, p<.001\) and depression (\(r=-.576, p<.001\)). The explanatory power for the health-related quality of life among these patients was 43.4\% (\(\beta=-.820, p<.001\) for daily inconvenience), 9.7\% (\(\beta=-.1.738, p<.001\) for depression, 4.6\% (\(\beta=-.159, p<.001\) for pain, 2.9\% (\(\beta=.345, p=.003\) for perceived health status), and 1.6\% (\(\beta=.412, p=.015\) for the timing of the surgery, making the total explanatory power 60.9\%. The factors that were identified are suggested to be used as basic data when developing a nursing intervention program to improve the quality of life among female patients of degenerative arthritis. Continued efforts to identify factors other than the effect on health-related quality of life are recommended.

Keywords: Total knee arthroplasty, Degenerative arthritis, Aged, Women, Pain, Disabilities of activities of daily living, Perceived health status, Depression, Health-related quality of life

1. Introduction

An increase in the elderly population and in the incidence rate of chronic diseases means that the lifetime during which one is unhealthy is extended [1]. Our society is thus faced with the need to understand how senior citizens can live their lives in a healthy way, to practice our understanding, and to show continued interest in measures to improve health-related quality of life.

According to the report by Korea Health and Society Research Center, titled ‘the increase in medical services uses by the elderly and its implications’, from 1999 to 2010, out of the total out-patients, the share of elderly patients increased by 3.8 fold. The share of admitted patients also increased by 2.9 fold, with higher age correlated with a longer stay at the hospital [1]. Degenerative arthritis, in particular, has a high incidence rate in Korea, ranking the country fourth for women and eighth for men [2]. When the elderly population increases, an increase in patients of degenerative arthritis can also be expected.

Ministry of Health and Welfare [3] noted that the incidence for degenerative arthritis among the population aged 60 or older by gender shows that women’s incidence was 3 times that of their male counterparts for ages 60-69 and 4 times higher for those aged 70 or older. This raises the need for more attention given to degenerative arthritis as one of the leading illnesses affecting female senior citizens.

Degenerative arthritis can occur in any joint but the knee joint is the most commonly affected [2]. As one of the joints that endure the most activities, stress and bending, it is more likely to undergo damage, leading to functional disabilities and pain when sitting down, standing up or taking the stairs. This
limits the patients’ activities and causes pain in daily life [4]. Various treatments including drug therapy and physical therapy are used, but a total knee arthroplasty is recommended as a more fundamental treatment. However, after the surgery, the range of movement in the joint and muscle strength decreases while pain remains severe [5], leading to much difficulty for female senior citizens in particular, who are often burdened with housework.

Physical activities have a positive effect in decreasing anxiety and depression, while boosting self-confidence and easing social isolation [6]. Given these study findings, functional health status is closely related to perceived health status. According to Campbell [7], perceived health status is a more important variable than objective health status in predicting the quality of life among the elderly.

Preceding studies mostly reviewed degenerative diseases, with studies on total knee arthroplasty reviewing the variables affecting depression [8], pain after the knee arthroplasty [9], pain before and after the surgery and comparison of depression and life satisfaction [10]. With the recent progress in cutting-edge medical technology, total knee arthroplasty is on an increase, but related studies are still insufficient. Given that degenerative arthritis is one of the leading illnesses that affect female senior citizens, existing studies are insufficient in understanding the health-related quality of life among female elderly patients after undergoing total knee arthroplasty.

This study limited its subject to female elderly as they have a three times higher incidence rate than male counterparts [3] and are also burdened with household chores. OAKHQOL that was developed to measure the health-related quality of life in patients of degenerative arthritis was used in this study, which is specifically applied to subjects with degenerative arthritis in their knees or hip [11]. This allows the tool to more sensitively reflect the quality of life of patients of degenerative arthritis [12], setting this study apart from preceding studies. This study seeks to identify factors that are suggested to be used as basic data when developing a nursing mediation program to improve the quality of life among female patients of degenerative arthritis.

1.1. Purpose

Specific objectives of the study are as follows.
1) Identify the degree of pain, disability of activities of daily living, perceived health status, depression and health-related quality of life in subjects.
2) Understand the correlation between pain, disabilities of activities of daily living, perceived health status, depression and health-related quality of life in subjects.
3) Analyze factors that affect health-related quality of life in subjects.

2. Methods

2.1. Research Design

A structured questionnaire was used for this descriptive study on female patients of degenerative arthritis who had undergone total knee arthroplasty to understand the degree of pain, inconvenience in daily life, perceived health status and depression in the subjects and identify the effect of these factors on health-related quality of life.

2.2. Subjects

The subjects where female elderly patients of age 65 or older who visited hospitals or senior citizens’ centers in city C of Chungbuk, Daejon and city M of Gyeongbuk and who had undergone total knee arthroplasty for their degenerative arthritis. With the approval of the biological ethics committee at University K and the head of each institution, subjects were selected among those who can read and understand Korean, who had no difficulty in communication, and who had not been diagnosed with dementia or mental illness. Among these subjects, those who understood the objectives of this study and consented their participation were finally selected. The sample size was based on 146 subjects, using G-power 3.1.7 program for an effect size of 0.15, significance level of 0.05, test power 0.95 and six predicting factors. Considering the drop-out rate, a total of 153 subjects were used to satisfy the standards for a proper sample size.
2.3. Ethical Consideration

Approval was acquired from the clinical trial ethics committee at K University for the content and methodology of this study (IRB No. KNU-IRB-2014-13), and the study ethics guidelines were upheld throughout the study. Before collecting data from subjects, the purpose of the study was explained. The subjects were informed that they could withdraw their consent for participation at any time. A written consent was acquired, detailing confidentiality of the subjects and their responses which would only be used for study purposes before distributing the questionnaire.

2.4. Instruments

Pain
Using Huskisson [13]'s Visual Analog Scale (VAS), pain was evaluated on a scale of 0 to 10. It is a method commonly used to measure pain, can be applied to various environments and has a high sensitivity for pain [14]. The tool allows to turn subjectively felt pain into scores. A higher score indicates a higher degree of pain.

Disabilities of activities of daily living
Based on the tool developed by Katz et al. [15], a Korean version was developed by Bae [16], referred to as KADL, was used for the study. It consists of a total of 17 questions, namely 4 on standing up, 5 on walking, 2 on holding onto items, 3 on stretching arms and 3 on personal grooming. It uses a 4 point Likert scale (1 point for ‘not inconvenient at all’, 2 points for ‘a little inconvenient’, 3 points for ‘very inconvenient’ and 4 points for extremely inconvenient). A higher score indicates greater difficulty in daily life. At the time of development Cronbach's $\alpha = .94$ and in this study it was .93.

Perceived health status
Health Self Rating Scale [17] developed by Northern Illinois University was used to measure current health status, health status compared to the previous year, health status compared to peers and the degree to which current health status gets in the way of daily life. Consisting of 4 questions, the scale is a 5 point scale. In the study by Shin & Kim [18] that used 3 questions to measure health status at the current time, compared to peers and compared to the previous year, Cronbach's $\alpha = .78$. In this study, 2 questions were responded to on a scale of 5 for ‘overall health status at current time’ and ‘health status compared to peers’. A higher score indicates better perceived health status. The reliability of the study is .74.

Depression
A short form from geriatric depression scale, the Korean version, which was developed by KEE [20] based on the original developed by Sheikh & Yesavage [19] was used. It consists of a total of 15 questions, among which 10 are in negative questions to reduce the bias. The scale is binary scale (1=yes, 0=no), with mean scores ranging from 0 to 1, with a higher score indicating a greater degree of depression [20]. At the time of the tool’s development by Sheikh & Yesavage [19], Cronbach's $\alpha = .94$, and the reliability of GDS-K translated and revised by Kee [20] was Cronbach's $\alpha = .88$. Question number 11, “Do you feel emotionally affected by trivial things in daily life?” had caused confusion among subjects and therefore was excluded from the final analysis Cronbach's $\alpha = .87$.

Health-related quality of life
The tool developed by Guillemin, Anne-Christine & Joel [21] to measure the health-related quality of life in patients with arthritis in their knee joints or hip joints, the Osteoarthritis of Knee and Hip Quality of Life (OAKHQOL), which was then translated and revised by Kim [22] was used in this study. A total of 43 questions consist of 16 questions on physical activity, 13 questions on mental health, 4 on pain, 4 on social support, 3 on social activities and 3 questions on independence (related to spouse, sex life or profession). These questions were categorized into 6 sub-categories. An 11 point scale from 0 point to 10 points was used. The score of each category was standardized to convert it into a total score for quality of life from 0 point (worst quality of life) to 100 points (best possible quality of life). Cronbach's alpha for each sub-category was as follows: .96 for physical activity, .93 for mental health, .90 for pain, .72 for social activities, and .80 for social support [23]. In this study, Cronbach's $\alpha =$
Chronbach's alpha for each sub-category was .95 for physical activity, .85 for mental health, .92 for health, .67 for social activities, and .79 for social support.

2.5. Data collection

After gaining approval from the IRB at K University and the head of each institution, the researcher and one assistant visited senior citizens’ centers and orthopedic hospitals for out-patients in city C in Chungbuk, Daejon and city M in Gyeongbuk from June 1, 2014 to August 30, 2014 to collect data. The research assistant is enrolled in a doctoral course and thus has the education and research experience to make him familiar with the methodology and interview methods. The researcher and the research assistant held two meetings to share information on the objectives of the study and data collection. The questionnaire was distributed to female senior citizens aged 65 or older who had undergone total knee arthroplasty for their degenerative arthritis for them to read it and fill out the responses themselves. Those with poor eyesight or unable to read had the researcher or research assistant read out the questions and complete the questionnaire. It took 20-30 minutes to fill out the questionnaire. A total of 160 copies had been distributed, but 3 copies that did not meet the age criterion and 4 copies with insufficient response were excluded. A total of 153 copies (95.6%) were used for final analysis.

2.6. Data analysis

SPSS/WIN 21.0 program was used for the collected data. The frequency, percentage, mean value and standard deviation were calculated for the general characteristics, pain, disabilities of activities of daily living, perceived health status, depression and health-related quality of life of the subjects. To compare the health-related quality of life across different characteristics in subjects, t-test and ANOVA were conducted. Scheffe’s test was used for post-verification. For the correlation between the subjects’ pain, disability in daily life, perceived health status, depression and health-related quality of life, Pearson’s correlation coefficients were used, while a stepwise multiple regression was used to identify the degree to which such pain, disability in daily life, perceived health status and depression affected health-related quality of life.

3. Research results

3.1. General characteristics of subjects

The general characteristics of the subjects in this study are as shown in Table 1. The largest share of them was between ages 70 and 79, counting 81 people (52.9%). The age range was 65~84, with a mean of 74.0. In terms of marital status, 89 were married (58.2%). In terms of education, those who had graduated elementary school or less counted 106 subjects (69.3%). 115 subjects (75.2%) had a religion and 106 subjects (69.3%) responded that their financial status was about average. More than half of the subjects at 105 people (68.6%) lived with their family. 95 subjects (62.1%) had two or more illnesses in addition to arthritis and 73 subjects (47.7%) responded that they had the degenerative arthritis for more than 10 years. Surgery was undertaken within the past 6 months – 3 years for 86 subjects (56.2%). Those who had both knees operated counted 82 subjects (53.6%), and the duration of their pain before undergoing surgery was five years or longer for 100 patients (64.4%).

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Division</th>
<th>No (%)</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>65-69</td>
<td>44(28.8)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>70-79</td>
<td>81(52.9)</td>
<td>74.0</td>
</tr>
<tr>
<td></td>
<td>≥ 80</td>
<td>28(18.3)</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td>Married</td>
<td>89(58.2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Single, divorced or widowed</td>
<td>64(41.8)</td>
<td></td>
</tr>
</tbody>
</table>
3.2. The degree of pain, disabilities of activities of daily living, perceived health status, depression and health-related quality of life in female patients of degenerative arthritis with total knee arthroplasty

The degree of pain, disabilities of activities of daily living, perceived health status, depression and health-related quality of life in female patients of degenerative arthritis who had undergone total knee arthroplasty are as shown in Table 2. Subjects felt less than average pain, with their score recording 4.33 points out of a total scale of 10 points. They recorded 2.21 points out of a total score of 4 points for disability in daily life, 2.81 points out of 5 points for perceived health status, and 0.39 points out of 1 point for depression. Health-related quality recorded 5.29 points out of a total of 10 points. By subcategory, social support was the highest at 5.97 points out of 10 points, followed by pain at 5.92 points, mental health at 5.61 points, independent questions at 4.95 points, physical activity at 4.88 points and social activities at 4.54 points.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Division</th>
<th>Mean(SD)</th>
<th>Range</th>
<th>Observed range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td></td>
<td>4.33(2.29)</td>
<td>0-10</td>
<td>0-10</td>
</tr>
<tr>
<td>Disabilities of activities of daily living</td>
<td></td>
<td>2.21(0.57)</td>
<td>1-4</td>
<td>1-4</td>
</tr>
<tr>
<td>Perceived health status</td>
<td></td>
<td>2.81(0.85)</td>
<td>1-5</td>
<td>1-5</td>
</tr>
<tr>
<td>Depression</td>
<td></td>
<td>0.39(0.30)</td>
<td>0-1</td>
<td>0-1</td>
</tr>
<tr>
<td>Health-related quality of life</td>
<td>Physical activities</td>
<td>5.29(0.13)</td>
<td>0-10</td>
<td>1-8.98</td>
</tr>
<tr>
<td></td>
<td>Mental health</td>
<td>4.88(0.18)</td>
<td>0-10</td>
<td>0-9.47</td>
</tr>
<tr>
<td></td>
<td>Pain</td>
<td>5.61(0.16)</td>
<td>0-10</td>
<td>0.23-10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.92(0.20)</td>
<td>0-10</td>
<td>0-10</td>
</tr>
</tbody>
</table>

Table 2. Degree of pain, disabilities of activities of daily living, perceived health status, depression and health-related quality of life
3.3. Differences in health-related quality of life across different general characteristics among female elderly patients of degenerative arthritis with total knee arthroplasty

Differences in health-related quality of life across different general characteristics among female elderly patients who underwent total knee arthroplasty for degenerative arthritis were as shown in Table 3. There was a statistically significant difference between ages 65-69 (5.87 points), ages 70-79 (5.13 points), and aged 80 or older (4.85 points) (F=4.51, p=.013), with the elderly aged 65-69 showing higher scores than those aged 80 or older. Those who were married (5.51 points) had a higher score than those who were single, divorced or widowed (4.98 points) (F=4.07, p=.045). There were no significant difference between those who graduated elementary school or less (5.09 points), those who graduated from middle school or high school (5.76 points) and those who graduated a two year college or more (5.73 points). Neither was there significant difference between those with a religion (5.21 points) and those without a religion (5.53 points). Those who said their financial status was high (5.88 points) had higher scores than those who responded as ‘low’ (4.58 points) (F=4.85, p=.009). Those who lived with family (5.51 points) had higher scores than those living alone (4.80 points) (F=6.63, p=.011). There was no statistically significant difference between those who had no illness other than arthritis (5.67 points), 1 illness (5.42), and 2 illnesses or more (5.09 points). There was significant difference between those who had arthritis for less than five years (5.68 points), for 5 years-10 years (5.50 points) and those who had it for 10 years or more (4.96 points) (F=3.15, p=.046). Those who had their surgery within the past 6 months-3 years (5.66 points) had a higher score than those who had it more than 5 years ago (4.63 points) (F=6.03, p=.003). There was no statistically significant difference between those who had surgery on one side (5.40 points) and those who had it on both sides (5.20 points). Those who had endured pain before surgery for less than 3 years (6.16 points) had a higher score than those who suffered for 3 years-5 years (5.11 points) and those who suffered for 5 years or more (5.15 points) (F=4.12, p=.018).

Table 3. Difference in health-related quality of life across general characteristics of female elderly patients with degenerative arthritis who had undergone total knee arthroplasty

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Division</th>
<th>Mean(SD)</th>
<th>t or F(p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age(yrs)</td>
<td>65-69 *</td>
<td>5.87(1.39)</td>
<td>4.51(0.013)</td>
</tr>
<tr>
<td></td>
<td>70-79 b</td>
<td>5.13(1.60)</td>
<td>a&gt;c</td>
</tr>
<tr>
<td></td>
<td>≥80 c</td>
<td>4.85(1.79)</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td>Married</td>
<td>5.51(1.53)</td>
<td>4.07(0.045)</td>
</tr>
<tr>
<td></td>
<td>Single, divorced, widowed</td>
<td>4.98(1.68)</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>≤Elementary school</td>
<td>5.09(1.72)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Middle school-high school</td>
<td>5.76(1.34)</td>
<td>2.83(0.062)</td>
</tr>
<tr>
<td></td>
<td>≥2 year college</td>
<td>5.73(1.61)</td>
<td></td>
</tr>
<tr>
<td>Religion</td>
<td>Yes</td>
<td>5.21(1.62)</td>
<td>1.12(0.293)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>5.53(1.58)</td>
<td></td>
</tr>
<tr>
<td>Financial status</td>
<td>High *</td>
<td>5.88(1.42)</td>
<td>4.85(0.009)</td>
</tr>
<tr>
<td></td>
<td>Average b</td>
<td>5.45(1.59)</td>
<td>a&gt;c</td>
</tr>
<tr>
<td></td>
<td>Low c</td>
<td>4.58(1.57)</td>
<td></td>
</tr>
<tr>
<td>Living arrangements</td>
<td>Living alone</td>
<td>4.80(1.46)</td>
<td>6.63(0.011)</td>
</tr>
<tr>
<td></td>
<td>Living with family</td>
<td>5.51(1.64)</td>
<td></td>
</tr>
<tr>
<td>Illnesses other than arthritis</td>
<td>0</td>
<td>5.67(1.44)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>≤2</td>
<td>5.42(1.85)</td>
<td>2.08(0.128)</td>
</tr>
<tr>
<td>Duration of arthritis</td>
<td>&lt;5 years</td>
<td>5.68(1.52)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 years-less than 10 years</td>
<td>5.50(1.60)</td>
<td>3.15(0.046)</td>
</tr>
<tr>
<td></td>
<td>≥10 years</td>
<td>4.96(1.63)</td>
<td></td>
</tr>
<tr>
<td>Time of operation</td>
<td>≥5 years *</td>
<td>4.63(1.74)</td>
<td>6.03(0.003)</td>
</tr>
</tbody>
</table>

N=153
3.4. Relation between pain, disabilities of activities of daily living, perceived health status, depression and health-related quality of life in female elderly patients of degenerative arthritis who had undergone total knee arthroplasty

The relation between pain, disabilities of activities of daily living, perceived health status, depression and health-related quality of life in female elderly patients of degenerative arthritis who had undergone total knee arthroplasty is as shown in Table 4. There was a negative correlation between health-related quality of life and pain (r=-.497, p<.001), disabilities of activities of daily living (r=-.660, p<.001), and with depression (r=-.576, p<.001), while there was a positive correlation with perceived health status (r=.515, p<.001). That is, the less the pain, disabilities of activities of daily living and depression, and the higher the perceived health status, the higher the health-related quality of life in female elderly patients of degenerative arthritis who had undergone total knee arthroplasty.

Table 4. Relation between pain, disabilities of activities of daily living, perceived health status, depression and health-related quality of life in female elderly patients of degenerative arthritis with total knee arthroplasty

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pain r(p)</th>
<th>Disabilities of daily living r(p)</th>
<th>Perceived health status r(p)</th>
<th>Depression r(p)</th>
<th>Health-related quality of life r(p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Disabilities of activities of daily living</td>
<td>-.494</td>
<td>.510</td>
<td>-.348</td>
<td>-.576</td>
<td>.515</td>
</tr>
<tr>
<td>Perceived health status</td>
<td>-.328</td>
<td>(-.001)</td>
<td>(-.001)</td>
<td>(-.001)</td>
<td>(-.001)</td>
</tr>
<tr>
<td>Depression</td>
<td>.222</td>
<td>.454</td>
<td>-.348</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Health-related quality of life</td>
<td>-.497</td>
<td>(-.001)</td>
<td>.515</td>
<td>-.576</td>
<td>(-.001)</td>
</tr>
</tbody>
</table>

3.5. The effect of pain, disabilities of activities of daily living, perceived health status and depression on health-related quality of life in female elderly patients of degenerative arthritis with total knee arthroplasty

The effect of pain, disabilities of activities of daily living, perceived health status and depression on health-related quality of life in female elderly patients who had undergone total knee arthroplasty for degenerative arthritis is as seen in Table 5. For independent variables, those that showed a difference in health-related quality of life among general characteristics were treated as variables. These were namely, age (65-69=0.0, 70-79=1.0, 80 or older=0.1), marital status (married=0, single, divorced or widowed=1), financial status (high=0.0, average=1.0, low=0.1), living arrangements (living alone=0, living with family=1), duration of arthritis (less than 5 years=0.0, 5 years-10 years=1.0, 10 years or more=0.1), timing of the operation (more than 5 years=0.0, within the past 3 years-5 years=1.0, within the past 6 months-3 years=0.1) and duration of the pain before operation (less than 3 years=0.0, 3 years-5 years=1.0, 5 years or more=0.1). Pain, disabilities of activities of daily living, perceived health status and depression were also included for analysis.

Before a multiple regression analysis, multicollinearity, independence, homoscedasticity and
normality were analyzed to meet the assumptions of the regression equation. A verification of
collinearity showed that the tolerance was above 0.1 at 0.554-0.956 and the variance inflation
factor (VIF) was also below 10 at 1.046-1.804, posing no issues of multicollinearity. The independence
of error verification showed that the value for Durbin Watson statistics was 1.824, which is closer to 2,
indicating self-correlation. An analysis of the residuals showed the range of standardized residuals to be
-4.918-2.204 meeting the criterion of equal dispersibility and normality. The regression analysis
shows that disabilities of activities of daily living had an explanatory power of 43.4% (β=-.820, p<.001)
for quality of life, followed by depression with an explanatory power of 9.7% (β=-.1.738, p<.001), pain
at 4.6% (β=-.159, p<.001), perceived health status at 2.9% (β=.345, p<.001), and the timing of the knee
arthroplasty at 1.6% (β=.412, p<.001). These variables together had a total explanatory power of 62.2%
for health-related quality of life. Therefore, those with less disability of activities of daily living, lower
depression and less pain, those who had undergone surgery recently and those with higher perceived
health had an effect on health-related quality of life among female elderly patients who had undergone
total knee arthroplasty for their degenerative arthritis. Among the factors, disabilities of activities of
daily living had the greatest effect.

Table 5. The effect of pain, disability of activities of daily living, perceived health status and
depression on health-related quality of life in female elderly patients of degenerative arthritis with total
knee arthroplasty

<table>
<thead>
<tr>
<th>Variables</th>
<th>B</th>
<th>SE</th>
<th>β</th>
<th>R²</th>
<th>Adj. R²</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>8.998</td>
<td>.699</td>
<td></td>
<td></td>
<td></td>
<td>12.877</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Disabilities of activities of daily living</td>
<td>-.820</td>
<td>.192</td>
<td>-.291</td>
<td>.434</td>
<td>.430</td>
<td>-4.270</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Depression</td>
<td>-1.738</td>
<td>.315</td>
<td>-.318</td>
<td>.531</td>
<td>.525</td>
<td>-5.523</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Pain</td>
<td>-.159</td>
<td>.041</td>
<td>-.226</td>
<td>.577</td>
<td>.568</td>
<td>-3.850</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Perceived health status</td>
<td>.345</td>
<td>.114</td>
<td>.183</td>
<td>.606</td>
<td>.596</td>
<td>3.017</td>
<td>.003</td>
</tr>
</tbody>
</table>

R²=.622,  Adj. R²=.609,  F=48.360,  p<.001

4. Discussion

This study was conducted to understand the degree of pain, disabilities of activities of daily living,
perceived health status, depression and health-related quality of life in female elderly patients who had
undergone total knee arthroplasty for degenerative arthritis, and to understand the correlation between
each variable and the effect of these variables on health-related quality of life. Based on the findings,
the following can be discussed. The pain experienced by these subjects recorded 4.33 points out of 10
points. The pain was 1.6 points at month 6 post-operation and 1.3 points at 1 year post-operation [9].
This seems to be because more than half of the subjects at 86 subjects (56.2%) had undergone surgery
in the past 6 months to past 3 years, which is the time when pain from surgery is still remnant.
Symptoms of arthritis worsen with age and women are known to experience three times more
frequently [24]. Given this fact, pain may have recorded a higher score because this study only used
female elderly patients as subjects. If the subject sample were to include male elderly patients as well,
the pain is expected to record a lower score. Therefore, this indicates that continued pain management
is needed after total knee arthroplasty, and particular care must be given to female elderly patients.

Disabilities of activities of daily living by these subjects recorded 2.21 points out of a total of 4
points. This coincides with the findings of Lee [25] from the study conducted on patients with
degenerative arthritis in rural areas, where disabilities of activities of daily living was slightly higher
than average. However, given that this study limited the subjects to those who had undergone total knee
arthroplasty, it can be said that disabilities of activities of daily living are still persistent after the
surgery. In the study by Choi et al [26], the most frequent response when patients were asked about the
best and worst things about total knee arthroplasty was that “it is not easy to stand up once seated on
the floor, one has to support oneself with the hand to raise oneself up, it is hard to squat”. This supports
the findings of this study where disabilities of activities of daily living were confirmed. Therefore,
rehabilitation programs are recommended to help patients to minimize any disabilities of activities of
daily living after surgery.

Perceived health status scored 2.81 points out of a total of 5 points, coinciding with the findings by Oh [27] where the score was 2.61 points for elderly patients with degenerative arthritis. Female elderly patients tend to see their positive perception towards health deteriorate due to aging and chronic diseases [18]. In particular, female elderly patients in their 70s saw their self-perceived health have a significant effect on satisfaction with life, more so than the effect by objective evaluations [28]. Therefore, efforts need to be made to develop multi-faceted measures that can help improve self-perceived health evaluations.

For depression, subjects scored .39 points out of a total of 1 point. This was lower than the .50 points reported in the study on depression two weeks after total knee arthroplasty conducted by Park [10], and also lower than the 2.72 points (out of a total of 4 points) for depression in chronic arthritis patients in a study by Ju & Kim [8]. This seems to be because the subjects in this study had undergone surgery more than 6 months ago and therefore have figured out a way to adjust themselves to the remnant pain after surgery or disabilities, leading to decreased depression. Likewise, consideration needs to give to the fact that depression shows significant difference depending on the time lapsed since the operation. Depression can delay recovery or worsen symptoms, and therefore must be recognized as a serious health issue [10] requiring nursing mediation.

Health-related quality of life in female elderly patients who had undergone total knee arthroplasty was 5.29 points out of a total of 10 points. This coincides with the findings in Lee et al [5] that used subjects in rural areas who had degenerative arthritis, as well as with the findings of Kim [22] where the score for patients with arthritis in their knees was 58.09 points (out of a total of 100 points). Given that this study used only female elderly patients who had undergone total knee arthroplasty as subjects, it seems insufficient to conclude that the surgery led to a significant improvement in health-related quality of life. This is because after the surgery, the elderly have difficulty in completely restoring the function of their knee joints due to deteriorated nerves, which makes it difficult to move [29], and this in turn leads to disability of activities of daily living. Therefore, a focus on rehabilitation nursing for such elderly patients needs to be placed.

Health-related quality of life in female elderly patients who had undergone total knee arthroplasty differed across age, marital status, financial status, living arrangements, duration of the illness, timing of the operation and the duration of the pain before the surgery. This is in line with the findings by Lee et al [5] that conducted a study on 601 arthritis patients in rural areas and concluded that quality of life differed across age, living arrangements and financial status. Therefore, efforts need to be taken to improve their quality of life while taking into consideration the differences among patients.

Health-related quality of life in female elderly patients who had undergone total knee arthroplasty was highly correlated with pain, disability of activities of daily living, perceived health status and depression. The lower the pain, disabilities and depression, and the higher the perceived health status, the higher was their health-related quality of life. An important variable that affected the health-related quality of life in these female elderly patients was disability in daily living with an explanatory power of 43.0%. This was followed by depression at 9.5%, pain at 4.3%, perceived health at 2.8% and the timing of the surgery at 1.3%. All the variables combined explained 60.9% of health-related quality of life. Although it is difficult to compare due to a lack of preceding studies that used same types of subjects, Bae et al [6] pointed out that the disability to stand out had the biggest effect on health-related quality of life among the elderly suffering from degenerative arthritis, which is in line with the findings of this study. Oh [27] noted that depression was the most important indicator for quality of life in the elderly suffering from degenerative arthritis, while Kim [22] concluded that pain was the most important indicator for health-related quality of life in patients of arthritis in the knee. These findings coincide with those of this study. Park [10] showed that as time passed from the surgery, satisfaction with life improved but this was in contrast with the result of this study. This seems to be because the subjects of this study have adjusted to the remaining pain after 6 months or more since the surgery and have become used to the limited joint angle, and therefore the perceived quality of life must have been lower than the point immediately after surgery or the most severe stage. Although explanatory powers of each variable differ across studies, pain can be concluded to bring about disability of activities of daily living, which in turn causes depression. Since damages to physical functions cause psychological issues, they also affect health-related quality of life. The subjects had experienced pain for more than one year after the surgery, unlike their original expectation of how pain and difficulty related to arthritis would simply disappear after the operation. [9]. Some of them experienced difficulty in daily
life such as having a hard time getting up once seated on the floor or finding it difficult to squat [26]. For the female elderly who are burned with care of their grandchildren or household chores, disabilities of activities of daily living seem to be the most important factor affecting health-related quality of life. Therefore, focus needs to be placed on providing early rehabilitation programs that take into consideration the characteristics of the elderly who have difficulty in completely recovering the function in their knee joints due to deteriorated nerves. [29].

Those with degenerative arthritis are three times as likely to experience depression compared to those without [30], and depression has a positive correlation with pain [8]. In general, the symptoms experienced by patients of chronic degenerative arthritis continue to appear even after the total knee arthroplasty [8]. Given this, continued attention must be paid to manage depression and pain through nursing mediation. Since for female senior citizens in their 70s, self-perceived health rather than objectively evaluated health, seem to have more influence on satisfaction with life [28], self-management programs that help with positive thinking must be provided and a multi-faceted support system must be provided. While total knee arthroplasty that has been made possible with the progress in medical technology has certainly improved the health-related quality of life in patients of degenerative arthritis, there are still issues of disability of activities of daily living, such as the related pain or the difficulty in squatting. This can pose serious issues for the female elderly who are often burdened with household chores or childcare. As such, this study suggests developing and providing early rehabilitation programs to promote early recovery and prevention of functional damage after total knee arthroplasty. Continued systematic management of pain and depression must also be ensured to improve the health-related quality of life in the female elderly.

5. Conclusion and Recommendations

The study analyzed the effect that pain, disability of activities of daily living, perceived health status and depression has on health-related quality of life in female elderly patients of degenerative arthritis who had undergone total knee arthroplasty. The finding was that the explanatory power of disabilities of activities of daily living for quality of life was 43.4%, followed by 9.7% for the explanatory power of depression, 4.6% for that of pain, 2.9% for perceived health, and 1.6% for the timing of the surgery. The total combined explanatory power of the variables was 62.2%. Based on these findings, the following is recommended.

A repeat study is recommended by selecting subjects based on probability rather than random sampling to make the subjects more representative. Even for those who had undergone surgery for their arthritis, many still feel difficulty and pain in daily life, perceive their health to be in a bad status and are often depressed. This has a significant effect on the health-related quality of life for these patients and therefore a mediation program that can solve these issues needs to be developed. In particular, studies on early rehabilitation programs of various characteristics that can help reduce disabilities of activities of daily living should be continued, as well as research on various factors that can improve self-perceived health. Additional efforts are also required to identify factors that affect health-related quality of life other than those already identified.

6. References


[27] Oh, J.H, “Structural equation modeling on quality of life in older adult with osteoarthritis”,


