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ORIGINAL ARTICLE

# Quality of Life of Patients submitted to Total Knee Arthroplasty

# Qualidade de vida de pacientes submetidos à artroplastia total do joelho

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## Abstract

**Objective:** the aim of this study was to evaluate the quality of life between patients who have already undergone the TKA surgery and those who have not. **Methodology**: 118 patients [60 undergoing TKA (G1) and the remaining 58 awaiting the procedure (G2)] answered questions about QoL using the WOMAC and SF-36 protocols. The comparison was performed using the chi-square test and Student's t-test, with a significance level of 0.05. **Results:** with regard to clinical aspects, there was a higher level of pain in Group G2, as well as greater frequency in the use of medications, especially for pain relief. In the QoL evaluation, significant difference was observed in all the domains of the generic questionnaire SF-36 and in WOMAC, estando a capacidade functional do G2 reduzida e abaixo do nível observado nos pacientes do G1. **Conclusion:** patients with advanced knee arthrosis who underwent TKA, compared to those who did not undergo the procedure, had better quality of life in all domains assessed by both the general SF-36 questionnaire and the WOMAC questionnaire.

**Keywords**: Total Knee Arthroplasty (TKA); knee osteoarthritis; quality of life.

## Resumo

**Objetivo**: o objetivo deste estudo foi avaliar a qualidade de vida entre pacientes que já se submeteram à cirurgia de ATJ e aqueles que ainda não passaram pelo procedimento. **Metodologia:** 118 pacientes [60 submetidos à ATJ (G1) e os 58 restantes aguardando o procedimento (G2)] responderam perguntas sobre QV usando os protocolos WOMAC e SF-36. A comparação foi realizada usando o teste qui-quadrado e o teste t de Student, com um nível de significância de 0,05. **Resultados**: em relação aos aspectos clínicos, houve um maior nível de dor no Grupo G2, bem como maior frequência no uso de medicamentos, especialmente para alívio da dor. Na avaliação da QV, foi observada diferença significativa em todos os domínios do questionário genérico SF-36 e no WOMAC, estando a capacidade funcional do G2 reduzida e abaixo do nível observado nos pacientes do G1. **Conclusão:** pacientes com artrose avançada de joelho que se submeteram à ATJ, em comparação com aqueles que não passaram pelo procedimento, apresentaram melhor qualidade de vida em todos os domínios avaliados tanto pelo questionário geral SF-36 quanto pelo questionário WOMAC.

**Palavras-Chave:** Artroplastia Total do Joelho (ATJ); osteoartrite do joelho; qualidade de vida.

## INTRODUCTION

Total Knee Arthroplasty (TKA) is an efficient procedure for the relief of pain and in functional recovery of patients with advanced arthrosis of the knee[1,2] .As a result of the increase in life expectancy, prevalence of obesity, and greater access to information, there has been a rising demand for this procedure, with alarming perspectives up to 2030, projecting an increase of 565% in the number of TKA surgeries per year, in the United States alone[3].

However, recent studies have revealed that a significant portion of the patients operated declared themselves dissatisfied with their knees after surgery[4,5,6]. This finding indicates that the level of expectation of some patients has been above that of the real possibilities; information regarding the complexity of the procedure has not been exhausted, and the results are based on objective clinical evaluation. This latter aspect, especially, has led to a review of the way to measure the outcomes achieved with the procedure and has encouraged studies to be conducted that also take into consideration the subjective perception of patients and their expectations[7,6].

Studies about the quality of life of patients submitted to TKA have gained space in the scientific literature, especially in developed countries[8,9]. These studies have established the benefits of surgery and the impacts of certain conditions on the change in the results. However, many of the aspects evaluated in these studies, such as the local health indicators, social, cultural, and economic aspects, and the difficulties of access to surgery, are peculiar to the studied populations and probably do not translate into a universal reality found in places with

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different indicators, as is the case with developing countries[10,11].

Therefore, the aim of our study was to evaluate diverse aspects related to the quality of life of patients submitted to TKA in our environment, analyzing the panorama of each of the domains that comprise the concept of quality of life.

## MATERIAL AND METHODS

A cross-sectional observational study was conducted in a group of patients from the Orthopedic Service between September 2012 and June 2018. The patients were selected by means of the non probabilistic sequential sampling technique at the Outpatient Knee Surgery clinic and then divided into two groups. The operated patients formed Group 1 (G1) and the non-operated Group 2 (G2).

The study was approved by the Research Ethics Committee, in compliance with the ethical principles of medical research in human beings. All the participants in the study were informed about the research, its risks and benefits, and signed the Terms of Free and Informed Consent.

The inclusion criteria for G1 were as follows: accept participation in the study; be resident in the State of search; age over 40 years; have been submitted to primary TKA for the treatment of arthrosis according to the Ahlbäck[12] classification Grade IV or V, with a post-operative period of over six months, in accordance with the criterion postulate by Lavernia et al[13]. The inclusion criteria for Group 2 were the same as those adopted for the patients of Group G1, with the exception of the fact of not having been operated on, no longer presenting a favorable response to conservative treatments, and awaiting surgical treatment by TKA.

Not included in the groups were patients with cognitive difficulties that would prevent them from understanding and responding to the questionnaires, patients with degenerative joint diseases other than arthroses (Rheumatoid Arthritis, Systemic lupus erythematosus (SLE), Psoriatic Arthritis, etc.), whether or not they were operated patients, in the presence of complications such as acute myocardial infarction, deep venous thrombosis, stroke, among others, or operated with complications that were not inherent to the TKA procedure, and in cases of failure of the surgery with removal of the prosthesis, such as deep infection, fractures, etc.

We required 48 individuals per group in order to obtain a statistical power of 80% in the detection of a 10% difference, with an alpha error of 5%, and considering an estimated standard deviation of 15.9 and 18.4 for the operated and non-operated groups, respectively, according to the study conducted by Brandes et al. Thus, 15% was added to compensate for possible losses, resulting in 55 individuals in each group[14].

The subjects were interviewed exclusively by the researchers. To Group G1, the standard instrument was applied for the collection of sociodemographic data, including age, gender, and race. In addition, clinical data were collected, such as weight and height (to calculate the body mass index - BMI), pain evaluation by the Visual Analog Scale (VAS), presence of comorbidities, which were categorized as follows: nonexistent, one, two, and three or more. Continuous use of medication for pain relief, categorizing them as one, two, three, or more medications. Physical therapy performed as a dichotomic response: Yes, for any modality of physiacal therapy that was constantly performed; No, when no modality whatever of physical therapy was performed.

The patients were functionally classified, based on the American College of Rheumatology (ACR) criteria[15], which stratify function from I to IV according to the degree of functional limitation imposed by the disease. Data were also collected with respect to the surgery, such as date, knee operation (one or both), the existence of prior surgery on the operated knee, and satisfaction with the procedure (Yes or No).

### Questionnaires used for evaluating the Quality of Life

Specific evaluation of the quality of life in arthrosis was performed by applying the version validated for the local language of the questionnaire *Western Ontario and McMaster Universities Osteoarthritis Index* (WOMAC), composed of three domains: pain, rigidity, and physical activity. The data were evaluated by means of the raw scale from 0 to 100, with zero being the worst state and 100 being the best state of health[16]. The general quality of life was measured using the version validated for the local language of the generic SF-36 questionnaire. In a similar way, the results varied from 0 to 100, where the highest result implied a better quality of life[17].

To the patients in G2, the same structured questionnaires were applied, with the exception of the questions with respect to surgery and with data with respect to the disease being added: knee affected (one or two) biomechanical alignment (varus or valgus), and arthrosis staging by the Albäch classification.

### Statistical Analysis

All the domains of WOMAC and SF-36 questionnaires were defined as dependent variables. The independent variables consisted of the socio-demographic data (gender, marital status, etc), clinical (comorbidities, use of medications, etc), and functional capacity according to the ACR. The data were presented in tables of distribution by frequencies and percentages when the variables were qualitative, and mean and standard deviation for the continuous variables. The Chi-square test was used for qualitative variables and the Student's t-test for quantitative variables. In all cases, the level of significance of 0.05 was adopted. One-way analysis of variance (ANOVA) was used to observe the differences in WOMAC for the period of time of surgery in the analysis of the operated group.

Correction among the variables was performed by the Pearson

correlation analysis, and models of multivariate analysis were also constructed to verify the existence of possible influence of the variables that presented significant differences in the allocation between the two groups on the response of the dependent variables. We used one-way ANOVA or linear regression, depending on the type of variable. Three different models were constructed, using the WOMAC global, Functional Capacity SF-36, and Pain SF-36 as dependent variables, associated with the Tukey post-test for multiple comparisons.

## RESULTS

In this research, 118 patients enrolled; 60 were included in Group G1, while 58 were in Group G2. The two groups of patients had very similar sociodemographic characteristics, with the exception of a slightly higher age in Group G1 (Table 1).

**Table 1.** Demographic data in period between September 2012 and June 2018, of patients with advanced arthrosis of the knees, or those submitted to TKA at least 06 months previously.

| | Operated Group | Non Operated Group | P |
|---|---|---|---|
| Demographic Data | | | |
| Gender | | | |
| Female | 55 (91.7%) | 49 (84.5%) | 0.228a |
| Age | 69.45 (± 7.53) | 63.40 (± 9.61) | 0.000b |
| Weight | 74.85 (± 12.01) | 75.02 (± 12.41) | 0.937b |
| Height | 1.59 (± 0.08) | 1.59 (± 0.08) | 0.598b |
| BMI | 29.25 (± 4.21) | 29.57 (± 4.19) | 0.676b |
| Race | | | |
| White | 20 (33.3%) | 24 (41.4%) | 0.509a |
| Black | 25 (41.7%) | 24 (41.4%) | |
| Mulatto | 15 (33.3%) | 10 (17.2%) | |
| Marital Status | | | |
| Married | 30 (50.0%) | 27 (46.6%) | 0.708a |
| Without comp. | 30 (50.0%) | 31 (53.4%) | |
| Religion | | | |
| Catholic | 47 (78.3%) | 36 (62.1%) | 0.053a |
| Other Relig. | 13 (21.7%) | 22 (37.9%) | |
| Schooling | | | |
| Primary school | 25 (41.7%) | 27 (46.6%) | 0.830a |
| High school | 26 (43.3%) | 24 (41.4%) | |
| Higher learning | 09 (15.0%) | 07 (12.1%) | |
| Occupation | | | |
| Without occupation | 25 (41.7%) | 22 (37.9%) | 0.624a |
| Working | 34 (56.7%) | 36 (62.1%) | |
| Physical Effort in Profession | | | |
| Little | 28 (46.7%) | 16 (27.6%) | 0.008a |
| Moderate | 25 (41.7%) | 22 (37.9%) | |
| Intense | 7 (11.7%) | 20 (34.5%) | |

[a] - Nominal variables were presented as frequency and percentage. In these cases the Chi-square test was used with a level of significance of 0.05.
[b] - The continuous variables are presented as mean and standard deviation. The test of significance was the Student's-t test.

With regard to clinical aspects, there was a higher level of pain in Group G2, as well as greater frequency in the use of medications, especially for pain relief. Distribution according to the functional class showed a higher frequency of Types 1 and 2 in the operated Group: these types represent a lower feeling of limitation by the disease. See Table 2.

**Table 2.** Clinical data in period between September 2012 and June 2018, of patients with advanced arthrosis of the knees, or those submitted to TKA at least 06 months previously.

| Variables | Operated Group | Non Operated Group | P |
|---|---|---|---|
| Co-morbidities | | | |
| No | 9 (15%) | 8 (13.8%) | 0.506a |
| One | 30 (50%) | 22 (37.9%) | |
| Two | 15 (25%) | 21 (36.2%) | |
| Three or more | 6 (10%) | 7 (12.1%) | |
| Functional Class | | | < 0.01 |
| Class 1: | 38.3%) | 15.5%) | |
| Class 2: | 46.7%) | 32.8%) | |
| Class 3: | 15%) | 44.8%) | |
| Class 4: | - | 6.9%) | |
| Physical Activity | | | |
| Yes | 20 (33.9%) | 9 (15.5%) | 0.021[a] |
| No | 39 (66.1%) | 49 (84.5%) | |
| Use of medication | | | |
| No | 27 (45%) | 6 (10.3%) | <0.00 a |
| One | 23 (38.3%) | 35 (60.3%) | |
| Two or more | 10 (16.7%) | 17 (29.3%) | |
| Physical Therapy | | | |
| No | 37 (61.7%) | 32 (55.2%) | 0.544a |
| Yes | 23 (38.3%) | 25 (43.9%) | |
| VAS | 3.10 (± 2.20) | 7.24 (± 1.88) | 0.001b |
| Mean Flexure | 119.94 (± 66.83) | 107.86 (± 14.01) | 0.180b |
| Extension | -1.23 (± 2.35) | -2.19 (± 4.36) | 0.136b |

VAS: Pain evaluation by Visual Analog Scale, ranging from 0-10, with ")" being the best and "10" the worst.

[a] - Nominal variables were presented as frequency and percentage. In these cases the Chi-square test was used with a level of significance of 0.05.

[b] - The continuous variables are presented as mean and standard deviation. The test of significance was the Student's-t test.

In the quality of life evaluation, a significant difference was observed in all the domains of the generic questionnaire SF-36. In the evaluation of the quality of life questionnaire specifically for arthrosis (WOMAC), marked differences were also observed between the groups. The data with respect to the evaluation of QoL by the two questionnaires are shown in Table 3. The distribution of patients according to the time of surgery is presented in Table 4, in which we also noted no significant differences in the comparison between the time intervals and QoL evaluated by WOMAC.

**Table 3.** Comparison of the SF36 and WOMAC scores of patients with advanced arthrosis of the knees, or those submitted to TKA at least 06 months previously in period between September 2012 and June 2018

| | Operated Group | Non Operated Group | P |
|---|---|---|---|
| **SF-36** | | | |
| FC | 51.58 ± 20.57 | 24.22 ± 18.03 | <0.001 |
| LPA | 60.00 ± 39.91 | 20.25 ± 33.59 | <0.001 |
| Pain | 56.05 ± 20.49 | 33.25 ± 17.70 | <0.001 |
| GSH | 79.34 ± 17.25 | 59.00 ± 22.67 | <0.001 |
| Vit | 72.50 ± 18.16 | 45.87 ± 23.13 | <0.001 |
| SA | 79.87 ± 24.07 | 42.54 ± 27.06 | <0.001 |
| LEA | 70.00 ± 39.63 | 34.02 ± 43.03 | <0.001 |
| MH | 74.55 ± 20.05 | 56.13 ± 24.15 | <0.001 |
| WOMAC | | | |
| Pain | 72.83 ± 21.59 | 40.58 ± 18.68 | <0.001 |
| Rigidity | 77.33 ± 22.92 | 40.12 ± 26.83 | <0.001 |
| FI | 72.37 ± 21.92 | 36.33 ± 18.34 | <0.001 |
| Overall | 74.18 ± 19.74 | 39.01 ± 18.18 | <0.001 |

In all the analysis the Student's-t test was used, with a level of significance of 0.05.
FC- Functional Capacity, LPA- Limitation by Physical Aspects, GSH- General State of Health, Vit- Vitality, SA- Social Aspects, LEA- Limitation by Emotional Aspects, MH- Mental Health, FI- Functional Incapacity.

**Table 4.** Number and Percentage of patients submitted to TKA by post-operative periods between September 2012 and June 2018.

| | N | Percentage | WOMAC* | P |
|---|---|---|---|---|
| **Per Periods** | | | | 0.430b |
| Up to 02 years | 20 | 33.3% | 77.9 ± 14.4 | |
| from 02 to 04 | 21 | 35.0% | 77.0 ± 18.3 | |
| Over 04 | 19 | 31.7% | 67.0 ± 24.5 | |

*The variables are presented as mean and standard deviation.

[b]The test of significance was One-Way ANOVA of the overall WOMAC value with a level of significance of 0.05.

The results of the multivariate analysis models constructed demonstrated no independent associations between the variables and quality of life evaluated by the two instruments (WOMAC and SF36), except for the variable physical force that presented a weak association (Table 5).

**Table 5**. Multivariate analysis of influence of independent variables on dependent variables in Operated and Non Operated Groups. Two-way ANOVA was used since the new variable was a nominal variable[b] Linear regression was used because the new variable was continuous

| | Independent variable | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Dependent variable | Physical Effort in Profession | Physical Activity. | Use of medication | Functional Class ACR | Age | Pain - VAS | Mental Health SF-36 | Gender |
| WOMAC | 0.030[a] | 0.620a | 0.211a | 0.868a | 0.218b | 0.861b | 0.106b | 0.770a |
| Pain SF36 | 0.489[a] | 0.525a | 0.221a | 0.069a | 0.795b | 0.638b | 0.572b | 0.400a |
| Functional Capacity SF-36 | 0.534[a] | 0.417a | 0.098a | 0.753a | 0.699b | 0.107b | 0.892b | 0.257a |

## DISCUSSION

The results of our study revealed that patients with advanced arthrosis of the knee, who had total knee arthroplasty of this joint performed, in comparison with those who had not undergone the procedure, presented a better quality of life in all the domains evaluated by both the overall SF-36 questionnaire and WOMAC questionnaire. Total knee arthroplasty can provide a high degree of patient satisfaction, as it adds medium and long-term benefits in terms of quality of life, pain relief, and function. However, the literature reports that up to 30% of patients are dissatisfied with the procedure[18]. Operated patients report difficulty going up and down stairs, reduced walking speed, and inability to return to the same level of sports performance before surgery[19].

Therefore, although TKA is considered one of the most satisfactory surgical procedures for pain relief, restoration of function, and improvement in general quality of life, some aspects of this topic remain uncertain[6,20]. Vissers et al, in a systematic review of psychological factors that affect the results of total arthroplasties of the hip and knee, observe limitations in the level of certainty of the conclusions due to the heterogeneity of the studies with regard to measurements of the results, use of different questionnaires with different approaches to QoL, and the use of different scales of values[21]. It has also been reported that even the comparison of studies about QoL in TKA performed in different countries is restricted because they concern diverse populations with plural life expectancies influenced by distinct cultural and economic aspects[6,22,23].

We found a higher mean age in the operated group, with this difference being statistically significant. The influence of age on QoL is controversial in the studies; however, Andy Judge et al. observed worse results in the higher age groups without this fact being a barrier to surgery[11]. Another prospective study observed that advanced age reduced the possibility of achieving a satisfactory post-operative level of QoL[24]. From this aspect, the presence of a more advanced age group in G1 could become a factor with a negative impact on QoL; however, the multivariate analysis revealed no interaction in the response of the dependent variable.

With regard to the clinical characteristics, we found differences between the groups in three variables analyzed, namely pain, use of analgesic medication, and practice of physical activity. However, none of the clinical variables had any influence on the response of the dependent variables in the multivariate analysis.

In the pain evaluation by VAS, we observed lower scores in Group G1. This finding was also observed by Papakostidou et. al. when they used VAS in a prospective cohort and observed elevated levels of pain in the pre-operative evaluation, especially in the female gender and among the more obese patients, with progressive improvement in the consecutive post-operative evaluations[25]. These results were coherent with those observed in SF-36 and WOMAC in the present study.

Pain is an important factor related to QoL and osteoarthrosis in the knees. Patients' dissatisfaction with the results of the surgery has presented a close relationship with pain, both in the post-operative and pre-operative evaluations. Kim et al., in a prospective study, observed that greater dissatisfaction with the surgery was found in patients who presented the worst scores in pain by WOMAC and SF-36 in the post-operative period. Furthermore, in a multivariate analysis, they observed that pre-operative pain was a strong predictor of post-operative dissatisfaction[6].

In our study, in both SF-36 and WOMAC, we found significant differences in pain between the two groups. In WOMAC, the difference was more pronounced, possibly because it specifically reflected pain related to the knee. In the analysis of the correlation of pain with the other domains, we found different responses between the groups. In the non-operated group, pain in the two questionnaires was correlated with vitality and social aspects, whereas in the operated group, pain presented a correlation with rigidity and functional aspects.

These data point towards different characteristics of pain in the situations analyzed. Among the non-operated patients with arthrosis, high levels of pain were found in those who also presented low vitality and greater difficulty in social aspects. The relationship may perhaps be explained by the greater functional incapacity and, consequently, the higher rate of depression in these patients. After surgery, vitality and social aspects presented a weak correlation with pain. The social aspects of SF-36 in the two groups maintained a moderate correlation with mental health and vitality, in agreement with the findings of Ackerman et al[26].

We observed less use of medication for pain in all the categories analyzed in favor of the operated Group. This datum certainly presents coherence with the lower level of pain in this group. In the case of physical activity practice, we also found a higher number of practitioners in Group G1 (operated). Brandes et al., in a prospective study with the aim of measuring the changes in physical activity of patients 12 months after TKA, concluded that the surgery provided the possibility of returning to physical activity for the majority of patients with severe arthrosis of the knees[27]. The difference found in our study may probably be explained by the functional improvement provided by the surgical procedure. In this case, the operated patients possibly felt apt again to practice systematic physical activity.

Among all the domains of QoL evaluated, the Functional Capacity (FC) of SF-36, Limitation by Physical Aspects (LPA) of SF-36, and Functional Incapacity (FI) of WOMAC were those that presented the worst scores in Group G2. These domains evaluate aspects relative to the incapacity of patients and limitations caused by overall functional loss, specifically of the knees. Severe loss of function, whether by pain or by a reduction in joint mobility, reflects the severity and time of development of the disease, and also presents a strong correlation with the time on the

waiting list[28,29]. This fact has been observed in several countries with limited access to TKA, where long waiting lists are formed due to high demand and scarce medical resources[30].

This situation of delay until the procedure is performed has also been observed in our medium. Some authors have observed that the long wait may result in deterioration of the QoL of patients, both from the functional aspect and as regards pain[2,24,26,28]. In our sample, the pre-operative scores by WOMAC were lower than those found in other studies,[9,29,31] and we believe that this was an important factor in the reduction of QoL of non-operated patients. Moreover, this deficiency would probably lead to harm to the patients after surgery because, according to the literature, severe pre-operative functional loss is an independent predictor of lower QoL after surgery[9,32].

Analysis of the dependent variables by Pearson correlation in Group 2 showed that variables related to the functional aspects, such as LPA of SF-36 and FI of WOMAC, presented an important correlation with Limitation by Emotional Aspects (LEA) SF-36, Vitality SF-36, and especially with Pain WOMAC. This analysis showed that among the non-operated patients, the feeling of pain in the knee, emotional disturbances, and vitality presented a synergic behavior with Functional Capacity. Among the operated patients, the same analysis revealed a correlation between FC SF-36, Pain of SF-36, Pain WOMAC, and the overall WOMAC value.

Although there is no causal relationship in this analysis, we could observe that among the operated patients, those who felt they had better functionality also achieved improvement in the levels of pain, mobility, and function of the knee joint. These findings are also in agreement with our observations in the more specific evaluation of the groups by the Functional Classification ACR, in which we observed that in G1, 38.3% of the patients were in ACR 1 against 15.5% of the patients in G2. Functional Class 1 includes persons who consider themselves capable of performing their personal, professional, and leisure activities.

González-Sáenz-de-Tejada et al. focused on the long-term outcomes of TKA, examining factors such as pain, stiffness, and function. They used the WOMAC and SF-36 questionnaires to assess these parameters and provided a detailed statistical analysis of the results, including changes in quality of life over time and factors that affected these changes. They concluded that low pre-operative HRQoL (Health-Related Quality of Life) scores, being elderly, severe obesity, the presence of certain comorbidities - depression and rheumatologic diseases – are factors of worse prognosis[33].

To verify whether there was possible interaction, that is, the possible influence that variables that present significant differences in the allocation between the groups (age, physical activity, physical effort in the profession, use of medication, pain by VAS, Functional Class ACR) could exert on the response of the dependent variables, multivariate analysis models were constructed. We performed the analysis separately, using overall WOMAC, Functional Capacity SF-36, and pain SF-36 as dependent variables. Nevertheless, we verified that among all the variables, only physical effort in the profession presented significant interaction at the level of 5% with the factor *"to be operated or not"* and only in the response of the variable overall WOMAC.

Siviero et al. investigated health-related quality of life (HRQoL) following knee replacement surgery, with data collection at the outset and 3 months post-surgery. They used the SF-12 Questionnaire and the Western Ontario and McMaster Universities Arthritis Index (WOMAC) for their evaluations, focusing on pain, stiffness, and disability due to knee osteoarthritis. These authors concluded that their research findings underscore the importance of using comprehensive assessment methods to identify factors affecting functionality and QoL (Quality of Life), and to develop interventions to improve the health/well-being of patients after knee replacement[34].

We believe that the interaction observed suggests that persons with advanced arthrosis of the knees and who performed less exhausting activities throughout life may have a better quality of life. However, this possibility does not present clinical consistency and may have been a characteristic of this sample or even the fruit of the lack of power in the study for analyzing this association.

In a study on the quality of life of patients waiting for knee arthroplasty, Pinto et al. observed that the waiting time has a significant impact on the daily life of patients undergoing TKA. The longer the wait, the worse the functional outcomes, satisfaction, and quality of life of these patients[35].

Some of the limitations of our study need to be carefully analyzed. The choice of patients from an institution of reference does not allow the external validity of the results to be diminished, especially among the non-operated patients, because for this sample possible patients with more advanced conditions, and a long wait for surgery were selected. However, studies in reference institutions make it possible to select a larger number of individuals. Variables not included in the research could influence the results, such as family support, income, degree of privation, and time of waiting for surgery, among others. Nevertheless, this concerns a multifactorial topic whose universe of all the direct and indirect variables could hardly be analyzed in one project.

The sample size may not have been adequate for the analysis of sub-groups of QoL or adequate for the multiple analyses that would be possible by the diverse dependent variables. Studies with a larger sample size must be the objective of other research with this specific purpose. Lastly, the cross-sectional model did not allow follow-up of the individuals or of the behavior of QoL over the course of time. Nevertheless, it was sufficiently adequate to evaluate and compare the two groups.

Our results allowed us to conclude that Total Knee Arthroplasty in our medium is a procedure capable of improving the quality of life of a large portion of individuals with advanced gonarthrosis in all the dimensions evaluated by the SF-36 and WOMAC questionnaires. A more pronounced difference was observed in the physical aspects and pain evaluated by SF-36, which presented an important correlation with the domain Rigidity of WOMAC. In the multivariate analysis, no variable analyzed influenced the results of the SF-36 scores, and except for the characteristic physical effort in the profession, no positive interactions with the results of WOMAC were found either.

## CONCLUSION

Patients with advanced knee arthrosis who underwent TKA, compared to those who did not undergo the procedure, had a better quality of life in all domains assessed by both the general SF-36 questionnaire and the WOMAC questionnaire.

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