

What is the association between gender and health-related quality of life in patients who underwent total hip or knee arthroplasty?

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AT A GLANCE

Total hip and knee arthroplasty (THA and TKA) provide effective relief for patients with osteoarthritis to increase functionality of the joint and to reduce pain. Although both are standardized treatments, differences in the health-related quality of life (HRQoL) between gender are observable. This study investigates the association between gender and the dimensions of HRQoL pre- and post-surgery measured by the EQ-5D-5L and the WOMAC. Our results confirmed that HRQoL significantly improves after surgery for both treatments. However, the different associations of gender with the individual dimensions of the EQ-5D-5L and the WOMAC indicate that the outcomes of orthopedic treatments need to be reported and analyzed separately concerning gender. Furthermore, we illustrate how a focus on the individual dimensions of HRQoL can reveal relevant gender differences, which might be missed today when using mere index-scores.

BACKGROUND & RESEARCH QUESTION

Although total hip and knee arthroplasty (THA and TKA) are standardized treatments, multiple studies reported that the health-related quality of life (HRQoL)¹ differs by gender. Literature suggests reasons such as women on average being referred to a surgeon only when showing a higher degree of disability, embodying a higher risk of complications, and reporting unwillingness to accept surgery.^{1,2} Additionally, women tend to be older when undergoing THA and TKA, especially in case of THA³, and age is known to be negatively associated with HRQoL scores.⁴⁻⁶

HRQoL is quantifiable by patient-reported outcome measures (PROMs), that are either generic (e.g., EQ-5D-5L) or disease-specific (e.g., WOMAC for joint replacement).⁷ The instruments allow for a subjective evaluation of patients' own health status in a reliable and systematic manner.^{8,9}

It is not clear whether systematic gender-specific differences are observable in generic (EQ-5D-5L) and disease-specific (WOMAC) HRQoL instruments for THA and TKA patients pre- and post-surgery. A granular analysis of the differences per questionnaire dimension could help to understand and improve the treatment process in respect to the patient's gender as previous studies have not analyzed the dimensions of the EQ-5D-5L and WOMAC per gender over time.

➔ The research question is as follows: "What are the differences in HRQoL dimensions – represented by the EQ-5D-5L and WOMAC – associated with gender in patients undergoing total hip and knee arthroplasty pre- and post-surgery?" Therefore, this study adds to the literature by taking a longitudinal, PROM-focused perspective by shedding light on the association between gender and the dimensions of HRQoL, which should provide more specific insights into patient well-being compared to looking at index scores.

METHODS

This study is a retrospective data analysis. The routine and PROM-data of patients who submitted for elective primary TKA or THA in two German hospitals between January 2016 and December 2018 were analyzed. The data of 2,368 patients (m=978; f=1,390) undergoing THA and 1,629 patients (m=715; f=914) undergoing TKA was used. Included patients filled in the pre-surgery (at the day of admission), 3- and 12-months post-surgery EQ-5D-5L and WOMAC questionnaires.

To quantify the association between gender and the EQ-5D-5L dimensions, a cumulative odds ordinal logistic regression with proportional odds was conducted and a multivariate general linear model was performed for the sub-scores of the WOMAC.

All analyses were performed separately for patients who underwent THA and TKA to quantify the association between gender and HRQoL. However, the included variables (gender, age and ASA score) are the same for all calculations to make the results within and between the PROM-instruments more comparable. All analyses were conducted with IBM-SPSS version 28.¹⁰

RESULTS

EQ-5D-5L index scores



EQ-5D-5L dimensions

		Gender (THA)		Gender (TKA)	
		OR	CI (95%)	OR	CI (95%)
Mobility	Pre-surgery	0.86	0.73-1.01	0.77 ^b	0.63-0.93
	3-months post-surgery	1.10	0.92-1.33	1.02	0.83-1.27
	12-months post-surgery	1.19	0.99-1.45	0.96	0.78-1.19
Self-care	Pre-surgery	1.33 ^b	1.08-1.63	1.19	0.87-1.63
	3-months post-surgery	1.44 ^a	1.03-2.00	1.52	1.01-2.27
	12-months post-surgery	1.60 ^b	1.15-2.22	1.36	0.96-1.93
Usual activity	Pre-surgery	0.81 ^b	0.69-0.95	0.72 ^b	0.59-0.87
	3-months post-surgery	0.93	0.77-1.13	0.96	0.77-1.19
	12-months post-surgery	1.60 ^b	1.15-2.22	0.77 ^a	0.62-0.95
Pain/Discomfort	Pre-surgery	0.65 ^b	0.55-0.77	0.58 ^b	0.47-0.71
	3-months post-surgery	0.78 ^b	0.66-0.92	0.70 ^b	0.57-0.85
	12-months post-surgery	0.94	0.79-1.11	0.67 ^b	0.55-0.81
Anxiety/Depression	Pre-surgery	0.48 ^b	0.40-0.58	0.31 ^b	0.25-0.40
	3-months post-surgery	0.55 ^b	0.41-0.73	0.58 ^b	0.42-0.78
	12-months post-surgery	0.68 ^b	0.53-0.88	0.65 ^b	0.48-0.89

WOMAC sub-scores

			THA	TKA
			Mean (SD)	Mean (SD)
Pre-surgery	Pain	Male	9.15 ^b (3.32)	8.75 ^b (3.21)
		Female	10.37 ^b (3.22)	10.07 ^b (3.14)
	Stiffness	Male	3.92 ^b (1.65)	3.71 ^b (1.74)
		Female	4.36 ^b (1.60)	4.28 ^b (1.69)
Function	Male	32.43 ^a (11.52)	29.16 ^b (11.49)	
	Female	35.39 ^a (11.04)	32.13 ^b (10.72)	
3-months post-surgery	Pain	Male	1.93 ^b (2.41)	3.19 ^b (2.82)
		Female	2.31 ^b (2.79)	3.96 ^b (3.17)
	Stiffness	Male	1.89 ^b (1.48)	2.22 ^b (1.43)
		Female	2.16 ^b (1.48)	2.69 ^b (1.65)
	Function	Male	9.12 (8.87)	12.29 ^a (9.98)
		Female	9.94 (9.27)	14.08 ^a (10.63)
12-months post-surgery	Pain	Male	1.65 (2.51)	2.43 ^b (2.97)
		Female	1.90 (2.94)	3.06 ^b (3.22)
	Stiffness	Male	1.45 ^b (1.45)	2.43 ^b (2.97)
		Female	1.68 ^b (1.57)	3.06 ^b (3.22)
	Function	Male	7.80 (9.70)	10.65 ^a (10.33)
		Female	8.50 (10.27)	12.43 ^a (11.26)

Legend: Significant Associations: ■ Female patients ■ Male patients
OR = Odds Ratio; CI = Confidence Interval; SD = Standard Deviation; ^a95% and ^b99% significance level for differences between gender

- THA patients show worse scores pre-surgery than TKA patients; 12 months later, THA patients display better scores.
- Female patients show lower scores compared to male patients over the entire period.
- Female patients show a greater absolute improvement in the index score compared to male patients.

- **THA:** Female patients show better values in "self-care" over all three measurement points, but male patients report significantly better values for "pain/ discomfort" and "anxiety/ depression".
- **TKA:** Male patients report fewer problems in "pain/ discomfort" and "anxiety/ depression".

- **THA:** Male patients report significantly fewer problems with "stiffness" at all three time points, and "pain" and "function" pre-surgery.
- **TKA:** Across all dimensions gender differences are indicated. In "stiffness" both genders show lower values after 3 months, but these increase again 12 months post-surgery.

DISCUSSION

Our results add to previous works on the potential of THA and TKA in improving quality of life, since HRQoL improved significantly after surgery.^{2,3} Regardless of gender, the patients in the THA group perceived a higher absolute HRQoL improvement in comparison to the patients in the TKA group within the 12-months timeframe. Additionally, gender was significantly related to the individual dimensions of the EQ-5D-5L and WOMAC in the THA and TKA groups, pre- and post-surgery, when controlled for age and comorbidity.

Lessons Learned: The discussion arises of whether the different perceptions of wellbeing of female THA or TKA patients is sufficiently weighted when using HRQoL measures as composite score or whether an analysis per dimension creates a more accurate picture of gender-specific HRQoL. The relationship of gender with "self-care" and "anxiety/ depression" was significant for the patients in the THA group. For the patients in the TKA group a significant gender-related association was found for the dimensions "pain/ discomfort", "anxiety/ depression" and "stiffness".

➔ **Call for Action:** Our results show the need to put more emphasis on the individual dimensions of HRQoL instruments when interpreting the outcomes in respect to gender differences. This leads to the conclusion that each treatment and the corresponding PROMs need to be analyzed individually to determine significant differences between genders and relevant associations on the outcome variables.

Limitations: We used routine data and PROM-data that was collected for quality control purposes. A limiting factor for the power of this research is the lack of data on whether the patient expectations with surgery were met, since data on preoperative patients' expectations and data on whether these expectations were fulfilled were not collected. Although the instruments used measures on objective scoring scales, they do not necessarily reflect the individual experience of patients.

Future Research: Further research is needed for a comprehensive analysis on why gender affects significantly specific dimensions of HRQoL and on whether the development of gender-specific adjustment mechanisms for generic and disease-specific HRQoL instruments are necessary.

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