Smoking Cessation and Relapse Effects on Patient-Reported Outcomes After Total Knee Arthroplasty

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INTRODUCTION: Smoking is a risk factor for poor outcomes after total knee arthroplasty (TKA). Despite this, many patients continue to smoke before and after surgery, leading to increased complications, costs, and worse patient-reported outcomes (PROs). The purpose of this study was to identify factors that could be modified to increase smoking abstinence and prevent relapse in these patients that would hopefully lead to more satisfactory outcomes. Specifically, we aimed to evaluate the prevalence of cigarette-smoking relapse, quitting behavior, and identify smoking cessation predictors.

METHODS: This study involved a retrospective analysis of medical records and a survey of patients who underwent TKA at a single institution between 2018 and 2021. Institutional review board approval was obtained. Two-hundred patients were identified (100 preoperative smokers and 100 preoperative nonsmokers, as a control group). Medical records of the pre-operative nonsmokers were reviewed to obtain their postoperative Knee Injury and Osteoarthritis Outcome Score for Joint Replacement (KOOSJR) and demographic data, which were recorded on a data spreadsheet. The preoperative smokers were contacted by phone and asked a series of questions about their smoking behavior before and after surgery using a standardized smoking habits questionnaire (Table 1). The data collected included the number of cigarettes smoked per day, the number of household members who smoke, quitting behavior, and the use of smoking cessation aids. Additionally, their KOOSJR Survey responses were recorded for comparison between groups.

RESULTS: Descriptive statistics showed that the age range of the patients in the study was 28-86 years, with a mean age of 65.20 (SD=8.92). Nonsmokers were slightly older than smokers (nonsmoker mean=67.59, smoker mean=62.82, F=15.326, p<.001). Fifty-one male and 49 female patients comprised the nonsmoker group, and 47 male and 53 female patients comprised the smoker group. Based on KOOSJR scoring, preoperative nonsmokers had significantly better outcomes compared to preoperative smokers. Nonsmokers had lower overall KOOSJR total scores compared to smokers (p=.016). Nonsmokers demonstrated higher overall knee health than smokers as shown by the KOOSJR converted score where a score of 100 equates to a perfect knee (p=.048). For specific functional movements, nonsmokers had less pain on stairs (p=.025), less difficulty rising from sitting (p=.06), and less difficulty bending to the floor (p=.02) (Table 2). In terms of smoking behavior, the mean number of cigarettes per day among smokers was 13.65 (SD=11.13). Most smokers (63%) had quit smoking before surgery, with most (61%) doing so at the request of their surgeon. Of those who quit before surgery, over half (52%) returned to smoking after surgery, with no significant difference in KOOSJR scores between those who quit and those who did not (chi square = 0.779, p=.377). Regarding smoking cessation methods, the most common method used was prescription medication (59%) followed by nicotine replacement therapy (38%). However, smoking cessation prior to surgery did not have a significant impact on rates of returning to smoking postoperatively, with 49% of patients returning to smoking (p=.410). Of this group, 50% returned to smoking within 1 week.

DISCUSSION: The results of this study suggest that nonsmokers have better outcomes than smokers after TKA, as they experienced less pain and better knee health. These findings are consistent with existing literature and reaffirm that postoperative outcomes are better in patients who do not smoke. The study also highlights the high rate of smoking relapse among patients who quit smoking before surgery, with over half of them returning to smoking after surgery. Smoking relapse may not have a significant impact on pain after TKA, but it can affect healing time and overall health. Therefore, smoking cessation interventions should be implemented both BEFORE and AFTER surgery to improve outcomes and prevent smoking relapse.

SIGNIFICANCE/CLINICAL RELEVANCE: This study provides valuable information for clinicians and researchers working with patients undergoing TKA to provide best outcomes, and it may serve as the basis for future research and interventions.

Table 1. Smoking Questionnaire

Cigarettes per day	13.65 ± 11.13
Quit before surgery	
-Yes	63%
-No	37%
Why smokers quit	
-Health	36%
-Money	2%
-Surgeon asked me to	61%
-Other	2%
How smokers quit	
-Behavioral	0%
-NRT	38%
-Chantix	59%
-Quitline	9%
-Smokeless	3%
Resumed smoking after surgery	
-Yes	49%
-No	51%
Consider quitting	
-Yes in next 30 days	35%
-Yes in 6 months	18%
-No	47%
Want support	
-Yes	31%
-No	69%
Time to return to smoking after surgery	50%
-within 1 week	24%
-1 to 4 weeks	12%
-1 to 3 months	6%
-3 to 6 months	6%
-after 6 months	

Table 2. Knee Injury and Osteoarthritis Outcome Score for Joint Replacement (KOOSJR)

Question Score (SD=Standard Deviation)	Nonsmokers	Smokers
Pain on stairs (mean ± SD, p=.025)	0.78 ± 0.12	1.13 ± 0.15
Difficulty rising from sitting (mean ± p=.06)	0.56 ± 0.09	0.94 ± 0.11
Difficulty bending to floor (mean ± p=.02)	0.61 ± 0.10	1.09 ± 0.13
Overall KOOSJR total (mean ± p=.16)	4.40 ± 0.78	6.32 ± 0.94
Converted Knee Health Score (mean ± SD, score of 100 indicates perfect knee score)	80.47 ± 5.67	75.18 ± 4.92