Orthopaedics and Traumatology: Surgery and Research

Title Page

Title: Smoking and alcohol behaviours in people following hip and knee arthroplasty: data from the Osteoarthritis Initiative.

Running Title: Smoking and alcohol post-THA and TKA

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Abstract

Background: Smoking and alcohol consumption have a negative effect on overall health. Limited evidence has been presented as to how these health behaviours may change between pre- and post-operative intervals in the initial 12 months post-arthroplasty. The purpose of this study was to address this uncertainty.

Hypothesis: Smoking and alcohol consumption differs between pre- and post-THA/TKA and is differs between non-arthroplasty cohorts.

Materials and Methods: Data from the Osteoarthritis Initiative (OAI), a population-based observational study in the USA, was gathered. In total, data from 287 people who had undergone THA or TKA from baseline to Month 48 OAI follow-up assessments were analysed. Data on this cohort were compared to 287 age- and gender-matched people with osteoarthritis. Mean change from pre- to post-arthroplasty, and differences between arthroplasty and non-arthroplasty participants for smoking and alcohol consumption were assessed descriptively and through Wilcoxin-matched pairs test and Student t-tests (as appropriate),.

Results: The life-time prevalence of smoking was high for people who received THA (99%) and TKA (96%). Prevalence of current smoking significantly decreased from 5% to 3% across the THA and TKA cohort in the initial 12 months post-arthroplasty ($p<0.05$). Similarly, there was a statistically significant decrease in weekly alcohol consumption post-arthroplasty for people who underwent THA and TKA ($p<0.01$), although the mean difference was only by 0.9 alcoholic drinks. The only statistically significant difference in smoking and alcohol consumption for arthroplasty to non-arthroplasty participants was in weekly alcohol consumption, which was higher by 0.3 drinks in the non-arthroplasty cohort ($p=0.04$).

Conclusions: Smoking and alcohol consumption decreased in the initial 12 months post-THA and TKA. This was not significantly different to an age- and gender-matched non-arthroplasty cohort. Whilst this is positive, a small group of patients still present with unhealthy lifestyle choices in relation to these behaviours post-arthroplasty.

Level of Evidence: Level III – Prospective cohort study.

Keywords: joint replacement; alcohol consumption; smoking; complication; morbidity

Introduction

Osteoarthritis is the leading cause of musculoskeletal pain and disability in older people [1,2]. Joint replacement or arthroplasty is considered the treatment of choice for end-stage osteoarthritis [3]. It has been shown to effectively improve pain, function and quality of life for this population [4]. The mean age of hip (THA) and knee joint arthroplasty (TKA) range from 67 to 69 years across the literature [5]. Consequently, this older age group often present with medical morbidities such as diabetes, cardiovascular disease, anxiety and depression [6].

Within developed countries, there remains a high proportion of people in this age group who smoke and drink alcohol [7]. It has been estimated that between 8% to 25% of people aged 60 to 70 years old are cigarette smokers [7]. Alcohol consumption in excess of recommended daily limits has been estimated to present in 14% of 65 to 74 year olds and 15% in those aged 75 years or over [8]. It remains unclear whether these figures represent people who undergo THA or TKA.

Smoking and alcohol consumption have been acknowledged to adversely affect post-operative outcomes [9]. For instance, these behaviours may be associated with increased revision and complication rates after THA and TKA, most notably increasing the risks of pneumonia, stroke, urinary tract infection (UTI) and overall mortality [9]. However limited evidence has been presented on how these health behaviours may alter after arthroplasty and principally in the initial 12 months post-operative when this population most frequently come into contact with healthcare professionals. Accordingly, the purpose of this study was in two-parts. Firstly we aimed to determine what was the pre- and post-operative smoking and alcohol consumption for people who undergo THA or TKA and to explore whether this changes within the first year post-operatively. Secondly we aimed to compare smoking and alcohol consumption for people post-arthroplasty to an age- and gender-matched cohort of people with osteoarthritis who have not undergone THA or TKA.

Methods

Osteoarthritis Initiative Dataset

Data used in the preparation of this article were obtained from the Osteoarthritis Initiative (OAI) database, which is available for public access at http://www.oai.ucsf.edu/. The OAI is a large-scale, multi-centre (four sites across the USA), longitudinal cohort study aimed to investigate the role of biomarkers in the development and progression of lower limb osteoarthritis.

Data has been collected longitudinally from baseline to 84 months. Data collected included individual's demographic characteristics, previous and current medical history, pharmacological requirements and practices, diet, lifestyle and physical activity. For this analysis, data were identified from all datasets from baseline to Month 48 as these follow-up intervals collected data on smoking and alcohol consumption from participants.

Cohort

The cohort of interest were people who had undergone THA or TKA, with a minimum of 12 month post-arthroplasty, from the baseline to Month 48 OAI follow-up assessments. Since this study was interested in individual's smoking and alcohol consumption and its change over time, rather than the specific arthroplasty *per se*, where people had undergone multiple arthroplasty procedures within the OAI follow-up period, data from the first arthroplasty procedure were analysed to avoid multiplicity. For comparison, we identified the same number of individuals who had hip or knee osteoarthritis, closely matched for age and gender, but who had not undergone a THA or TKA. These individuals were therefore used as a 'reference group' to assess smoking and alcohol consumption as a normative comparison.

Outcomes

The outcomes of interest were smoking and alcohol consumption. The self-reported data used to answer these questions included: "have you smoked at least 100 cigarettes (five packs) in entire life"; "how old when first started smoking cigarettes fairly regularly"; "how old when first started smoking cigarettes fairly regularly"; "have you ever smoked cigarettes regularly"; "on average of entire time have smoked", "how many cigarettes did usually smoke per day"; "do you currently smoke cigarettes"; " how many pipes, cigars or cigarillos do you smoke per week"; "how older were you when you stopped smoking pipe, cigars or cigarillos"; "how much alcohol do you consume in typical week in past 12 months"; "have you ever drunk more beer, wine or liquor than you do now"; and the calculated pack-years of smoking cigarettes. Demographic characteristics of: age at arthroplasty, gender, ethnic origin,

height at age 25, weight at aged 25, maximum adult weight, minimum adult weight and arthroplasty procedure (THA or TKA), were extracted from the OAI dataset.

Data analysis

Participant characteristic and data at baseline and Month 48 follow-up assessments were assessed using descriptive statistics (frequencies and mean/standard deviation (SD) values). To assess change in smoking and alcohol consumption between pre- and post-arthroplasty and for the non-arthroplasty reference group, data were analysed using a Wilcoxin-matched pairs test or Student paired t-test (dependent on data normality), and presented with mean differences and p-values with 95% confidence intervals. To compare smoking and alcohol consumption to a normative group, we compared each measure of smoking and alcohol consumption between the arthroplasty and the non-arthroplasty reference group using a Mann Whitney U-Test or Student t-test for continuous data and Fishers Exact Test for categorical data at Month 48 follow-up assessments. A p-value of less 0.05 was considered statistically significant. All analyses were undertaken using STATA version 14.0 (STATACorp LP, Texas, USA).

Results

Cohort Characteristics

Figure 1 illustrates the participant selection based on an *a priori* eligibility criteria. From the initial 4796, 287 individuals were identified as having undergone THA or TKA between baseline to Month 48 follow-up, with data on smoking and alcohol consumption and a minimum 12 month post-operative interval. This included 70 people who had undergone THA and 217 TKA. These were compared to 287 individuals who had a physician-made (clinical and/or radiological) diagnosis of hip (n=70) or knee (n=217) osteoarthritis, but had not undergone THA or TKA.

The demographic characteristics of the cohorts are presented in Table 1. The mean age at arthroplasty was 69.0 years (THA: 66.1; TKA: 69.9). The arthroplasty cohort consisted of 117 males and 170 females (THA: 30/40; TKA: 87/130). The non-arthroplasty reference group consisted of 114 males and 173 females, with a mean age of 67.7 years. Table 2 demonstrates the baseline (pre-arthroplasty) smoking and alcohol behaviours for the THA, TKA and non-arthroplasty group.

Smoking

The change in smoking habit between pre-arthroplasty (baseline) and post-arthroplasty (Month 48) is presented in Table 3 and Table 4. There was a statistically significant difference in the number of current smokers from pre- to post-THA (10.0% to 5.7%) or TKA (3.7% to 2.3%; $p \leq 0.01$), and a significant decrease in the number of cigarette smokers from pre- to post-THA ($p=0.01$) and TKA ($p<0.01$). This decrease was only by three individuals in each cohort. There was also a decrease in the number of individuals who smoked a pipe, cigar or cigarillos from pre-arthroplasty to post- (THA: $p=0.02$; TKA: $p=0.02$). Again this decrease was only by a single individual in each cohort. There was no statistically significant change in mean number of cigarettes, pipes, cigars or cigarillos smoked for the THA and TKA groups from pre- to post-arthroplasty assessments ($p \geq 0.07$). There was no statistically significant difference in smoking habit between the THA or TKA cohorts compared to the non-arthroplasty reference group at post-arthroplasty assessment (Table 5; $p>0.05$).

Alcohol Use

The change in alcohol consumption between pre-arthroplasty (baseline) and post-arthroplasty (Month 48) is presented in Table 3 and Table 4. There was a statistically significant difference in alcohol consumption between pre- and post-arthroplasty ($p<0.01$). People following THA or TKA reduced their alcohol consumption, with a statistically significant decrease in the number of alcoholic drinks typically

taken per week in the overall arthroplasty cohort ($p<0.01$) and specifically the TKA ($p=0.01$). There was no statistical difference in alcohol consumption in the THA cohort ($p=0.49$). The absolute differences were small with a mean difference of 0.1 drinks in the THA and 0.2 in the TKA cohort (Table 4). There was a statistically significant decrease in the number of people who reported ever drinking more alcohol now than previously, with this reducing from 124 to 109 participants in the overall arthroplasty cohort ($p<0.01$). Whilst statistically significant, this decrease was by three participants in the THA cohort and 12 in the TKA cohort. There was a statistically significant decrease in the number of alcoholic drinks typically taken per week in the TKA cohort compared to the non-arthroplasty cohort ($p<0.04$), although only by 0.3 drinks per week. There was no statistically significant difference between this measure for the THA group ($p=0.18$). There was also no statistically significant difference between the THA or TKA cohorts compared to the non-arthroplasty group for the number of people who reported ever drinking more alcohol now than previously ($p\geq0.79$; Table 5).

Discussion

The findings of this study indicate the life-time prevalence of smoking was very high for people who later underwent THA or TKA. This significantly reduced post-arthroplasty with an overall prevalence of 3%. Similarly there was a significant, but small, decrease in alcohol consumption post-arthroplasty in this arthroplasty cohort. However, there was no statistically significant difference in smoking and alcohol behaviours for people post-arthroplasty compared to an age- and gender-matched cohort of people with osteoarthritis who had not undergone arthroplasty. This suggests that the changes seen between pre- and post-THA or TKA are not related to surgery, but are related to ageing or other natural differences over time.

The data suggests that although there is a need to ensure that this population have support and advice on smoking cessation and alcohol misuse, these behaviours may be less of a problem than in the wider-population where smoking and excessive alcohol consumption over recommended levels is estimated to be between 14% to 25% for this older age group [7,8]. However type two statistical error caused by analysing a small number of individuals who were still smokers at the Month 48 follow-up may be the cause for some of the non-statistically significant findings between the THA and TKA cohorts. For example, for mean number of alcoholic drinks consumed per week, where the TKA cohort reported a statistically significant decrease ($p<0.01$) whereas this did not reach significance for the THA cohort ($p=0.49$). Nonetheless the quantities of alcohol consumed recorded were under recommended limits of alcohol consumption suggesting a low risk to overall health [10,11].

The results indicate that whilst low, there remains a small proportion of people before and after THA or TKA who smoke. Previous literature has identified that this can have a detrimental effect on clinical outcomes, particularly within the initial six months post-arthroplasty [9]. Accordingly, strategies are required to support and counsel people on these disadvantages to maximise their clinical outcome following these orthopaedic procedures [10]. Through this, consideration should be made to support the adoption of interventions, and to encourage this population to change lifestyles post-operatively, as this could have longer-term implications on their general health and well-being given the association of smoking and cardiovascular disease and cancer [11-13]. Clinicians are therefore supported to consider the adoption of smoking cessation advice to educate and support their patients to change lifestyles in promoting future health.

Whilst these findings suggest that smoking and alcohol behaviours in THA and TKA cohorts are similar to non-arthroplasty participants from the OAI dataset, it remains unclear why this specific population presented with lower levels of smoking and alcohol consumption compared to the wider general population. Hypotheses include the possibility that this population have greater contact with healthcare

professionals who may have instilled health promotion strategies on smoking and alcohol consumption within their initial 12 post-operative months. For instance, counselling from these individual's surgeons on the known complications of smoking and alcohol, may have caused behaviour change. Alternatively, the arthroplasty procedure, with a reduction in pain and functional limitation, may empower and motivate this population to live better, healthier lifestyles post-operatively, thereby individuals may take the initiative and responsibility for their health. Finally, all participants in the OAI dataset volunteered to participate in this observation study. Therefore it may be that this is a self-selecting group of the population who are not 'typical' of the wider population. These all remain speculative and further explorative research is required to better understand whether attitudes and experiences of this population differ to the wider population.

Previous studies have explored the impact of significant alcohol misuse as opposed to determining overall 'normative' data on people following arthroplasty. For instance, Best et al's [14] cohort from the North American National Hospital Discharge Survey reported the association between alcohol misuse and surgery-related and general medical complications. Whilst this provided valuable data on the 'misuse' population, it provided limited insight into those people who consume alcohol but either less frequently in 'binges' or at sub-misuse levels. Furthermore, there remains uncertainty within the literature on the consequences of alcohol consumption or smoking on longer-term surgical outcomes, and whether this changes over time with modifications in people's lifestyles post-arthroplasty. Further longitudinal studies assessing medical morbidities, and the incidence of adverse events such as falls and perceptions of smoking and alcohol consumption in the recovery following THA and TKA are considered important to better understand the theoretically underpinning involved with these behaviours in this population.

This study raises three important limitations. Smoking and alcohol consumption data from the OAI dataset was self-reported. Consequentially these data may have been influenced by systematic errors in individual's capability to recall their previous smoking and alcohol consumption or potentially purposeful under-reporting of consumption due to social desirability biases, and not wanting to release information on these lifestyle behaviours. Such a phenomena has been previously reported within the literature [15,16]. Secondly, the OAI database is a cohort of people from North America. Whilst this provides valuable data, there may be reduced generalisability to other developed countries as well as to developing nations. This is important given the differences in smoking and alcohol consumption reported particularly in developing countries where these are growing in prevalence [17,18]. Such countries have also seen significant increases in arthroplasty procedures during the past 10 years [19]. Therefore the generalisability of these findings to other populations should be considered with caution. Finally, no data were provided from this dataset on health resources or interventions which individuals may have attended which may have accounted for the low prevalence of smokers and drinkers in the

cohorts. It is unclear whether some patients analysed in the arthroplasty cohort had counselling or therapy pre-operatively to aid alcohol reduction or smoking cessation. Therefore the results on lifestyle change may be attributed to health service interventions rather than individual initiatives. Recording such information in future cohort datasets on this topic would therefore be a valuable addition to better contextualise the results from this analysis.

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Conflict of Interest: None.

Patient consent Obtained.

Ethics approval Committee on Human Research, University of California, San Francisco (IRB approval number 10-00532 Approved 10th March 2015).

Data sharing statement This manuscript was prepared using an OAI public use data set and does not necessarily reflect the opinions or views of the OAI investigators, the NIH, or the private funding partners.

Figure and Table Legends

Figure 1: Flow-chart illustrating the participant selection based on a priori eligibility criteria.

Table 1: Demographic characteristics

Table 2: Baseline smoking and alcohol consumption characteristics.

Table 3: Changing smoking and alcohol consumption between baseline and Month 48 data.

Table 4: Inferential analyses to assess the statistical difference between baseline and Month 48 for smoking and alcohol consumption for each group.

Table 5: Inferential analyses to assess the statistical difference between THA and TKA cohorts and the normative non-arthroplasty cohort for smoking and alcohol consumption.

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Figure 1: Flow-chart illustrating the participant selection based on a priori eligibility criteria

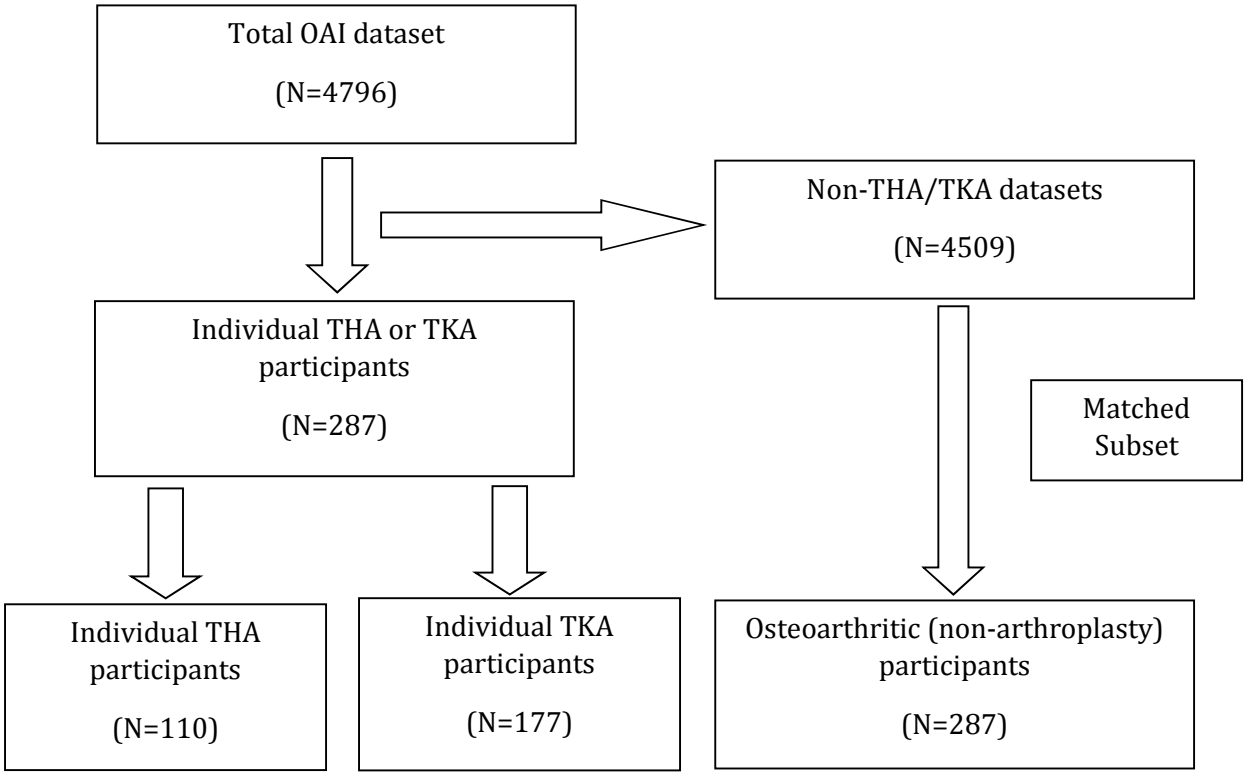

Table 1: Demographic characteristics

	Total Arthroplasty Cohort	**THA**	**TKA**	**Normative Cohort**
N	287	70	217	287
Mean age at arthroplasty in years (SD)	69.0 (33.2)	66.1 (9.7)	69.9 (37.8)	67.7 (8.59)
Gender (m/f)	117/170	30/40	87/130	114/173
Race				
Non-white	4	1	3	6
Caucasian	232	57	175	226
African-American	49	12	37	52
Asian	2	70	2	3
Mean height at aged 25 in meters (SD)	1.66 (0.2)	1.70 (0.9)	1.66 (0.3)	1.68 (0.1)
Mean weight at aged 25 in kg (SD)	67.8 (12.9)	88.1 (13.7)	67.8 (13.2)	64.8 (12.3)
Maximum adult weight in kg (SD)	88.1 (16.2)	63.7 (11.0)	88.2 (16.9)	82.5 (16.9)
Minimum adult weight in kg (SD)	62.5 (11.3)	67.8 (12.3)	62.2 (11.4)	60.2 (11.4)

F – female; kg- kilograms; M – Males; N – number; SD – standard deviation; THA – total hip arthroplasty; TKA – total knee arthroplasty

Table 2: Baseline smoking and alcohol consumption characteristics.

	Total Arthroplasty (N=287)	**THA (N=70)**	**TKA (N=217)**	**Normative (N=287)**
Smoked at least 100 cigarettes (5 packs) in entire life (Y)	147/113	34/30	113/83	140/140
Mean age when first started smoking cigarettes fairly regularly (SD)	17.4 (3.94)	17.6 (3.41)	17.4 (4.15)	18.4 (4.20)
Ever smoked cigarettes regularly (Y/%)	277 (96.5)	69 (98.6)	208 (95.9)	276 (96.2)
Of entire time have smoked, number of cigarettes smoked per day	17.9 (13.5)	21.5 (17.3)	16.6 (11.7)	15.7 (10.0)
Current cigarette smoker (Y/%)	9 (3.1)	4 (5.7)	5 (2.3)	17 (5.9)
Mean current number of cigarettes smoke per day (SD)	10.4 (5.8)	12 (5.4)	9.2 (6.5)	13.8 (14.3)
Mean age when stopped smoking (SD)	40.0 (12.0)	40.5 (11.9)	39.3 (12.0)	40.3 (12.8)
Mean pack-years of smoking cigarettes (SD)	9.1 (17.5)	12.8 (23.8)	7.9 (14.8)	9.2 (15.5)
Ever smoked pipe, cigars or cigarillos (Y/%)	56 (19.5)	15 (21.4)	41 (18.9)	52 (18.1)
Mean age when first started smoking pipe, cigars or cigarillos fairly regularly (SD)	26.0 (12.5)	26.0 (12.9)	26.2 (11.9)	26.2 (11.0)
Ever smoked pipes, cigars or cigarillos regularly (Y/%)	20 (7.0)	4 (5.7)	16 (7.4)	21 (7.3)
Currently pipe, cigars or cigarillos smoker (Y/%)	7 (2.4)	2 (2.9)	5 (2.3)	6 (2.1)
Mean number of pipes, cigars or cigarillos smoke per week (SD)	4.3 (4.9)	8 (9.9)	3 (2.6)	15.8 (17.0)
Mean age when stopped smoking pipe, cigars or cigarillos (SD)	36.5 (13.2)	33.9 (12.7)	37.4 (13.5)	36.8 (13.8)
Mean number of alcoholic drinks in typical week in past 12 months (SD)	1.41 (1.44)	1.73 (1.70)	1.31 (1.34)	1.8 (1.5)
Ever drink more beer, wine or liquor than do now (Y/%)	110 (38.3)	26 (37.1)	84 (38.7)	116 (40.4)

N – number; P – probability value; SD – standard deviation; THA – total hip arthroplasty; TKA - total knee arthroplasty; Y - yes

Table 3: Changing smoking and alcohol consumption between baseline and Month 48 data.

	Baseline				Month 48			
	Total (N=287)	**THA (N=70)**	**TKA (N=217)**	**Norm (N=287)**	**Total (N=287)**	**THA (N=70)**	**TKA (N=217)**	**Norm (N=287)**
Current cigarette smoker (Y/%)	15 (5.3)	7 (10)	8 (3.7)	17 (5.9)	9 (3.1)	4 (5.7)	5 (2.3)	10 (3.5)
Mean current number of cigarettes smoke per day (SD)	16.8 (14.0)	23 (19.4)	13.9 (6.0)	13.8 (14.3)	10.4 (5.8)	12 (5.4)	9.2 (6.5)	7.8 (5.9)
Current pipe, cigar or cigarillo smoker (Y/%)	9 (3.1)	3 (4.3)	6 (2.8)	6 (2.1)	7 (2.8)	2 (2.9)	5 (2.3)	4 (1.4)
Mean number of pipes, cigars or cigarillos smoke per week (SD)	16 (18.2)	22 (17.1)	13 (19.6)	15.8 (17.0)	4.3 (4.9)	8 (9.9)	3 (2.6)	1 (9.0)
Mean number of alcoholic drinks in typical week in past 12 months (SD)	1.71 (1.52)	2.01 (1.82)	1.62 (1.39)	1.8 (1.5)	1.41 (1.44)	1.73 (1.70)	1.31 (1.34)	1.8 (1.5)
Ever drink more beer, wine or liquor than do now (Y/%)	124 (43.2)	29 (13.4)	95 (43.8)	116 (40.4)	109 (38.0)	26 (37.1)	83 (38.2)	84 (22.1)

N – number; P – probability value; SD – standard deviation; THA – total hip arthroplasty; TKA - total knee arthroplasty; Y - yes

Table 4: Inferential analyses to assess the statistical difference between baseline and Month 48 for smoking and alcohol consumption for each group.

	Total (N=287)		**THA (N=70)**		**TKA (N=217)**		**Normative (N=287)**	
	MD (SD)	**(p-value; 95% CI)**	**MD (SD)**	**(p-value; 95% CI)**	**MD (SD)**	**(p-value; 95% CI)**	**MD (SD)**	**(p-value; 95% CI)**
Current cigarette smoker (Y; Baseline/Month 48)	15/9	P<0.001	7/4	P=0.01	8/5	P<0.001	17/10	P<0.001
Mean current number of cigarettes smoke per day (SD)*	8.8 (6.23)	P=0.04 (0.03,0.04)	12.1 (8.59)	P=0.17 (0.18 to -0.20)	6.2 (4.40)	P=0.07 (0.07 to -0.08)	3.5 (4.43)	P=0.20 (-3.56 to 10.57)
Current pipe, cigar or cigarillo smoker (Y; Baseline/Month 48)	9/7	P<0.001	3/2	P=0.02	6/5	P=0.02	6/4	P=0.08
Mean number of pipes, cigars or cigarillos smoke per week (SD)*	10.2 (7.2)	P=0.06 (0.07 to -0.08)	16.7 (11.8)	P=0.10 (0.25 to -0.27)	7.75 (5.5)	P=0.32 (0.38-0.39)	12.0 (10.6)	P=0.32 (-0.05 to 0.10)
Mean number of alcoholic drinks in typical week in past 12 months (SD)	0.16 (0.92)	P=0.006 (0.05 to 0.27)	0.11 (1.27)	P=0.49 (-0.21 to 0.43)	0.18 (0.78)	P=0.002 (0.06 to 0.29)	-0.06 (1.31)	P=0.73 (-0.23 to 0.10)
Ever drink more beer, wine or liquor than do now (Y; Baseline/Month 48)	124/109	P<0.001	29/26	P<0.001	95/83	P<0.001	116/84	P<0.001

* Wilcoxin-matched pairs test

CI – confidence interval; MD – mean difference; N – number P – probability value; SD – standard deviation; THA – total hip arthroplasty; TKA - total knee arthroplasty; Y - yes

Table 5: Inferential analyses to assess the statistical difference between THA and TKA cohorts and the normative non-arthroplasty cohort for smoking and alcohol consumption at Month48.

	THA vs. Normative		**TKA vs. Normative**	
	MD (SD)	**(p-value; 95% CI)**	**MD (SD)**	**(p-value; 95% CI)**
Current cigarette smoker (Y; Month 48)	4/10	P=0.59	5/10	P=0.49
Mean current number of cigarettes smoke per day (SD)*	4.22 (5.89)	P=0.20 (-3.42, 11.86)	1.42 (5.90)	P=0.79 (-5.98, 8.83)
Current pipe, cigar or cigarillo smoker (Y; Baseline/Month 48)	2/4	P=0.58	5/4	P=0.60
Mean number of pipes, cigars or cigarillos smoke per week (SD)*	7.83 (8.28)	P=0.98 (-22.00, 22.51)	-4.75 (6.08)	P=0.52 (-13.54, 4.04)
Mean number of alcoholic drinks in typical week in past 12 months (SD)*	0.10 (1.57)	P=0.79 (-0.33, 0.54)	-0.33 (1.46)	P=0.04 (-0.61, -0.06)
Ever drink more beer, wine or liquor than do now (Y; Baseline/Month 48)	26/84	P=0.89	83/84	P=0.18

* Wilcoxin-matched pairs test

CI – confidence interval; MD – mean difference; N – number P – probability value; SD – standard deviation; THA – total hip arthroplasty; TKA - total knee arthroplasty; Y - yes