

Are total joint arthroplasty patients becoming more obese over time?

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BACKGROUND

Increased body-mass index (BMI) is a risk factor for osteoarthritis. Over the past 30 years, the percentage of overweight and obese adults has increased by 13.5% in the United States. As a result, the demand for total knee and total hip arthroplasty (TKA and THA) continues to grow.

Taking this into consideration, we sought to determine how BMI has changed in arthroplasty patients over time.

METHODS

Literature Data: A literature search was performed to identify clinical trials regarding patients undergoing TKA and THA, specifically identifying articles on deep vein thromboprophylaxis. Studies were excluded if patients were from outside the US, if BMI data was not reported, or if study patients were not representative of the general arthroplasty population.

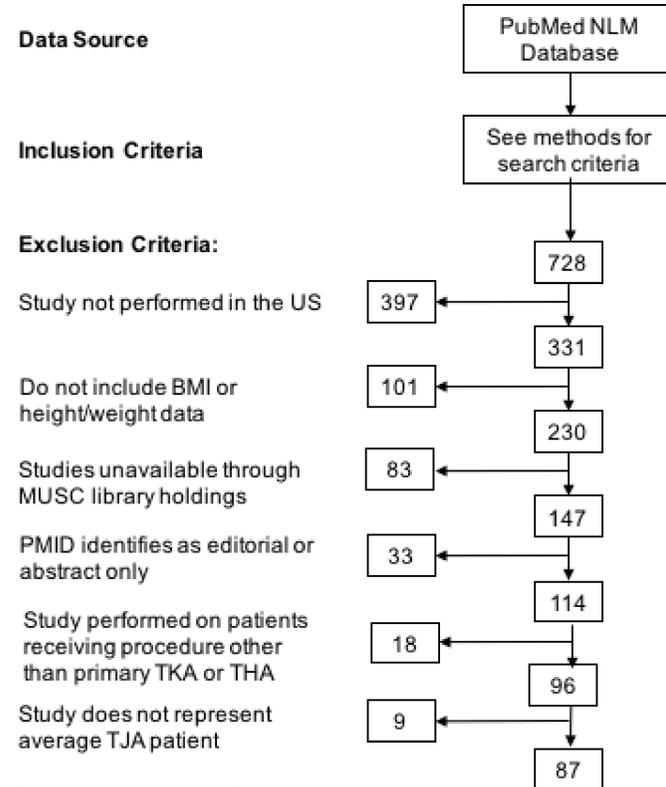
NSQIP Data: The American College of Surgeon's NSQIP database was also used to compare literature demographic data to those of a nationally-representative cohort. CPT codes specific for TKA and THA were used to identify patients.

Statistical Analysis: Pearson correlations were performed on BMI, patient age, and gender. Using Bonferroni correction, a p-value of 0.016 was considered statistically significant.

Table 1: Demographic Changes in Total Joint Arthroplasty Over Time

TKA	Literature	1990-1999			2000-2004			2005-2009			2010-2014			2014-2017		
		N*	Mean	SD	N*	Mean	SD	N*	Mean	SD	N*	Mean	SD	N*	Mean	SD
	Age	17	66.1	3.5	9	67.3	2.0	15	66.7	2.5	5	63.2	1.8	3	65.7	3.1
	BMI	6	29.3	1.0	7	30.7	0.9	8	29.1	1.3	5	30.9	4.6	3	27.3	2.1
	NSQIP															
	Age	0	-	-	0	-	-	8732	67.0	10.1	109237	66.7	9.8	107977	66.5	9.4
	BMI	0	-	-	0	-	-	8350	33.0	7.3	109370	33.0	7.1	107950	33.2	6.9
	THA															
	Literature	N*	Mean	SD	N*	Mean	SD	N*	Mean	SD	N*	Mean	SD	N*	Mean	SD
	Age	25	65.3	4.5	10	65.3	2.2	6	66.8	3.4	5	61.0	1.8	0	-	-
	BMI	7	27.6	1.9	6	28.7	0.9	5	28.5	0.5	5	28.0	0.4	0	-	-
	NSQIP															
	Age	0	-	-	0	-	-	4286	64.9	12.4	70075	64.8	11.7	64486	64.8	11.4
	BMI	0	-	-	0	-	-	4294	30.0	6.6	70351	30.1	6.5	64647	30.3	6.3

Table 1: Comparison of age and BMI from primary literature and NSQIP over several decades for both TKA and THA. N* represents both the number of studies (literature) and number of patients (NSQIP).



Studies Included in Final Analysis:

Figure 1: Study design. A graphic representation of search methods and exclusion criteria for final analysis.

Table 2: Linear Regression on Patient Age and BMI Over Time

TKA	Literature	β_1	95% CI		p-value
			Lower	Upper	
	Age	-0.178	-0.300	-0.057	0.006**
	BMI	-0.019	-0.142	0.103	0.747
	NSQIP				
	Age	-0.084	-0.104	-0.065	<0.001***
	BMI	0.063	0.048	0.077	<0.001***
	THA				
	Literature				
	Age	-0.173	-0.414	0.069	0.153
	BMI	0.058	-0.027	0.142	0.172
	NSQIP				
	Age	5.865	2.961	8.769	<0.001***
	BMI	-0.738	-2.254	0.778	0.339

Table 2: Linear regression on patient age and BMI over time. β_1 represents the slope of the line of best fit. Using Bonferroni correction, a p-value of 0.016 was considered statistically significant.

RESULTS

- Literature Results:** A total of 728 studies were identified with 87 (11.9%) included in the final analysis, representing 38,348 patients (17,655 TKA, 20,693 THA) over a 26-year timespan (1991-2017).
- The mean **age** in patients undergoing TKA, has significantly decreased with time, with no significant changes in BMI.
- Patients undergoing THA failed to demonstrate any significant trends in age or BMI.
- NSQIP Results:** A total of 225,546 TKA patients and 138,847 THA patients were identified over an 11-year timespan (2005-2016).
- The mean **age** in patients undergoing TKA has significantly decreased with time, while average **BMI** has increased.
- In patients undergoing THA, the average **age** has significantly increased with time, with no significant changes in BMI.

CONCLUSION

- Our data show that the average patient undergoing **TKA** in the United States has become **younger** and **heavier** with time, suggesting that national BMI trends are related to an increased burden of advanced knee osteoarthritis in younger patients.
- Conversely, the average patient undergoing **THA** has become **older** with time, reflecting the increasing demand for this surgery by older patients as well as improved patient safety and satisfaction following THA.