Duke University School of Medicine
Doctor of Physical Therapy

Does Physical Activity Change after THA/TKA? A Systematic Review and Meta-Analysis

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Background

- Affects over 7 million Americans & expected to increase to 11 million by 2030
- Costs average $16,213 per TKA/THA hospital admission
- 30 min moderate PA 5x/wk or 20 min vigorous physical activity (PA) 3x/wk decreases risk for many serious co-morbidities

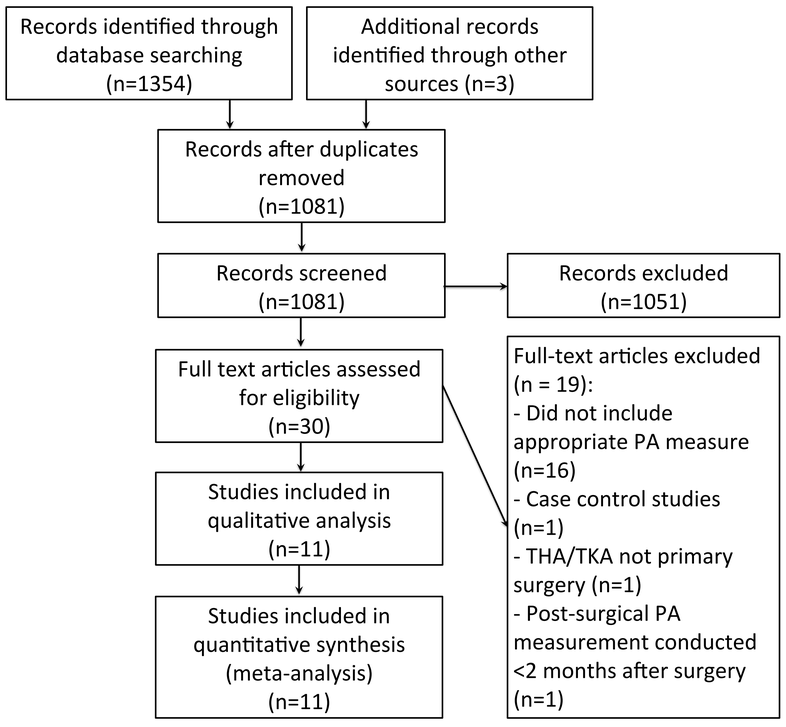
Purpose

- to conduct a systematic review of the literature, with meta-analysis, on the change in PA after THA or TKA surgery and evaluate other factors such as pain levels, physical function and quality of life that contribute to participation in PA.

Methods

- Librarian assisted computerized search of PubMed, Embase, and CINAHL.
- Screening, quality assessment, data abstraction were done in a duplicate manner.

PRISMA Flow Diagram



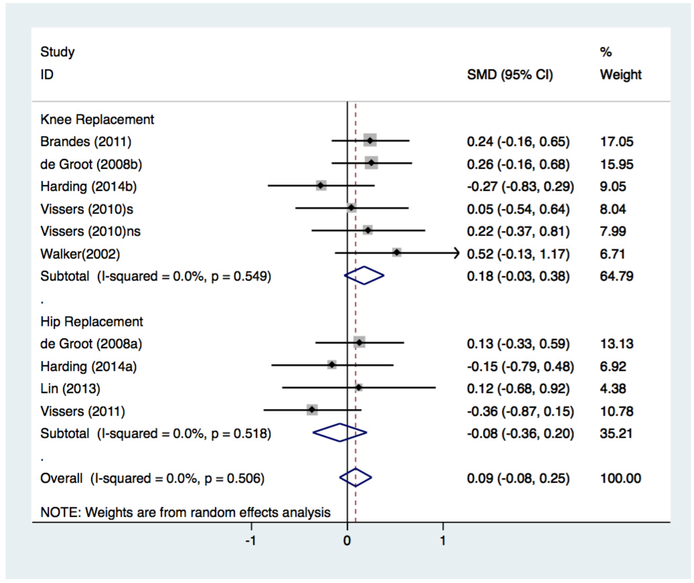
- Inclusion criteria: pre- & post-surgery measure of PA on same cohort, use of PA measure that provides frequency, intensity, and/or time of PA, and PA measured at least 2 months post-surgery
- Exclusion criteria: primary surgery not THA or TKA

Analysis

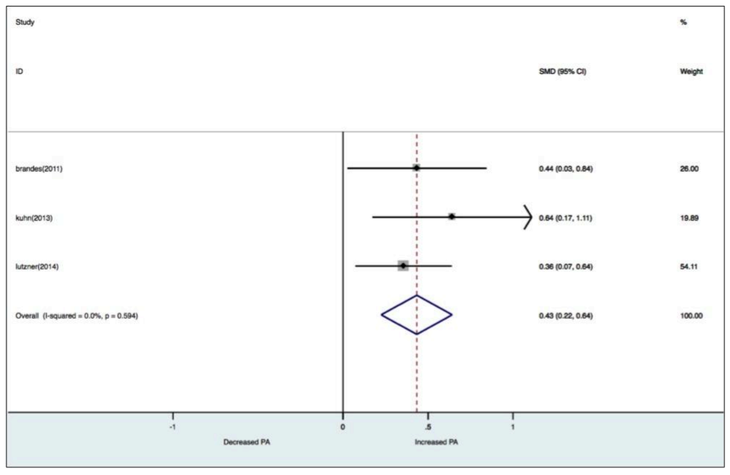
- Meta-analysis computed summary estimates of standardized mean difference (SMD) and 95% CI for PA tracked by accelerometer at 6 and 12 months, as well as intensity of PA at 12 months, quality of life (QoL) at 6 months, pain at 6 months, and physical function at 6 months
- Summary estimates were pulled using random effects models

Results

- Eleven articles were deemed eligible for inclusion in the study.



- Overall pooled estimates indicated a small, non-significant increase of PA measured at 6 months for TKA (SMD=0.18), decrease for THA (SMD=-0.08), and total increase (SMD=0.09).



- Overall pooled estimate indicated a small-moderate, significant increase of PA measured at 12 months (SMD=0.43).

Results

Measure	Post-Surgical Measurement Timeline	Primary PA Measure	SMD	95% CI	Interpretation	I^2	p Value
Light intensity PA	12 months	Pedometer, accelerometer, self-report measure	0.25	-0.06, 0.85	Small increase in light intensity PA	37.2 %	0.203
Moderate intensity PA	12 months	Pedometer, accelerometer, self-report measure	0.61	0.38, 0.83	Mod-large increase in mod intensity PA	0.0%	0.595
Vigorous intensity PA	12 months	Pedometer, accelerometer, self-report measure	0.31	0.09, 0.53	Small-mod increase in vigorous intensity PA	14.7%	0.310
Quality of life	6 months	Accelerometer	0.71	0.08, 1.34	Mod-large increase in quality of life	85.3%	<0.001
Pain	6 months	Accelerometer	-1.25	-1.89, -0.61	Large decrease in pain	89.7%	<0.001
Physical function	6 months	Accelerometer	0.84	0.21, 1.47	Large improvement in physical function	89.2%	<0.001

- Moderate and vigorous intensity PA significantly increased after surgery and light intensity PA showed a non-significant increase.
- QoL significantly increased at 6 months post-surgery.
- Pain showed a large significant decrease at 6 months post-surgery.
- Physical function increased overall across TKA and THA studies.
- High heterogeneity (I^2) of quality of life, pain, and physical function measures across different studies.
- Quality assessment values ranged from 4 (n=2) to 5 (n=6) stars out of a maximum possible score of 6 stars.

Conclusions

Total joint replacement shows no significant effect on PA at 6 months post-surgery and a small-moderate improvement at 12 months post surgery, even despite large improvements in pain and physical function. Reasons for decreased levels of PA are unknown but may be behavioral in nature. Considering the consistency of effect demonstrated across these eleven studies, future studies should seek to understand the barriers for PA following TKA or THA so future intervention studies may improve PA among this subgroup. Standardization of PA outcomes should be established..

Clinical Relevance

Choosing to undergo an elective THA/TKA may not increase PA alone. There may be a behavioral component that may need to be addressed in order to increase PA. Pain, however, does seem to decrease across the board and this can be a main limiting factor that, if decreased, may lead to a more active lifestyle. Therefore, physical therapists should focus on pain management along with patient education on the benefits of regular PA and PA parameters.

References

- Brandes, M., et al. (2011). "Changes in physical activity and health-related quality of life during the first year after total knee arthroplasty." Arthritis Care Res (Hoboken) **63**(3): 328-334.
- American College of Sports Medicine [ACSM]. *ACSM's Guidelines for Exercise Testing and Prescription.* 9th ed. Baltimore, MD: Wolters Kluwer Health LWW; 2014.