

Prevalence of Prolonged Sitting Among Orthopaedic Residents

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ABSTRACT

Background: There is a plethora of data regarding the negative health consequences of sitting, including increased cardiometabolic risk factors and all-cause mortality. Correctable actions should be identified.

Methods: A literature review was performed to examine articles that identified sitting prevalence and health consequences. A survey querying average hours per day spent sitting was distributed to orthopaedic residents at a single institution. Statistical analysis of the data was performed using a 2-tailed *t* test.

Results: A total of 25 orthopaedic residents were surveyed, and 20 responses were received. The average time spent sitting was 5.38 hours per day. There was equal representation among year in residency, with no statistically significant difference between year and sitting.

Conclusions: The average orthopaedic resident sits less than the average American adult, yet may be at risk for increased all-cause and cardiometabolic mortality. Programs using standing desks should be considered as an intervention to decrease sitting time.

Keywords: Sitting, Health, Longevity

INTRODUCTION

There is an increasing amount of data emerging on the effects and negative health consequences of prolonged sitting. Prolonged sitting increases cardiometabolic risk factors and all-cause mortality.¹ Literature has shown an increase in all-cause mortality (46%) and cardiovascular-related mortality (80%) in those that sit more than 4 hours a day.² Owen et al³ found that 1 in 4 adults will spend 70% of their day sitting, while other studies determined that the average American adult sits a little over 7 hours per day.⁴ Prolonged sitting can alter health directly and increase negative physiologic consequences such as cardiovascular risks.^{5,6} Prolonged sitting equates to decreased skeletal muscle contraction, lower energy expenditure, lower overall vascular flow, and vascular pooling.⁷ These risks appear to occur in a dose-response relationship, with

those sitting more than 10 hours per day having the worst biomarkers for cardiometabolic risks.^{1,4}

Although literature is increasingly emerging on the topic, the authors are not aware of any data showing the relationship between prolonged sitting and physicians. This purpose of this study was to examine the prevalence of sitting behavior of orthopaedic residents at a single institution.

METHODS

We received approval from our Human Research Review Committee (HRC #18-803). A literature review was performed on PubMed and Google Scholar to identify studies that examined sitting prevalence and health consequences. A survey querying the average hours per day spent sitting was distributed to orthopaedic residents at a single institution, The University of New Mexico (UNM). Using resident recall, sitting time was measured based on the average sitting time per day over an average week during the resident's current year. Statistical analysis of the data was performed using a 2-tailed *t* test.

RESULTS

Of the 25 orthopaedic residents surveyed, there were 20 responses in total. On average, the respondents spent 5.38 hours per day sitting (Table 1), with the majority sitting between 4 to 6 hours a day (Figure 1). There was equal representation among post-graduate year (PGY) in residency. There was no statistically significant difference between time spent sitting and program year, nor a statistical difference between lower (PGY 1, 2, and 3) and upper level (PGY 4 and 5) residents and sitting time (71 hours per week vs 36.5, *P* = 0.82).

DISCUSSION

Prolonged sitting, also known as sedentary activity, is defined as any behavior while awake that involves little or no energy expenditure (ie, 1-1.5 metabolic equivalents) while in a sitting or reclining posture.¹ Prolonged sitting has a real impact on health and longevity. Although sitting is not the new smoking as shown by Vallance et al,⁸ prolonged sitting still has

Table 1. Average Resident Sitting Time Per Day

PGY Year	A	B	C	D	E	Avg.
1	5	5	8	4	4	4.8
2	10	4.5	8	3	-	6.38
3	3	5	3.5	10	-	5.38
4	5	5	5	-	-	5
5	5	7	5	3.5	6	5.38

PGY, post-graduate year

Free hand response by each resident, divided by PGY year. The values represent residents' expected average hours of daily sitting.

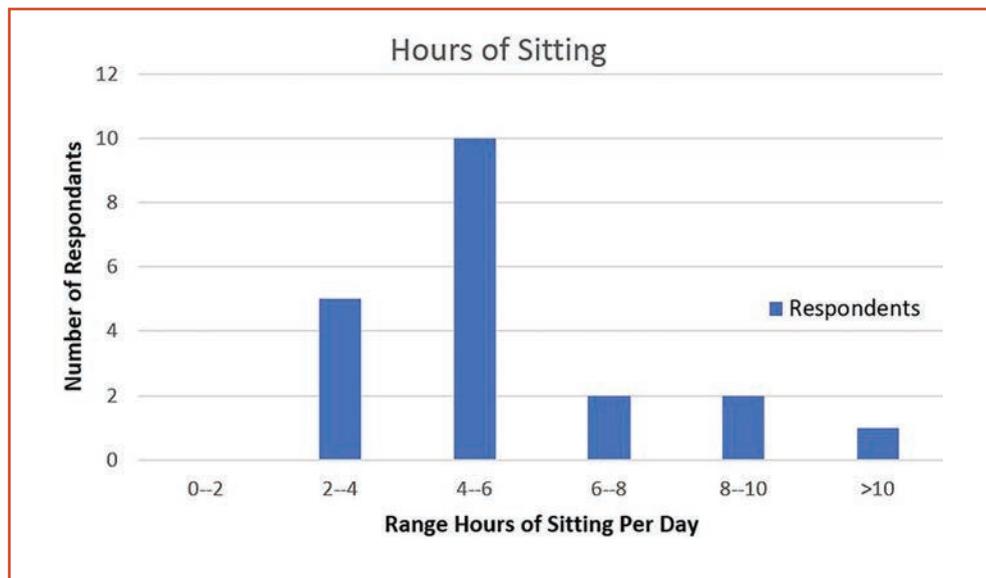


Figure 1. Hours of sitting per day as described by a range. Each value represents the range options residents could choose.

destructive health consequences. The study showed heavy smoking caused more than 2000 excess deaths from any cause per 100,000 persons compared to 190 excess deaths for prolonged sedentary activity.⁸

Sitting reductions can be helpful and incite change. One study showed that cardiometabolic risk factors (ie, diastolic and systolic blood pressure, body fat, weight, cholesterol, and insulin) were considerably reduced when implementing sitting reduction.⁹ Shrestha et al¹⁰ showed a sit-stand desk, with no requirements or instructions to stand, reduced sitting time by 2 hours daily. Ergonomic workstations can be implemented by adding a standing desk to an already present desk. Standing mats can also be added to help with fatigue. Redfern and Cham¹¹ showed that softer floors provided more comfort than harder floors, especially for the lower back and extremities.

To help reduce sitting, Winkler et al¹² created an institution-wide program for their desk-bound employees and coined the phrase “Stand Up, Sit Less, Move More.” *Stand Up* is a reminder to break up periods of prolonged sitting, especially anytime over 30

minutes. The goal is not necessarily to remain standing for the entirety of the day, but rather to ensure no prolonged periods of sitting (ie, over 30 minutes). *Sit Less* aims to reduce overall, cumulative sitting time by various means such as using standing desks. *Move More* promotes formal physical activity that focuses on a select and discrete time and emphasizes the inclusion of daily movement, including walking breaks, taking the stairs, or stepping in place. Long-term (ie, 12-month) sitting reductions that were created by this program showed reduced cardiometabolic risk, triglycerides, total-cholesterol-to-HDL ratio, diastolic blood pressure, weight, body fat, and waist circumference. Formal physical activity has also shown to be moderately beneficial in decreasing cardiovascular risk factors.¹³

There are limitations in this study. Not all residents who were given the survey responded, which caused an incomplete representation of the orthopaedic residency at The University of New Mexico. The results of this survey are subjective and retrospective. There is a large risk of recall bias with respondents unable to give specific and accurate data to their length of sitting.

We did not use technological devices to collect data nor measured data in real-time. Nonetheless, Boudet et al¹⁴ conducted a systematic review of 154 articles that examined sedentary activity, and they found 91 articles that used self-reported questionnaires with sufficient results. Wearable technology can cost over \$400 with each device; thus the use of this technology can vastly increase the cost of a study. The purpose of the current study was to determine the subjective prevalence of sitting amongst orthopaedic physicians, to gauge a baseline for the population in hopes of a secondary study, in which subjects would be examined with wearable technology. Additionally, sitting time was not stratified by specific rotation, which may change depending on specific rotations. Likely, residents spend the majority of their time sitting in the office dictating notes or at a clinic; however, the questionnaire did not specifically address where and when each resident spent their time sitting.

To the authors' knowledge, this is the first study examining the relationship between sitting prevalence and orthopaedic physicians. Although the average orthopaedic resident at The University of New Mexico sits less than the average American, 5.38 hours compared to 7 hours, they may still be at risk for increased all-cause and cardiometabolic mortality. Programs using standing desks, ergonomic workstations, and the teaching of deleterious effects of sitting should be considered. Measures taken to decrease sitting time may improve the short- and long-term health outcomes of orthopaedic residents. An inexpensive intervention of standing desks can be used to evaluate whether sitting routines of orthopaedic residents can be modified.

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