

Are physical work demands during cleaning associated with sedentary leisure time?

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1. Introduction

It is well known that both high physical workload and a sedentary leisure time independently increase the risk of lifestyle diseases i.e. cardiovascular disease. Whether there is an association between high physical workload and mainly sedentary leisure time, and thereby a jointly increased health risk, is unknown. Additionally there is a lack of reliable objective information of physical workload and leisure time physical activity. Cleaners constitute a group with a high level of physical workload. The aim of this study was to examine the association between physical workload and sedentary leisure time, among cleaners.

2. Methods

Data collection consisted of objective diurnal measures of heart rate, physical activity and body position over 2 working and 2 non-working days. Physical workload was evaluated in relation to i) amount of time on the feet (percentage of working hours) ii) amount of steps taken (steps/working hour), and iii) aerobic workload (percentage of heart rate reserve during working hours). Additionally, a questionnaire-based interview and testing of health profile and physical capacity were conducted, these results are reported elsewhere. The study was approved by the Danish data Protection Agency and the Ethics Committee for the regional capital in Denmark (journal number H-2-2011-116) and was conducted in accordance with the Helsinki declaration. The trial is registered as ISRCTN86682076. Criteria of inclusion in study population were: No daily ingestion of heart or hypertension medication and employment as cleaning assistant. Criteria of inclusion for the analysis were: A continuous period of minimum a total of 7 hours of wear time for the accelerometers and heart rate monitoring with < 50 % beat errors, both during working hours. A linear regression analysis was performed; the analysis was conducted at individual basis where the physical workload is calculated as the mean exposure during the

measured working days. The dependent variable is the sedentary leisure time and the independent variables are the physical workloads. The linear regression analyses were performed in 3 steps, 1) adjusted for age and sex, 2) additionally adjusted for smoking, fitness level and BMI and 3) additionally adjusted for job seniority and work place.

3. Results

In total 272 employed cleaners were informed of the study and invited to participate, 139 accepted and volunteered for participation. At baseline 119 participants showed up and were tested. Eighteen were excluded from the study population (Table 1), and 76 participants were included in the analyses (Table 2).

Table 1 Description of study population ($N = 101$) at baseline health check, mean \pm SD. Blood pressure is consultation blood pressure. The proportion of females in the population was 75% ($n = 76$).

	Total	Females	Males
Age (years)	44.4 \pm 8.3		
Height (m)	161.9 \pm 8.5		
Weight (kg)	70.1 \pm 14.2		
BMI ($\text{kg}\cdot\text{m}^{-2}$)	26.6 \pm 4.5		
Cardiorespiratory fitness ($\text{mlO}_2\cdot\text{min}^{-1}\cdot\text{kg}^{-1}$)		23.1 \pm 8.0	27.6 \pm 4.8
Job seniority (years)	11.8 \pm 7.7		
Current smoker (%)	28		

The linear regression shows no significant associations between sedentary leisure time and amount of working hours on the feet, steps taken per working hour and aerobic workload. Table 2 shows that an increase in physical workload will decrease sedentary leisure time, i.e. a 10 % higher aerobic workload will decrease sedentary leisure time with 0.18 hours (11 minutes), in model 3. The associations between sedentary leisure time and physical workload are weak when evaluated by R^2 ; R^2 are 0.18 in all outcomes at model 3 level.

Table 2 Linear regression of sedentary leisure time and amount of working hours on the feet, steps taken per working hour and aerobic workload. Model 1 is adjusted for age and sex, model 2 is additionally adjusted for smoking, fitness level and BMI, model 3 is additionally adjusted for job seniority and work place.

	Model	Coefficient	SE	p
Work on the feet	1	-0.12	0.07	0.10
	2	-0.10	0.08	0.25
	3	-0.10	0.08	0.22
Steps per working hour	1	-0.02	0.02	0.40
	2	-0.04	0.03	0.18
	3	-0.03	0.03	0.29
Aerobic workload	1	-0.05	0.12	0.65
	2	-0.16	0.18	0.36
	3	-0.18	0.18	0.32

4. Discussion

The present study reveals no associations between physical workload and sedentary leisure

time. However, several studies report that having high physical workload is related to a sedentary leisure time. Therefore, additionally studies are needed to better understand these relationships in order to provide physical activity guidelines for preventing cardiovascular disease. A strength of the present study is that data are objectively measured data over several working days. The limitations are that the study is cross sectional, that the population only includes cleaners and that physical workload on the upper body is only indirectly evaluated by percentage of heart rate reserve.