

## **Associations between sedentary time and EQ-5D index score in middle-aged and older adults.**

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### **Abstract**

**Purpose:** This study was conducted to identify the associations between sedentary time and EuroQol-5-dimensional (EQ-5D) index score in middle-aged and older adults.

**Materials and methods:** Data were extracted from the 6th Korea National Health and Nutrition Examination Survey (2014-2015). Subjects aged  $\geq 45$  y were selected for analysis ( $n=3,543$ ). Self-reported sedentary time and EQ-5D index score were the outcome variables. The sedentary time was dichotomized into  $\geq 7.5$  h/d and  $<7.5$  h/d. To ensure that the sample represents the Korean population, sampling weights were generated by considering a complex sample. Associations with sedentary time and EQ-5D index score were analysed using multiple logistic regression.

**Results:** Sitting for  $\geq 7.5$  h/d was significantly associated with 85% (odds ratio, 0.15; 95% confidence interval, 0.08-0.30) lower odds of EQ-5D index score when adjusted for sex and age compared to those who were sitting for  $<7.5$  h/d.

**Conclusion:** These findings imply that in order to improve health-related quality of life in middle-aged and older adults, sedentary time should be reduced.

**Keywords:** Sedentary time, EQ-5D index.

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### **Introduction**

All humans experience aging throughout their life cycle. A successful aging process is an especially important task for middle-aged and older adults, which may be met through a high quality of life. The quality of life is an important concept and health indicator set by the World Health Organization [1]. However, previous studies suggested that one's health-related quality of life can negatively be affected by a sedentary behaviour in young adult men [2], adults with visual impairments [3], and adults [4,5]. Sedentary behaviour is defined as a sitting or reclining posture in a waking state [6]. Prolonged sedentary time was reported as an important risk factor for poor health in middle-aged and older adults [7] and an independent predictor of adverse health outcomes in older adults [8]. Sedentary behaviour may also influence the overall success on the aging process physically, psychologically, and socially in middle-aged and older adults [7]. Taken together, sedentary time could be an important factor for successful aging and quality of life in middle-aged and older adults. Unfortunately, aside from the negative influences on the successful aging [7], the relationship between sedentary time and quality of life in middle-aged and older adults remains minimally explored [9,10]. In this context, the association of sedentary time with quality of life in middle-aged and older adults should be investigated. Therefore, the present study aimed to investigate the association between sedentary time

and quality of life in a representative sample of middle-aged and older adults in Korea.

### **Materials and Methods**

The subjects were selected from the 3,543 populations aged  $\geq 45$  y in the 6<sup>th</sup> Korea National Health and Nutrition Examination Survey (KNHNE, 2014-2015), which was approved by the institutional review board of the Korea Centers for Disease Control and Prevention (2013-07CON-03-4C and 2013-12EXP-03-5C) [11]. The main outcomes are sedentary time and EuroQol-5-dimensional (EQ-5D) index score. The sedentary time self-reported through interviews was dichotomized into sitting  $\geq 7.5$  h/d and  $<7.5$  h/d [12,13]. This cut-off time was based on a meta-analysis indicating that "the risk of all-cause mortality increases when a person self-reported to sit approximately  $>7-8$  h/d" [12,13]. EQ-5D index scores are measured using a scale where 0 represents the "worst health state" and 1 represents a "perfect health state." Statistical analyses were conducted using the SPSS program, version 18.0 (IBM Corp., Armonk, NY) for Windows. To ensure that the sample represents the Korean population, sampling weights were generated by considering a complex sample. Associations between sedentary time and EQ-5D index score were analysed using multiple logistic regression. Probability values of  $<0.05$  were considered statistically significant.

## Results

Tables 1 and 2 present the findings. The total number of subjects aged  $\geq 45$  y was 3,543 with an average age of  $59.37 \pm 0.3$  (mean  $\pm$  standard deviation). Sitting for  $\geq 7.5$  h/d was significantly associated with 85% (Odds Ratio (OR), 0.15; 95% Confidence Interval (CI), 0.08-0.30) lower odds of the EQ-5D index score when adjusted for sex and age compared to those who were sitting for  $<7.5$  h/d. Sitting for  $\geq 7.5$  h/d was significantly associated with 23% (OR, 0.77; CI, 0.65-0.92) lower odds of the EQ-5D index score in women than men. Compared to subjects aged 75 and older (reference group), sitting for  $\geq 7.5$  h/d was significantly associated with 36% (OR, 0.64; CI, 0.48-0.86) and 39% (OR, 0.61; CI, 0.46-0.81) lower odds of EQ-5D index score in subjects aged 55-64 y and 65-74 y, respectively.

**Table 1.** Characteristics of subjects aged  $\geq 45$  (N=3,543).

Characteristics	Mean or % (SE)		
	Total	Male	Female
Age, mean	59.37 (0.30)	58.58 (0.3)	60.27 (0.4)
EQ-5D index, mean	0.92 (0.0)	0.95 (0.0)	0.90 (0.0)
Sedentary time, mean	7.09 (0.12)	7.32 (0.17)	6.84 (0.11)
<7.5 h/d	51.4 (1.4)	49.7 (1.9)	52.9 (1.5)
$\geq 7.5$ h/d	48.6 (1.4)	50.3 (1.9)	47.1 (1.5)

SE: Standard Error.

**Table 2.** Associations between sedentary time and EQ-5D index among subjects aged  $\geq 45$  y.

Characteristics	Adjusted for sex and age		
	Sedentary time $\geq 7.5$ h/d		
	Weighted OR	95% CI	p-value
EQ-5D index	0.15	0.08-0.30	0
Sex			
Female	0.77	0.65-0.92	0.003
Male	1	Reference	
Age			0.001
45-54	0.84	0.63-1.12	0.242
55-64	0.64	0.48-0.86	0.003
65-74	0.61	0.46-0.81	0.001
75+	1	Reference	

## Discussion

In this study's results, the EQ-5D index scores in subjects sitting for 7.5 or more hours/day were significantly (85%) lower than those sitting for less than 7.5 h/d after adjusting for sex and age in the middle-aged and older adults. These

findings are similar to those of a previous study in Australia, indicating that "individuals with the most extreme sedentary profiles may be vulnerable to additional losses of quality of life if they become more sedentary" in middle-aged and older adults with osteoarthritis [14]. Similarly, another previous study suggested that "restricted sedentary time has been demonstrated to positively influence health-related quality of life in adults without disabilities" in adults with visual impairments [3]. The present study findings support the results of previous studies that prolonged sedentary time is significantly associated with quality of life in adults with visual impairments or general adults or in middle-aged and older adults with osteoarthritis [3,5,14]. In contrast with previous studies indicating that men have lower quality of life than women, the present study show that the quality of life was lower in women than men when sitting for 7.5 or more h/d in older adults or among older men [9,10]. These results suggest that a comparative study is needed by selecting different subjects. With regard to age, the quality of life in subjects aged 55-74 y was lower than those aged  $\geq 75$  y who (reference group) were sitting for 7.5 or more hours/day. These results indicate that strategies for reducing sedentary time spent are needed in those who aged 55-74 y. Present study supported that reducing sedentary time spent may be useful strategies to improve health-related quality of life [8]. In conclusion, these findings imply that sedentary time should be reduced to improve the quality of life of middle-aged and older adults. In particular, appropriate interventions should be implemented to improve the quality of life and reduce the sedentary time in women aged 55-74 y.

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