Even With Low BMI, Sitting Linked to Fatty Liver Disease

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A large, cross-sectional Korean study has linked prolonged sitting and decreased physical activity with nonalcoholic fatty liver disease (NAFLD), even in physically active people of normal weight. The results, published online September 15 in the *Journal of Hepatology*, underscore mounting evidence of the importance of reducing sedentary time and increasing physical activity to prevent chronic illnesses and premature death.

"The findings of this study suggest that both increasing participation in physical activity and reducing sitting time are independently important for NAFLD risk," Seungho Ryu, MD, PhD, from the Department of Occupational and Environmental Medicine, Kangbuk Samsung Hospital, Sungkyunkwan University School of Medicine, Seoul, South Korea, and colleagues write.

Dr Ryu and fellow researchers analyzed almost 140,000 Koreans from the 180,000-strong Samsung Health Study cohort. Participants underwent a comprehensive annual or biennial examination at Kangbuk Samsung Hospital Total Healthcare Centers in Seoul and Suwon, South Korea, from March 2011 to December 2013. Physical activity levels and sitting times were assessed using the validated Korean version of the international Physical Activity Questionnaire Short Form. Cohort subjects with known liver disease or who had taken medications associated with NAFLD in the past year were excluded from the analysis.

Participants fell into three categories of sitting time: less than 5 hours a day, 5 to 9 hours a day, and 10 or more hours a day. Their activity levels were categorized as inactive, minimally active, and health-enhancing physically active. Fatty liver was determined by ultrasound.

Of the 139,056 participants, 46.7% were women and 52.4% were men. Participants had a mean age of 39.9 years (standard deviation [SD], 8.8 years), a mean body mass index (BMI) of 23.0 kg/m^2 (SD, 3.2 kg/m^2; range, 13.3 - 47.7 kg/m^2), and a mean sitting time of 7.6 hours (SD, 3.8 hours). The correlation between sitting time and physical activity level was −0.15 ($P < .001$).

Subjects who reported the longest sitting time of 10 or more hours a day were more likely to be younger and male and to have a higher BMI and total calorie intake, and they were less likely to have a history of cardiovascular disease, diabetes, or hypertension.

The researchers found 39,257 participants (28%) had NAFLD. A multivariable-adjusted model found both prolonged sitting time and decreased physical activity were independently associated with increasing NAFLD prevalence. The prevalence ratios for NAFLD comparing 5 to 9 hours a day and 10 or more hours a day sitting time with less than 5 hours a day were, respectively, 1.04 (95% confidence interval [CI], 1.02 - 1.07) and 1.09 (95% CI, 1.06 - 1.11), *P* for trend < .001.

Interestingly, these associations held even in normal-weight individuals, including those with BMIs lower than 23 kg/m^2. The prevalence ratios for NAFLD comparing the minimally active and the health-enhancing physically active groups with the inactive group were 0.94 (95% CI, 0.92 - 0.95) and 0.81 (0.79 - 0.83), respectively (*P* for trend < .001).

The adverse effect of sitting time on NAFLD was mediated by increased fat mass or decreased skeletal muscle mass. Notably, an adverse effect of prolonged sitting (10 or more hours a day) on NAFLD emerged even among the physically active group.

"More than half of the average person's waking day involves sedentary activities, and NAFLD is very common," Dr Ryo told *Medscape Medical News*. "From the viewpoint of public health, reducing sitting time could have a

substantial impact on liver metabolic health in the general population. So doctors need to educate patients not only about increasing physical activity but also about reducing time spent sitting."

In an accompanying editorial, commentator Michael I. Trenell, PhD, a professor of metabolism and lifestyle medicine at Newcastle University, Newcastle upon Tyne, United Kingdom, adds, "The data from Ryu and colleagues add to the strong and alarming evidence that sitting too much and moving too little has significant negative consequences for cardio-metabolic health."

He warns: "The message is clear, our chairs are slowly but surely killing us."

Although noting that physical activity and sedentary behavior clearly have independent effects on cardiometabolic health, Dr Trenell noted a problematic absence of evidence-based guidelines for sedentary behavior and physical activity in NAFLD. "There remains a significant lack of large scale studies exploring physical activity and exercise in NAFLD, with and without dietary change/pharmacotherapy, limiting the generation of guidelines specific for NAFLD," he writes.

General guidelines of 150 minutes of moderate exercise per week or 10,000 steps per day are good rules of thumb based on guidelines for the primary prevention of cardiovascular disease; however, "the current literature cannot inform us how much sitting is too much, we just know that it is better to sit less than to sit more," writes Dr Trenell.

The human body is designed to move, and hence it comes as no surprise that sedentary behavior and low muscle activity negatively affect physiology, he adds. With a dearth of approved drug therapies for NAFLD, lifestyle changes remain the cornerstone of clinical care.

"The challenge for us now is to 'stand up' and move for NAFLD, both physically and metaphorically," he writes, adding that unraveling the mechanisms at the core of the "what, why and how of sedentary behaviour and liver health is a promising area for future research."

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