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Dose-response association of accelerometry-measured physical activity and sedentary time with non-communicable diseases: a systematic review and meta-analysis

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Background: Non-communicable diseases (NCDs) are leading causes of global mortality, with physical inactivity being a key modifiable risk factor. While previous studies relied on self-reported activity measures, meta-analyses incorporating objective accelerometer measurements remain limited. This study investigated dose-response associations between accelerometer-measured movement behaviors and NCD outcomes.

Methods: This systematic review and meta-analysis analyzed 28 prospective studies (17 unique cohorts) that used accelerometers to measure physical activity (PA) and sedentary behavior (SB). We examined associations with mortality (all-cause, cardiovascular disease (CVD), and cancer) and incident disease (CVD, cancer, and diabetes). Dose-response relationships were assessed using restricted cubic splines.

Results: For SB, risks substantially increased beyond 7-8 hours/day, with each additional hour associated with increased mortality risks (all-cause: HR: 1.04, 95% CI: 1.02-1.06, CVD: HR: 1.09, 95% CI: 0.95-1.25). Light physical activity (LPA) demonstrated inverse association, with each additional hour reducing all-cause mortality (HR: 0.93, 95% CI: 0.89-0.97) and cancer mortality (HR: 0.86, 95% CI: 0.77-0.95). For CVD mortality, LPA showed optimal benefits at 2.2 hours/day (40% risk reduction). Moderate-to-vigorous physical activity (MVPA) showed the strongest protective associations for mortality and demonstrated early benefits for disease incidence, with significant risk reductions within the first hour/day for CVD and first 20 minutes/day for diabetes.

Conclusions: SB exceeding 7-8 hours/day increased mortality and disease risks, while even modest increases in LPA or MVPA conferred meaningful health benefits. These findings support public health recommendations emphasizing reduced SB and increased PA across all intensity levels.

Keywords

Non-communicable disease; Accelerometer; Physical activity; Sedentary time

Conflict of Interest & Ethical Approval

yes

Abstract submitters declaration

yes

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