

Upper arm elevation in blue-collar work with and without exclusion of arm elevation during sitting

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Extensive work with unsupported elevated arms is associated with increased risk for neck-shoulder pain (1,2). Unsupported arm elevation above 60° for more than 10% of the workday has been suggested to be an action limit for when to intervene (3). Tri-axial accelerometers may be used to measure upper arm elevation over the full workday. But accelerometers cannot identify whether the arms are supported, which will likely occur more often during sitting than standing/walking.

The aim of the present study was to compare upper arm elevation data calculated with and without exclusion of upper arm elevation during sitting, and to determine the extent to which exclusion led to changed associations between arm elevation and neck-shoulder pain.

In the NOMAD (4) and DPHACTO (5) studies, arm elevation was measured for several days using accelerometers. Periods of sitting were identified using an additional accelerometer on the thigh.

In NOMAD, arm elevation was compared for work and leisure in 13 occupational groups (n=197), including some known to contain work tasks requiring workers to have unsupported and elevated arms to a considerable extent.

In DPHACTO, the association between arm elevation at work and neck-shoulder pain during the following year (n=660) was determined among transportation workers, cleaners and manufacturing workers.

In both NOMAD and DPHACTO, analysis were performed with and without exclusion of upper arm elevation during sitting.

In NOMAD, arms were elevated above 60° (%timeAbove60°) for, on average, 10.4%time (SD 7.2) during leisure and 7.4%time (SD 5.5) during work. None of the occupational groups showed a higher %timeAbove60° during work than during leisure. When arm elevation during sitting were excluded, %timeAbove60° decreased to 2.3%time (SD 1.3) during leisure and 4.4%time (SD 4.4) during work. With arm elevation during sitting excluded, construction workers, garbage collectors, manufacturing workers and cleaners had a significantly larger %timeAbove60° during work than during leisure.

In DPHACTO, transportations workers had 10.2 %timeAbove60° (SD 6.5), cleaners 5.5%time (SD 2.4), and manufacturing workers 6.0%time (SD 3.7). This decreased to 4.2%time (SD 4.3), 4.0%time (SD 1.4) and 4.3%time (SD 3.1), respectively, when arm elevation during sitting periods were excluded. In contrast to previous studies (6–8), no significant association were found between %timeAbove60° and neck-shoulder pain. An explanation may be that exposure to elevated and unsupported arms, as estimated by excluding sitting periods, was too low to entail a risk.

These results show that a large proportion of time with elevated arms may derive from sitting. Data without arm elevation during sitting may better reflect unsupported arm elevation than unadjusted data. Thus leading to more trustworthy associations between upper arm postures and neck-shoulder pain.

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