Circadian misalignment is associated with a high cardiovascular risk among shift workers: is this an opportunity for prevention in occupational settings?

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Introduction: Atypical work schedules encompass more than 20% of the European workforce. The link between shift work and cardiovascular disease (CVD) has been extensively studied being lifestyle behaviours, sleep disruption and circadian misalignment the key mechanisms involved. Social Jetlag (SJL) has been proposed as a proxy for circadian misalignment in epidemiological studies, once it takes into account individual's chronotype and working schedules. Therefore we hypothesize that, among workers under fixed atypical work schedules, those with a greater SJL have a higher CVD risk.

Methods: A cross-sectional observational study was conducted among blue-collar workers of one retail company. Fixed working schedules were early morning, late evening, and night work. Sociodemographic, occupational, lifestyle and sleep data were collected through questionnaire. SJL was quantified by the difference for mid-sleep points on work- and free-days. Even though SJL is a continuous variable, 3 categories have been used (≤2h; 2-4h; ≥4h). Blood pressure (BP) and the total cholesterol (TC) were assessed. The CVD risk was estimated according to the relative risk SCORE chart. A relative risk≥3 was considered "high CVD risk". Descriptive statistics and bivariate analysis according to the CVD risk (high vs other) was performed. The relationship between SJL and high CVD risk was analysed through logistic binary regression using generalized linear models adjusted for age, sex, education, Body Mass Index, consumptions, sleep duration and quality plus work schedule and seniority.

Results: Of the 301 workers, 56.1% were male with a mean age of 33.0 ± 9.4years. Average SJL was 1:57 ± 1:38hours with the majority of workers experiencing ≤2h (59.4%) and 8% (n = 24) more than 4h. Less than a half had hypercholesterolemia (48.8%), overweight (37.9%)or hypertensive values (10.6%), however 50.5% were currently smokers. We found a significant trend for hypertension (p = 0.006) and smoking prevalence (p = 0.043) among ordinal SJL categories. A relative "high CVD risk" was found in 20.3% of the sample (n = 61). These workers were significantly older (p < 0.001), less educated (p = 0.003) and slept less hours on workdays (p = 0.021). In the multiple regression analysis, SJL was an independent risk factor for a "high CVD risk" (p = 0.029).The odds of having a "high CVD risk" increased almost thirty per cent per each additional hour of SJL (OR = 1.29; 95% CI:1.03-1.63), even after adjusting for sociodemographic, lifestyle, sleep and working features.

Conclusions: We found compelling evidence that a greater SJL was associated with a bigger chance of high CVD risk. From this innovative perspective, the focus is not just on the working schedule itself but also on the worker's chronotype. These findings suggest that interventions aimed to reduce Social Jetlag, especially in extreme chronotypes and working schedules, poses a great opportunity to minimize the cardiovascular health impact of shift work.