

## Does shift work affect blood pressure values and hypertension risk? a systematic review and meta-analysis

Gamboa Madeira S.<sup>1</sup>; Fernandes C.<sup>2</sup>; Paiva T.<sup>3</sup>; Santos Moreira C.<sup>4</sup>; Caldeira D.<sup>5</sup>

<sup>1</sup>Faculdade de Medicina, Universidade de Lisboa, Instituto de Saúde Ambiental (ISAMB), Lisbon, Portugal

<sup>2</sup>Universidade Nova de Lisboa, Escola Nacional de Saúde Pública (ENSP), Lisbon, Portugal

<sup>3</sup>CENC - Sleep Medicine Center, Lisbon, Portugal

<sup>4</sup>Faculty of Medicine University of Lisbon, Medicine Clinic I, Lisbon, Portugal

<sup>5</sup>Santa Maria University Hospital CHLN Lisbon Academic Medical Centre, Cardiology Department, Lisbon, Portugal

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**Introduction:** Modern societies function 24h/day which accounts for shift work (SW) encompassing already more than 20% of the European workforce. While the relationship between blood pressure (BP) and cardiovascular events is a continuous, hypertension (HTN) remains the major preventable cause of cardiovascular disease (CVD) in our continent. SW has been associated with sleep disturbances, circadian misalignment and unhealthy behaviours, possibly conducting to several chronic diseases. Therefore, we aimed to determine if shift workers have higher BP values and/or HTN risk.

**Methods:** This systematic review was conducted in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A literature search was performed on MEDLINE, EMBASE and Cochrane electronic databases. Included studies reported HTN diagnosis using current thresholds and/or BP values, in both shift workers and in a control group of day workers. SW was categorized in 4 subgroups, focused mostly on night work. Pooled mean difference and 95% Confidence Intervals (95%CI) were estimated for continuous outcomes, Systolic BP (SBP) and diastolic BP (DBP), and pooled Odds Ratio and 95%CI were determined for HTN risk. The Newcastle-Ottawa Quality Assessment Scale was used for quality evaluation of included studies.

**Results:** Forty-five independent studies were included engaging 117252 workers. Of these, 41 studies were included in the meta-analysis for SBP, 39 for DBP and 14 for HTN. Most studies provided cross-sectional data (n = 42), were developed in Asia (n = 21), in an industrial setting (n = 25) and included only men (n = 26). Most studies were rated as satisfactory quality (n = 23) with confounder adjustment being the weakest parameter.

We found a statically significant increase for both systolic and diastolic BP among permanent night workers, 2.52mmHg [0.75–4.29] and 1.77mmHg [0.39–3.15] respectively. Amongst rotational shift workers, both with and without night work, we found a significant increase only for SBP, namely 1.28 mmHg [0.18–2.39] and 0.65 mmHg [0.07–1.22]. For HTN risk, none of SW types showed significant differences.

**Conclusions:** Certain groups of shift workers may be at special risk for increased BP. This is the first review assessing the impact of SW specifically on BP values. Although the increases were generally modest, these may play an important role among already susceptible individuals exposed overtime. The effect of SW was more consistent for SBP, which has a major impact on CVD risk. Hence, occupational health services should embrace a holistic CVD preventive approach including atypical risk factors such as SW, with active monitoring across the lifespan of more vulnerable workers.