ABSTRACT

Introduction: Hypertension is a health problem with high prevalence in adults. Over the last years it has been observed an increase in hypertension prevalence also among adolescents. During the same period, sleep duration in adolescents has decreased, mainly due to increased time spent in extracurricular and social activities.

In order to identify modifiable risk factors for BP in adolescents, several studies have focused their research on the role of diet and physical activity. However, in the last years the role of other factors such as sleep duration, particularly its restrictions, has gained attention. Several studies have found short sleep duration as a risk factor for hypertension in childhood and adulthood. However, in adolescence, the association between sleep duration and BP still unclear, while some studies found an inverse association and others found no association.

Aims: Evaluate the association between sleep duration throughout adolescence and blood pressure at 13 and 17 years of age, using both cross-sectional and longitudinal approach.

Methods: Eligible participants were urban adolescents, members of the Epidemiological Health Investigation of Teenagers in Porto (EPITeen). The EpiTeen is a population-based cohort of adolescents born in 1990, which were recruited from private or public schools in Porto in the 2003/2004 school year (78% participation at the individual level). In the first follow-up evaluation of the cohort, held in 2007/2008, 79.4% of the participants could be re-evaluated.

At both evaluations, data were collected using self-administered questionnaires, comprising information on individual and family history of disease, and social, demographic and behavioural characteristics. Sleep duration was obtained by questionnaire and was estimated by usual bedtimes and wake-up times. A physical examination was also performed, and blood pressure (BP) was measured with a mercury sphygmomanometer using the auscultatory method, and hypertension was defined according to the American Academy of Pediatrics criteria.

To evaluate the cross-sectional association between sleep duration and BP at 13-year-old, odds ratio (OR) and respective 95% confidence intervals (95% CI), were computed,
using logistic regression models. Regression coefficients (β) and 95% CI were used to estimate the association between sleep at 13 years old and BP levels at 17 years old. All analyzes were stratified by gender and adjusted for potential confounders.

**Results:** The mean (SD) of sleep duration at 13 years of age was 9.0 (0.80) hours per day and decrease on average -0.77 (1.25) at 17 years of age. The decrease was higher in males than in females.

The prevalence of high blood pressure (SBP or DBP above the 90th percentile for sex, age and height) at baseline was 32.5% and decreased to 21.8% at follow-up. In both evaluations the high blood pressure (SBP or DBP above the 90th percentile for sex, age and height) prevalence was higher among males than in females, 35.3% vs. 30.1% at 13-year-old and 26.0% vs. 18.1% at 17-year-old.

In cross-sectional approach, at 13 years old, after adjustment, it was observed an increased odds of high blood pressure with long sleep duration. The odds (95% CI) of high blood pressure was 1.56 (1.07-2.27) among females sleeping more than 8.5h and lower than 9.5h per day and 1.83 (1.23-2.70) among those sleeping 9.5h or more, compared with those sleeping 8.5h or less. At 17 years old, it was observed a positive association between sleep duration and systolic blood pressure (SBP) significant only in females (β=0.70, 95% CI 0.02-1.37). Among males, no significant association was found between sleep duration and BP. In longitudinal approach, no significant association was found between sleep duration and BP levels in females. However, in males, an inverse association was found between sleep duration and SBP (β=-1.95, 95% CI -3.16 – -0.74).

**Conclusion:** In general, sleep duration and prevalence of high blood pressure in adolescents decreased from 13 to 17 years of age in both genders. In cross-sectional approach, sleep duration was positively associated with BP, only among females. In longitudinal approach, no significant association was found between sleep duration at 13-years-old and BP levels at 17-years-old in females, but an inverse association was found between sleep duration and SBP, in males. These results suggest that sleep duration could play a role in the etiology of hypertension in adolescents.