

# Sleep related breathing disorders and heart rate variability in young and healthy adults from the general population

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## Purpose

- The influence of sleep related breathing disorders on heart rate variability (HRV), a measure of the autonomic nervous function, is not well studied.
- We therefore assessed the relationship of the Apnea-Hypopnea Index (AHI) and the Oxygen Desaturation Index (ODI) with 24-hour HRV in a large population of young and healthy adults.

## Methods

- Individuals aged 25-41 years were included in a prospective cohort study in the Principality of Liechtenstein (GAPP-Study).
- Exclusion criteria: Known sleep apnea syndrome, BMI>35kg/m<sup>2</sup>, established cardiovascular disease or diabetes mellitus
- 24-hour electrocardiograms were performed with a validated device and post-processed with dedicated software.
- The standard deviation of all normal RR intervals (SDNN) was used as a marker of the HRV.
- AHI and ODI were obtained from nighttime pulsoxymetry with nasal airflow measurements.
- Sleep apnea was defined as either an AHI≥5 or an ODI≥5.
- Associations between SDNN, AHI and ODI were assessed with multivariable regression models including a broad set of potential confounders.

## Results

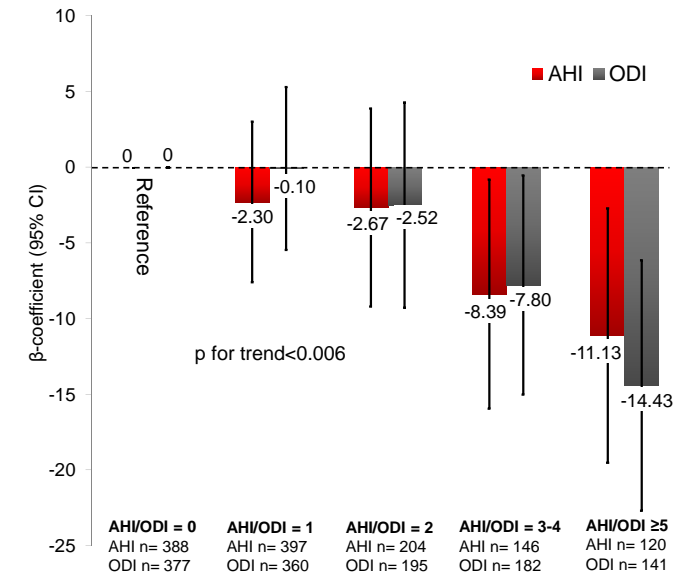
- We included 1255 individuals in the present analysis.
- Baseline characteristics are presented in the **Table**.
- AHI, ODI and SDNN were significantly higher among men compared to women.
- Linear negative relationships of SDNN with AHI and ODI (p for trend <0.006) were found (**Figure**).
- β-coefficients (95% confidence interval) for SDNN among those with sleep apnea were -7.48 (-14.8; -0.23), p=0.04 for AHI defined sleep apnea and -11.45 (-18.4; -4.5), p=0.001 for ODI defined sleep apnea.

**Table** Baseline characteristics stratified by sex

Total n = 1255	Males n = 592	Females n = 663	p-Value
Age (y)	35 (30; 39)	36 (31; 39)	0.76
BMI (kg/m <sup>2</sup> )	25.8 (23.6; 27.9)	22.5 (20.7; 25.3)	<0.0001
Curr. smoking (%)	153 (25.8)	120 (18.1)	<0.0001
SDNN (ms)	158 (132; 188)	146 (123; 169)	<0.0001
AHI	2 (1; 3)	1 (0; 1)	<0.0001
AHI≥5 (%)	100 (17.0)	20 (3.0)	<0.0001
ODI	2 (1; 4)	1 (0; 1)	<0.0001
ODI≥5 (%)	120 (20.3)	21 (3.2)	<0.0001

BMI = body mass index; SDNN = standard deviation of all normal RR intervals; AHI = Apnea-Hypopnea Index; ODI = Oxygen Desaturation Index

**Figure** Relationship of SDNN with sleep apnea related variables



AHI = Apnea-Hypopnea Index; ODI = Oxygen Desaturation Index; SDNN = standard deviation of all normal RR intervals. Multivariable model was adjusted for age, sex, BMI, smoking status, LDL, HbA1c, systolic blood pressure, physical activity and diet.

## Conclusion

- Sleep related breathing disorders are strongly associated with decreasing HRV among young and healthy adults.
- These findings suggest a tight link between sleep related breathing disorders and autonomic dysfunction.