



Witnessed breathing pauses during sleep: A study in middle-aged French males[☆]

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Summary The aim of the study was to evaluate the prevalence, the covariates and determinants of respiratory pauses during sleep in a sample of French middle-aged males.

Study subjects were 850 active males, aged 22–66 years; 88.4% of them answered the question on breathing pauses during sleep from a structured, validated sleep questionnaire.

Forty-one (= 5.4%) subjects reported breathing pauses at least once a week; these “positive responders” were older, heavier and had larger neck- and waist girths as compared to subjects with negative answers. Loud habitual snoring, various sleep disturbances, excessive daytime sleepiness, a doctor diagnosis of sleep apnoea, history of stroke and hypertension were significantly more frequent among subjects with breathing pauses during sleep.

The prevalence found in this survey was close to that reported from the UK (5.2%). However, by logistic regression, we identified novel determinants of breathing pauses i.e. habitual snoring, loud snoring, and excessive sleepiness, factors well known in clinical setting, but never previously reported in epidemiologic studies.

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Introduction

Sleep apnoeas are defined as cessation of airflow for at least 10 s.¹ The standard technique of measurement is polysomnography (PSG),² but this is an expensive, work-intensive method, not suited for widespread screening purposes.³ Surveys using laboratory PSG in epidemiological setting require important staff and financial means.^{4,5}

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Consequently, most field studies use questionnaires for ascertaining respiratory pauses during sleep—an indirect indicator of sleep apnoeas. Some studies on breathing stops during sleep reported significant ethnic differences,^{6,7} suggesting that results obtained in one group cannot be extrapolated to another population. The first objective of our study was thus to assess the prevalence of breathing pauses during sleep in a sample of middle-aged men from north-eastern France using a structured questionnaire⁸ as no information was available for this population. Many factors have been found to be associated with breathing stops during sleep, and most of these are inter-related; multivariate analysis is indicated to identify the factors independently associated with the outcome. However, this technique was applied in only three previous studies, of which only one in Europe^{7,9,10} and the factors identified were not the same. The second objective of the present study was therefore to apply logistic regression to our results in order to identify the determinants of the outcome under study in our population.

Methods

Subjects

Three samples of active male subjects from our region (north-eastern France) were studied: 299 employees of a local university, 201 subjects attending a Regional Centre of Preventive Medicine, and 350 employees of an urban transport company. The 850 volunteers represented 72.2% of the subjects approached.

The study protocol was approved by the Regional Ethics in Medical Research Committee.

Study design

The study was cross-sectional. A personal invitation letter was sent to each eligible subject, explaining the purpose and methods of the study, stressing the non-invasive procedure and the anonymous processing of the results. Written consent was obtained after this detailed explanation.

Protocol

The subjects self-completed with assistance of the spouse or bed partner a French version of the 1992⁴ 32-item Wisconsin Sleep Questionnaire. The previous validation by our group indicated very satisfactory internal consistency (alpha

statistic = 0.81) and reproducibility ($\kappa = 0.75$) of the question on stop breathing during sleep.⁸ The main outcome in the present study was the answer to question number 10: “According to what others have told you, how often do you seem to have momentary periods during sleep when you stop breathing or you breathe abnormally?” The possible answers were (1) never; (2) rarely—once a few times; (3) sometimes—a few nights per month; (4) often—at least once a week; (5) very often; (7) not sure. We accepted as “positive answers” in the analysis the responses 4 or 5 (= breathing pauses at least once a week); the negative answers were responses 1 or 2; subjects answering “sometimes” or “not sure” were excluded from the analysis. Height and weight, neck-, waist-, and hip-girths were measured using standard methods by one observer; from primary data we computed the Body Mass Index (BMI, kg/m²) and the waist-to-hip ratio (*W/H*), an index of central obesity.

Data analysis

Continuous variables were analysed by ANOVA, with Mann–Whitney test if inhomogeneous variances; proportions were assessed by the χ^2 test. Univariate associations were assessed by odds ratios (with 95% confidence intervals and Mantel–Haenszel adjustment if relevant); the Fisher exact test was used if expected values were less than 5. To identify the independent determinants of the studied outcome we applied a logistic regression (stepwise forwards and backwards) model. Statistical analysis used the Stata Statistical Software, release 5.0.¹¹

Results

Among the 850 subjects completing the questionnaire, 99 (= 11.6%) lived without a partner or did not answer the question about breathing pauses during sleep and were excluded. From the remaining 751, 41 (5.4%), reported breathing pauses at least once a week. We compared these subjects with “witnessed breathing stops” (WBS) to the 656 subjects who had “rarely or never” such symptoms. With the exception of height and of hip girth, *all demographic and anthropometric* variables indicated significant differences between the two groups (Table 1). WBS subjects were older, heavier, had larger neck- and waist girths and a larger *W/H* ratio. The difference for hip girths was non-significant. In respect to *life habits*, the WBS group included more current smokers (39% vs. 29.6%) and

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