Subjective sleep evaluation by laypersons

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Methods: Nocturnal polysomnography of 39 patients were sleep staged by an experienced technologist according to standard criteria. The EEG was systematically examined for the presence of non-neurogenic artefact. Experienced technologists manually reviewed each 5 s epoch of EEG and scored epochs contaminated by artefact. A computer-based automated algorithm also identified 5 s epochs of EEG contaminated by artefact. We compared the manual and automated artefact scores and assessed differences in accuracy, sensitivity, specificity, and Cohen's kappa of the two artefact identification methods. We also compared the absolute spectral power of the EEG from the raw recording (no artefact removal), and following manual and automated artefact removal.

Results: The proportion of 5 s epochs identified as contaminated by artefact were $5.3 \pm 3.3\%$ and $6.8 \pm 1.2\%$ with the manual and automated methods, respectively ($P < 0.05$). Compared to the gold-standard manual method, the accuracy of the automated algorithm was $93.3 \pm 3.9\%$, sensitivity $71.9 \pm 20.6\%$ and specificity $94.6 \pm 4.7\%$. Cohen's kappa showed moderate agreement between the two methods (0.47 ± 0.24). Power spectral analysis of the EEG during rapid-eye-movement sleep demonstrated a reduction of delta power (0.5–4.5 Hz) following the exclusion of artefactual epochs (raw: 103.3 ± 60.4 uV2; manual: 71.8 ± 34.8 uV2; automated: 68.6 ± 30.0 uV2; $P < 0.05$ for raw versus manual and raw versus automated; $P = 0.11$ for manual versus automated).

Conclusion: The high accuracy, sensitivity and specificity demonstrate the ability of the computer-based automated algorithm to successfully identify non-neurogenic artefact in sleep EEG. The statistical comparison of spectral power between the raw, manual, and automated artefact removal methods further support the importance and practical use of the automated algorithm to identify EEG artefact in sleep studies prior to quantitative analysis.

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Subjective sleep evaluation by laypersons

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Objectives: Although many questionnaires to measure sleep quality are available, there is no clear definition of what aspects of perceived sleep contribute to the overall subjective evaluation of sleep quality. Most sleep quality measures take a scientific and/or clinical perspective, targeting quantification of sleep related behaviour and/or clinically relevant sleep anomalies. However, it is not known to what extent such inventories help characterize lay concepts of sleep quality. The aim of this study is to identify how laymen describe their sleep quality intuitively, using a sentence stem completion methodology.

Method: A 30 item sentence stem completion questionnaire was constructed to capture lay concepts of sleep experience and sleep quality. This is a method in which sentence stems, e.g. 'What influences my sleep the most...', need to be completed by participants own concepts and in their own wording. Included topics were sleep habits, experience of sleep itself and after awakening, and elements that influence sleep.

For the initial analysis of the item 'my ideal sleep...' 64 participants were included, equally distributed over the variables sex (male/female), age (18–50/≥51 years old), education level (< Bachelor/≥Bachelor) and sleep quality using the Pittsburgh Sleep Quality Index (< 5/≥6).

Stem completions were examined with conventional content analysis in which unique descriptive codes (keywords) were assigned to cluster text with similar semantics.

Results: Preliminary results covering the initial coding of the single item 'my ideal sleep...' showed that six descriptive codes arose most frequently: Having a desired sleep duration (37.5%), not waking up during the night (34.4%), feeling refreshed after waking (14.1%), waking up on their own effort (12.5%), falling asleep fast (12.5%) and to be able to wake up at their desired time (12.5%).

Conclusion: The outcome shows that people's own description of their ideal sleep does not necessarily match the subscales mentioned in standard sleep questionnaires. Sleep questionnaires often inquire about exact values like sleep duration and leave the interpretation of this number to the scoring manual. However, the personal interpretation of sleep (e.g. whether the sleep duration matched the desired sleep duration) is very likely to be a key factor in a valid sleep quality construct. To gain a complete description of people's own subjective sleep perspective, analysis of all items still needs to be performed.

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Screening of obstructive sleep apnoea in awake subjects

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Background: Polysomnographic signals are usually recorded from patients exhibiting symptoms related to sleep disorders such as Obstructive Sleep Apnea (OSA). OSA has a relatively high prevalence, occurring in 5% of the adult population, but the majority of these cases remain undiagnosed. The usual procedure entails an overnight recording several hours long. Our goal is to present a fast screening method to identify OSA during the awake period, in order to simplify the diagnosis and reduce costs and waiting time for diagnosis and treatment.

Methods: This study presents a methodology to help with the screening of OSA using a 5-min oronasal airway pressure signal emanating from a polysomnographic recording during the awake period, eschewing the need for an overnight recording. The Hilbert-Huang Transform (a recent time-frequency analysis method) was used to extract intrinsic oscillatory modes from the signals. The frequency distribution of both the first mode and the second mode and their sum was shown to differ significantly between non OSA subjects and OSA patients.

Results: The clinical sample consisted of a total of 41 subjects, 20 non OSA individuals and 21 individuals with OSA. An index measure based on the distribution frequencies of the oscillatory modes yielded a sensitivity of 81.0% (for 95% specificity) for the detection of OSA. Two other index measures based on the relation between the area and the maximum of the 1st and 2nd halves of the frequency histogram both yielded a sensitivity of 76.2% (for 95% specificity). The data was mostly composed of severe OSA patients (12), however it also included 4 patients with mild OSA and four patients with moderate OSA. Efficiency of detection was not dependent on disease severity. No significant correlations were found between age, sex and the best correlated indexes.

Conclusions: Although further studies will be needed to test the reproducibility of these results, the proposed measures seem to provide a fast method to screen OSA patients, in awake period, thus reducing the costs and the waiting time for diagnosis. The physio-