Inter-observer and Intra-observer Reliability of a Sleep Questionnaire in Indian Population

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Abstract

Sleep disorders are a cause of significant morbidity and mortality. These are however still not widely detected/treated. Though various questionnaires have been designed for screening purposes, none are available in India.

Aim : To construct a questionnaire for detection of sleep disorders and determine its reliability and validity.

Material and Method : The questionnaire was prepared from the Case Western Health Research Questionnaire, translated into Hindi and then back into English, prior to its use. This was administered to 20 subjects at an interval of 2 weeks by the same observer to determine the intra-observer reliability.

For estimation of validity, 275 subjects were evaluated by a trained health worker and a specialist in sleep disorders. The specialist's opinion was taken as the `gold standard' to calculate sensitivity and specificity.

Results : The kappa statistic was 0.94 for intra-observer reliability. The sensitivity and specificity were calculated for the question, presence/absence of sleep disorders and for all the other questions also. The sensitivity ranged from 70-91% and specificity 80-100%.

Conclusion : This questionnaire is simple to use, reliable and has good sensitivity and specificity. It can be used in epidemiological community surveys.

INTRODUCTION

Sleep disorders (SD) are increasingly being recognized as risk factors or causes of mortality or morbidity and also disrupt quality of life. In addition, SDs are associated with health problems, work-related accidents, and road traffic accidents. Despite these consequences, SDs are not widely detected or treated. This could be due to lack of training in recognition of sleep disorders, or because of failure of patients and health providers to discuss sleep problems during a health care visit.

The gold standard for diagnosis of SD is an overnight polysomnogram (PSG). Which is an expensive tool with limited availability and it is not cost-effective for screening for SD. For screening purpose, various questionnaires have been designed and validated.

The need for a questionnaire is even more essential in developing countries, to detect and distinguish patients with a high risk from the general population and refer them for an overnight sleep study (PSG).

Prior to the use of a questionnaire it is critical to determine its reliability and validity. The present study is carried out to determine the test-retest and interobserver reliability, and validity of a sleep questionnaire in Indian population.

MATERIAL AND METHODS

A questionnaire was prepared from Case Western Health Reserve and the Sleep Disorders Questionnaires (SDQ). The questions were translated into Hindi and then back translated into English and was found to convey the concept, hence accepted. Minor alterations were made as appropriate to the language. This was administered one to one interview to all.

The questionnaire was administered to 20 subjects by the same observer at an interval of two weeks. To evaluate, intra-observer reliability it was ensured, that there was no change in health status.

Two hundred seventy five subjects (215 healthy controls and 60 patients with sleep disorders) were evaluated by
trained health worker and specialist in sleep disorders (Expert). For assessment of validity the experts’ opinion was taken as the gold standard and sensitivity and specificity calculated to determine the inter-observer reliability.

**Questionnaire**

There were total of 44 questions. It was divided into four sections.

Section 1 contained questions on demographic information, age, education race, weight, height, and neck circumference.

Section 2 enquired about presence/absence of sleep disorder and further defined its nature (excessive daytime sleepiness, decreased sleep, abnormal behavior in sleep).

Section 3 contained questions relating to major sleep disorders such as obstructive sleep apnoea, narcolepsy, insomnia, restless legs syndrome and parasomnias.

Section 4 contained questions about associated medical illness, current medication, and personal habits (smoking/alcohol use etc.), usual bedtime and wake time. Details of significant past history and family history were also asked for.

For a few questions, the answers were based on a ‘yes’ and ‘no’ response and others were rated on a 4-point scale [0-never, 1-rarely (<1/week), 2-sometimes (1-2/week), 3-frequently (3-4/week), 4-always (5-7/week)]. Those with answers > 2 were taken as significant symptoms.

**Statistical Analysis**

All data was entered into Excel spreadsheets.

The mean SD was calculated for all continuous variables. The test retest reliability was calculated using kappa statistic.

The sensitivity and specificity was used to calculate health workers diagnostic abilities with the expert as standard.

**RESULTS**

Twenty subjects were evaluated at an interval of 2 weeks to calculate test-retest reliability. The mean age was 36(17 years with 16 males and four females. These included 18 patients and two controls. The kappa value was 0.94.

**Validity**

A total of two hundred and seventy-five subjects were evaluated by the health worker and Expert. Sixty were patients with sleep disorders presenting to the Sleep Disorders Clinic, Department of Neurology, All India Institute of Medical Sciences, New Delhi, India, and 215 were healthy subjects, relatives of patients presenting to the Clinical Neurophysiology Lab, AIIMS, New Delhi.

The age of 215 subjects was (SD) 51+8 years, 145 were males and 70 females, 143 had education of high school and above.

The mean age of patients was 40.5 ± 6 with 40 males (66.6%) and 20 females (33.3%). For the response to the question “do you have a sleep disturbance?” the sensitivity was 91% and specificity 89% (Table1).

In addition, the sensitivity and specificity was also calculated for each question. Questions on excessive daytime sleepiness, snoring, insomnia abnormal behavior in sleep had sensitivity >70% and specificity ≥ 80%.

Whereas questions relating to sleep paralysis and cataplexy had a lower sensitivity (33 and 56%, respectively) but high specificity of 100 and 96% (Table 2).

**DISCUSSION**

There was good test and retest (k=0.94) and inter-observer reliability in the present study.

Various questionnaires are available for evaluating sleep disorders. The present one was tested in the local population to establish its reliability and consistency. As overnight PSG is an expensive tool, it is crucial to have reliable and tested questionnaires for screening purpose in order to prioritize patients for an overnight sleep study especially in developing countries.

The limitation of the present study being that data was not compared with a gold standard; however that was not the objective of this study, the aim was to compare the observation with that of an SD expert, but is underway to determine its validity.

This questionnaire is relatively simple easy to administer yet comprehensive. It has a reasonably good sensitivity and specificity to detect sleep disorders. This will be a useful tool to conduct epidemiological studies to determine the prevalence of sleep disorders in this country. However this is not a replacement for a clinical assessment by a trained sleep specialist plus polysomnography. The questionnaires neither be used as the only diagnostic tool nor to make treatment decisions.

**Acknowledgement**

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**REFERENCES**

Table 2: Agreement, sensitivity and specificity of the questions included in the questionnaire

<table>
<thead>
<tr>
<th>Questions</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>True Positive</th>
<th>True Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What is the disturbance of sleep?</td>
<td>81.82</td>
<td>83.33</td>
<td>108</td>
<td>100</td>
</tr>
<tr>
<td>2. Excessive sleepiness during day time.</td>
<td>54.62</td>
<td>86.11</td>
<td>88</td>
<td>31</td>
</tr>
<tr>
<td>3. Do you snore?</td>
<td>66.67</td>
<td>93.18</td>
<td>48</td>
<td>164</td>
</tr>
<tr>
<td>4. At the end of the pause do you have a long snore with motor movements?</td>
<td>83.33</td>
<td>90.00</td>
<td>40</td>
<td>180</td>
</tr>
<tr>
<td>5. Are you refreshed after the night-sleep?</td>
<td>62.96</td>
<td>83.33</td>
<td>68</td>
<td>120</td>
</tr>
<tr>
<td>6. Morning headaches / Neck pains on getting up?</td>
<td>42.86</td>
<td>91.84</td>
<td>24</td>
<td>180</td>
</tr>
<tr>
<td>7. Do you sweat during sleep?</td>
<td>55.56</td>
<td>98.15</td>
<td>20</td>
<td>212</td>
</tr>
</tbody>
</table>

Narcolepsy
1. Do you feel paralyzed, unable to move for short periods at the onset of sleep or just on awakening? 33.33 100.00 4 240
2. Do you get sudden weakness on laughing? 56 96.72 — 236
3. Do you get sudden muscular weakness when angry or in situations of strong emotion? 100 96.83 — 244
4. Do you find yourself in vivid dreamlike state when falling asleep or awakening even though you know you are awake? 98.11 50.00 20 208
5. Any history of falling asleep while driving? 66.67 96.49 16 220
6. Do you feel excessive sleep during daytime? 82.76 73.53 96 100

Insomnia
1. Do you have disturbed sleep due to sadness or depression? 60.00 91.38 12 212
2. Duration of the difficulty? Wk./monthly/yr. 66.67 91.23 16 —
3. Do you remain awake during your sleep time due to anxiety with sweating? 66.67 98.33 8 236
4. Are you taking any medication for sleeplessness? 66.67 95.00 8 228

Restless Leg Syndrome
1. Do you have an intense, irresistible urge to move the legs associated sensory complaints while falling asleep? 80.00 91.38 16 212
2. Areas of legs restless of legs, which is relieved on walking? 66.67 89.47 16 204
3. Do you have restless legs, which is relieved on walking? 66.67 91.23 16 208
4. Do you feel increased severity of symptom in the evening/night? 71.43 91.07 20 204
5. Do you take excess of rest during daytime? 100.00 79.03 4 196
6. Frequency of movements of legs/toes in sleep. 66.67 95.00 8 228

Parasomnias
1. Do you wake from sleep, screaming, confused and at times violent? 100.00 96.72 8 236
2. Do you have nightmares in sleep? 62.50 92.73 20 204
3. Do you have sleep walk? 100.00 98.39 4 244
4. Do you talk during sleep? 46.15 91.84 24 180
5. Do you have jerky movements in sleep? 100.00 98.33 8 236


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