

Sleep History Taking and Examination

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ABSTRACT

Sleep is the essence of productive and a healthy life. This chapter provides a comprehensive outlook for patient assessment including sleep history taking, detailed examination through general assessment as well as sleep diary. Special focus has been laid upon common and useful questionnaires which are not only inexpensive but also validated to be used in sleep apnea patients. Sleep history needs to be corroborated from the bed partner along with detailed examination from the patient. It is important to conduct the physical examination which constitutes various parameters like BMI, neck circumference, upper airway examination, etc. Efficient sleep history serves as a good predictor of sleep apnea and should not be missed before a patient undergoes polysomnography test. Usage of sleep diary has been largely underplayed in general practice, but if administered correctly it provides key information about patient's sleep hygiene and practices.

Keywords: Sleep apnea, Sleep diary, Sleep history taking, Sleep questionnaires

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WHAT IS THE IMPORTANCE OF SLEEP HISTORY TAKING?

Like in most other disease conditions a detailed sleep history taking is key in making the diagnosis.¹ As far as possible the patient should be prompted to be elicit history in his own words and later leading questions can be added.² The chief complaints can be grossly divided into nighttime complaints and daytime problems. The sleep history needs to be corroborated from the bed partners.³ Often the patient may not be aware of some of the problems with their sleep and the history is only available from the attendants. Detailed social history is very important to diagnose sleep disorders especially sleep disorders like insomnia and a number of social factors can be contributing to it and the key to addressing the disorder is to understand the social dynamics. It is also important to elicit a detailed medical history as other medical conditions can both a contributing to sleep problems and also a consequence of sleep disorders. A structured sleep history can follow the following pattern.

DETAILED SLEEP HISTORY QUESTIONNAIRE⁴

Sleep Timings

- How many hours do you generally sleep? (do not include the hours you spend awake on bed)
- How many hours does it take for you to feel well rested?
- Do you take daytime naps and for how long (weekdays and weekends)?

Normal Sleeping Habits

- What time do you go to bed on a normal day?
- What time do you get out of bed on a normal day?
- What is the time required for you to fall asleep once you go to bed?
- Do you get up in middle of the night? If yes, how many times and what is it that wakes you up?
- How quickly are you able to get back to sleep?

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(Address these questions separately for weekdays as well as weekends)

Sleep Quality

- Do you feel refreshed in the morning?
- How long does it take for you to feel refreshed after awakening?
- During the day, are you chronically fatigued, sleepy or tired?

Snoring

- Do you think, you snore in the night?
- Are your snores heard outside the bedroom?
- Do you think your snoring is worse while lying on back or on either side?
- Can you suggest, how many nights per weeks do you snore?
- Does it awaken the bed partner?
- Is this worse on the night you have stuffed nose or consume alcohol.

Apneic Event

- Has your bed partner noticed that you transiently stop breathing while asleep?
 - Have you ever witnessed that while you sleep there is a silent period with no snoring followed by a loud snort or a body jerk which awakens you?
 - Have you experienced episodes of choking or waking up in the night shortness of breath?
- This history is often elicited by the bed partners.

Abnormal Behavior During Sleep

- Do you have an urge to move your limbs in early part of night?
- Has anyone noticed any abnormal movements/behavior in the night?

Daytime Functioning

- Do you wake up with a headache or heaviness in head?
- Have you felt that you are mostly tired/fatigued during the day?
- Have you ever dozed off in meeting or while driving?
- What time do you get home from your work place?
- What time do you have your dinner?

Personal Habits

- Any history of alcohol consumption?
 - How many drinks? per day/per week/per month
 - What time of day is your last drink?
- Any history of tobacco consumption?
 - If yes, how many per day and for how many years?
 - If yes, what time of day is your last use?
- History of consumption of tea/coffee
 - How many time and what time of the day/night
 - Any consumption of hyper caffeinated drinks.

Medical History

A detailed medical history needs to be taken and specific details need to be asked regarding

- Heart diseases/skipped heart beats/ heart failure/ high blood pressure
- Thyroid problems/
- Diabetes
- Stroke/epilepsy/headaches
- Asthma/emphysema/sinusitis/nasal congestion/deviated nasal septum/enlarged tonsils allergies
- Depression/anxiety/bipolar disorder.

Drug History

- All medications need to be noted with special emphasis on
- Any sedatives/antidepressants/anxiolytics.

Any Established Comorbidities State/Condition

- Cardiovascular disease
- Cerebrovascular disease
- Metabolic syndrome
- Gastroesophageal reflux
- Obesity.

Occupational History

- Does your job involve a lot of stress?
- Is your work timing out of 9 AM–5 PM? (if not everyday/ but mostly)
- Does your job demand regular flight travel to the western countries?

Social History

- General quality of life should be evaluated
- General attitude of the patient and his family/colleagues.

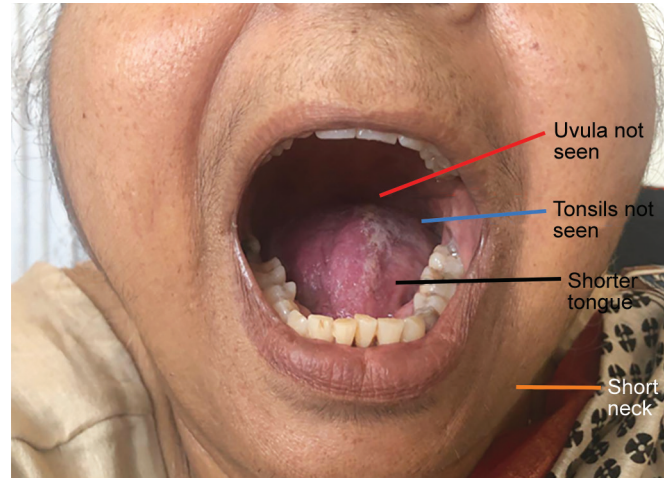


Fig. 1: Features on clinical examination of opened mouth

EXAMINATION

What can a physician examine in sleep apnea (Fig. 1)?

- Obesity⁵
- Body mass index (height/weight)⁵
- Neck circumference⁵
- Enlarged tonsils⁵
- Elongated soft palate
- Larger tongue⁵
- High-arched hard palate
- Enlarged uvula⁵
- Facial abnormalities (retrognathia or micrognathia)⁶
- Large degree of overjet
- Medical conditions: High blood pressure, metabolic disease, cardiovascular disease, stroke.⁶

Obesity is a major concern in obstructive sleep apnea (OSA). It is estimated that 45% obese individuals may have OSA. What simply happens in obesity is the fat deposition in the tissues surrounding the upper airways leading to smaller lumen and increased chances of collapsibility during sleep leading to sleep apnea.⁷

SLEEP DIARY

It is a record of a patient's sleep and wake patterns (Fig. 2).⁸ The diary is meant to capture sleep wake information over several weeks. Patients can be instructed to record the information by themselves or it can be recorded by a caregiver. It aims to measure the pattern and quality of sleep, and factors that may affect patient's sleep.

General Instruction for the Patient⁹

- Fill the diary every day for minimum two weeks
- Generally, fill the diary after one hour of getting up from the bed in the morning
- Be as specific as you can
- If you forget to fill the diary on a particular day, leave it blank for that day
- Make brief notes of anything unusual which has affected your sleep in the diary

SAMPLE SLEEP DIARY

NAME:

AGE:

GENDER: M/F

START DATE:

END DATE:

COMMENTS:

S.NO	PLEASE ANSWER THESE IN THE MORNING(ROUGHLY MENTION THE TIME	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
1.	What time did you get into the bed last night?							
2.	What time did you put everything off and tried to sleep							
3.	How long did it take you to fall asleep after that?							
4.	What did you do between getting into bed and falling asleep?							
5.	Did you wake up during the night? How often?How often were your awake total?							
6.	What time was your final awakening this morning?							
7.	What time did you get out of bed?							
8.	Did anything unusual happen yesterday that might have affected your sleep?(Illness, disturbances, emotional stress etc)							
9.	What is the total amount of time you slept last night in hours and minutes?(Best estimate)							
10.	Did you take any medication that might have affected your sleep? What? When?							

Fig. 2: Sleep diary

- In the diary, day is the time when you get up and night is the time when you got to sleep
- Do not get too bothered with respect to accurate timings, give the best estimate

SLEEP DISORDERED BREATHING-RELATED QUESTIONNAIRES

Polysomnography is considered to be the gold standard in confirming the diagnosis of Obstructive Sleep Apnea.¹⁰ Yet simple inexpensive, validated questionnaires are available that can be used as a screening tool to select patients for polysomnography (the test is expensive, cumbersome and is not reimbursed by insurance). Along with the questionnaire-based screening, the stratification is based on clinical presentation, chief complaints, physical examination and comorbidities.

Berlin Questionnaire

In 1996, at the conference on sleep in primary care, the Berlin questionnaire was developed. It is a validated tool which can be used to identify individuals who are at risk for OSA (Flowchart 1).¹¹

The questionnaire has a total of eleven questions grouped in 3 categories around snoring, feeling tired and blood pressure. Category 1 consists of a set of 5 questions regarding history of snoring and sleep apneas. Category 2 consists of 4 questions for daytime tiredness and a question around feeling drowsy while driving a motor vehicle. Category 3 consists of 2 questions with history of high blood pressure (>140/90 mm Hg) and BMI of >30 kg/m². Categories 1 and 2 are said to be positive having ≥ 2 positive responses in each category. Category 3 is positive with a self-report of high blood pressure and/or a BMI of >30 kg/m².

Patients are scored as "high risk", if scores are positive for 2 or >2 categories. If a patient scores positive on less than two categories than they are identified as "low risk".¹²

STOP-bang Questionnaires

Berlin questionnaire was validated for screening OSA. While, STOP-bang questionnaire was developed to screen patients undergoing preoperative evaluation for obstructive sleep apnea (Fig. 3).

The STOP questionnaire is composed of four questions:

1. **S** denotes — Do you snore loudly? (the snore is so loud that it can easily be heard through closed doors)
2. **T** denotes — Do you often feel Tired, fatigued, or sleepy during daytime?
3. **O** denotes — Has anyone Observed you stop breathing during your sleep?
4. **P** denotes — Do you have or are you being treated for high blood Pressure?

Few more questions were added to the STOP component. i.e. is your BMI (BMI >35 kg/m²), is your age (>50 years), is your neck circumference (NC >40 cm), and gender (male), which was later coined as STOP-Bang questionnaire.

The answers to all questions are quantitative, meaning yes and no. For "high risk" 2 or more than 2 questions in STOP and 3 or more than 3 questions in STOP Bang have to be answered as YES.

Whereas when a patient gives his/her answer as yes to less than 2 questions in STOP questionnaire and less than 3 questions in STOP-Bang questionnaire it is denoted as "low risk".¹¹

Epworth Sleepiness Scale

Epworth sleepiness scale (ESS) has seen some utility in clinical practice around the globe. Many researches are now available around ESS usage in screening daytime sleepiness not only in individuals suspected to have OSA but also among motor vehicle drivers, doctors, etc. It was first developed in 1990 by Dr Johns with slight modification that was incorporated in 1997. Dr Johns developed it to assess 'daytime sleepiness' in his own private practice of sleep medicine. He named the questionnaire after Epworth Hospital in Melbourne, where he also established the Epworth Sleep Centre in 1988 (Fig. 4).¹³

ESS is a validated questionnaire which can be easily administered by the patient himself. Subjects have to answer to 8 questions. The questions are rated as—how likely is it that they would doze/fall asleep in 8 specific situations or activities that an individual commonly encounters in everyday life.

The scores range 0–3 (0 = would never doze, 1 = slight chance of dozing, 2 = moderate chance of dozing, and 3 = high chance of dozing) and the cumulative score may vary from 0 to 24.

The total score can be inferred as follows:

- 0–10: Normal (no excessive daytime sleepiness)
- 11–12: Mild daytime sleepiness
- 13–15: Moderate daytime sleepiness
- 16–24: Severe daytime sleepiness

Practically speaking, ESS is easy to administer and inexpensive which makes it readily usable in routine clinical practice

ACTIGRAPHY

Actigraphy consists of using a portable wearable device which estimates sleep parameters and circadian rhythms. Information from actigraphy is obtained on the computer via a special software. Actigraph provides objective information about patient's sleeping habits in his own environment which can be estimated to be reasonably accurate (Fig. 5). Specifically, actigraphy is indicated in assisting the diagnosis of advanced sleep phase syndrome (ASPS), delayed sleep phase syndrome (DSPS) and shift work disorder.¹⁴

Additionally, it may be used in the evaluation of patients suspected of jet lag and non-24 hr sleep/wake syndrome (including that associated with blindness). Holistically, this tool can be used in evaluation of circadian rhythm sleep disorders, treatment progress and its outcomes and as a complimentary tool to home monitoring of sleep-disordered breathing. Actigraphy holds some limitation in evaluation of sleep-onset latency and daytime sleepiness.

It has also been listed by the International Classification of Sleep Disorder (ICSD-2) for confirming the diagnosis of sleep apnea, especially when the sleep patterns must be assessed over time and polysomnography test is not possible, or not available. It is also suggested by ICSD-2 that actigraphy may be used as an aid in assessment of habitual sleep time and circadian pattern in patients with behaviourally induced insufficient sleep syndrome and idiopathic hypersomnia with and without long sleep times.¹⁵

Flowchart 1: Berlin questionnaire

Patient information

Height:

Weight:

Age:

Gender: Male/Female

Please tick appropriate answer to each question

CATEGORY 1

1. Do you snore?

- ☐ a. Yes
- ☐ b. No
- ☐ c. Don't know

If you snore

2. Your snoring is?

- ☐ a. Slightly lower than breathing
- ☐ b. As loud as talking
- ☐ c. Louder than talking
- ☐ d. Can be heard in adjacent room

3. How often do you snore?

- ☐ a. Nearly everyday
- ☐ b. 3-4 times a week
- ☐ c. 1-2 times a week
- ☐ d. 1-2 times a month
- ☐ e. Never or nearly never

4. Has your snoring ever bothered other people?

- ☐ a. Yes
- ☐ b. No
- ☐ c. Don't know

5. Has anyone noticed that you quit breathing during your sleep?

- ☐ a. Nearly everyday
- ☐ b. 3-4 times a week
- ☐ c. 1-2 times a month
- ☐ d. Never or nearly never

CATEGORY 2

6. How often do you feel tired or fatigued after your sleep?

- ☐ a. Nearly everyday
- ☐ b. 3-4 times a week

contd...

contd...

- ☐ c. 1-2 times a week
- ☐ d. 1-2 times a month
- ☐ e. Never or nearly never

7. During your waking time, do you feel tired, fatigued or not up to par?

- ☐ a. Nearly everyday
- ☐ b. 3-4 times a week
- ☐ c. 1-2 times a week
- ☐ d. 1-2 times a month
- ☐ e. Never or nearly never

8. Have you ever nodded off or fallen asleep while driving a vehicle?

- ☐ a. Yes
- ☐ b. No

If yes:

9. How often does this occur?

- ☐ a. Nearly everyday
- ☐ b. 3-4 times a week
- ☐ c. 1-2 times a week
- ☐ d. 1-2 times a month
- ☐ e. Nearly or nearly never

CATEGORY 3

10. Do you have high blood pressure

- ☐ a. Yes
- ☐ b. No
- ☐ c. Don't know

11. BMI =

Categories 1 and 2 are considered positive if there are ≥ 2 positive responses to each category.

Category is considered positive with a self-report of high blood pressure and/or a BMI of $>30 \text{ kg/m}^2$.

Patients are scored as "high risk" of having OSA if scores are positive for two or more than two categories.

Patients are scored as "low risk" of having OSA if scores are positive for less than two categories.

Please answer the following question by checking YES or NO for each question

STOP	
Snoring (Do you snore loudly)	Yes No
Tiredness (Do you feel tired, fatigued, or sleepy during the daytime?)	Yes No
Observed Apnea (Has anyone observed that you stop breathing, or choke or gasp during your sleep?)	Yes No
High Blood Pressure (Do you have or are you being treated for high blood pressure?)	Yes No
BANG	
BMI (BMI more than 35kg/m ²)	Yes No
Age (Age over 50 years)	Yes No
Neck (Neck circumference greater than 40cm)	Yes No
Gender (Male gender)	Yes No

Fig. 3: STOP-bang questionnaires

NAME: _____ DATE: __/__/____

AGE: _____ GENDER: MALE/FEMALE

How likely are you to doze off or fall asleep in following situations, in contrast to feeling just tired?

This refers to your usual way of life in recent times

Even if you haven't done some of these things recently try to work out how they would have affected you.

Use the following scale to choose the most appropriate number for each situation

0= would never doze

1= slight chance of dozing

2=moderate chance of dozing

It is important that you answer each question as best you can

SITUATION	CHANCE OF DOZING (0-3)
Sitting and reading	
Watching TV	
Sitting, inactive in a public place (e.g. a theater or a meeting)	
As a passenger in a car for an hour without a break	
Lying down to rest in the afternoon when circumstances permit	
Sitting and talking to someone	
Sitting quietly after a lunch without alcohol	
In a car, while stopped for a few minutes in the traffic	

Fig. 4: Epworth sleepiness scale



Fig. 5: Patient wearing an Actigraph while asleep

Generally, actigraphs are available as watches which are worn on the non-dominant arm. Various parameters are reflected on the Actigraph which depend on the kind of device that is procured.

CASE DESCRIPTION

A 45-year-male visited the respiratory clinic on 10-03-2018 with complaints of heavy snoring in the night, difficulty in sleeping, disturbed sleep timings, sleeping late and waking late in the morning, sleep talking, sudden jerky movements while asleep and occasional sleepless nights. On examination, patient's BMI was 30.24

and had a shorter neck. He looked tired and sleepy. His ESS was 45. On subjective assessment, he mentioned his tea intake was 10 cups across the day and the last cup was around 8 in the night. Patient did not have any relevant medical history (Fig. 6 and Table 1).

The physician recommended the patient to maintain a sleep diary and wear an actigraph on his left wrist and revisit the physician after 2 weeks.

Patient's sleep diary

Name:	MR X
Age:	45
Gender:	Male
Start date	10-03-2018
End date:	17-03-2018

Patient's Treatment

- Weight reduction through diet and exercise
- Restricted active time in the bed (do not go to the bed until not sleepy)
- Bedroom should be used only to sleep (bedroom should not harbor television, mobile phone, laptops or any electronic device)
- Reduction in number of teas and consumption of last cup before by 6 pm in the evening
- Use bright light to get off the bed the next morning (open the curtains)
- Strict waking up timings
- Meditation and mindfulness.

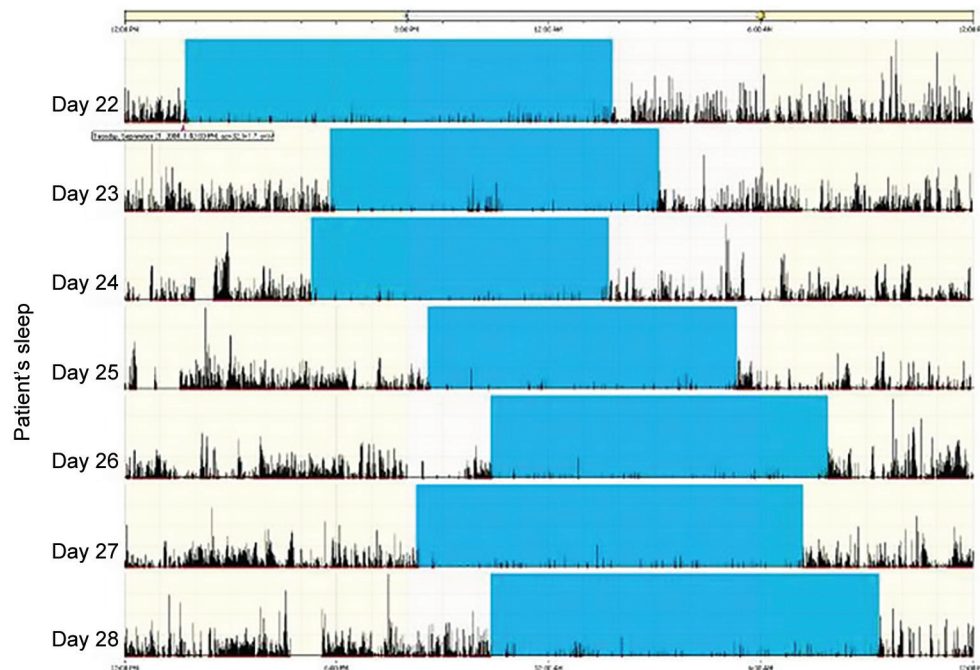


Fig. 6: Patient's actigraphy report

Table 1: Patient's subjective assessment

S. No	Please answer these in the morning (roughly mention the time)	Monday 12-03-2018	Tuesday 13-03-2018	Wednesday 14-03-2018	Thursday 15-03-2018	Friday 16-03-2018	Saturday 17-03-18	Sunday 18-03-18
1.	At what time did you go to bed last night?	11 pm	12 pm	12 pm	11 pm	12:00 am	1 am	12:30 am
2.	What time did you put everything off and tried to sleep	11:30 pm	12:30 am	1 am	11:30 pm	12:45 pm	02:00 am	1 am
3.	After how much time did you fall asleep?	1 hour	½ hour	2 hours	½ hour	45 min	1 hour	½ hour
4.	What did you do between getting into bed and falling asleep?	Used mobile phone	Used laptop	Used mobile phone and TV	Watched TV	Watched TV	Did office work on laptop	Watched TV
5.	Did you wake up in the middle of night? For how much time? For how long were you awake in total?	Yes, 2 times 3 hours	Yes, 2 times 4 hours	Yes, 2 times 2 hours	Yes, 3 times, 2 hours	Yes, 1 time, 1/2 hour	Yes, 1 hour	Yes, 3 hours
6.	What time was your final awakening this morning?	9 am	8 am	8 am	9 am	8 am	10 am	10 am
7.	What time did you get out of bed?	10 am	8:30 am	8:30 am	9:30 am	8:30 am	10:15am	10:15 am
8.	Did anything unusual happen yesterday that might have affected your sleep? (Illness, disturbances, emotional stress etc)	No	No	No	No	No	No	No
9.	What is the total amount of time you slept last night in hours and minutes? (best estimate)	6 hours 30 min	3 hours 30 min	3 hours	6 hours	6 hours	7 hours	5 hours 30 min
10.	Did you take any medication that might have affected your sleep? What? When?	No	No	No	No	No	No	No

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